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THE XB-52 AIRPLANE

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THE XB-52 AIRPLANE

Prepared by
Historical Office
Executive Secretariat
Air Materiel Command
Wright-Patterson Air Force Base
August 1949

By
Margaret C. Bagwell
Historian

Prepared under provisions of AF Regulation No. 210-3 as a part of the USAF Historical Program.

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GLOSSARY OF ABBREVIATIONS

Airc.	Aircraft
AMC	Air Materiel Command
Br.	Branch
C	Confidential
CF-B	Central Files, Area B
Col.	Colonel
Conf.	Conference
Contr.	Contract
Corresp.	Correspondence
Div.	Division
ECM	Electronic Countermeasures
Eng.	Engineering
Hist.	Historical
Ibid.	Ibidem
Indust.	Industrial
Info.	Information
Lab.	Laboratory
Ltr.	Letter
Min.	Minutes
p. (pp.)	page (s)
Plan.	Planning
Proc.	Procurement
Prop.	Propeller
RCM	Radar Countermeasures
R&D	Research and Development
Rpt(s).	Report (s)
S	Secret
U	Unclassified
USAF	United States Air Force
Vol.	Volume
WDGS	War Department General Staff
W-PAFB	Wright-Patterson Air Force Base

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PREFACE

The XB-52 project was initiated for the purpose of developing a high-altitude, high-speed, long-range, special mission aircraft in accordance with military characteristics established by the Army Air Forces in November 1945. This history covers the development of the Boeing high-wing, turbo-prop, very heavy bombardment airplane from the inception of the project in November 1945 through March 1949. The study also includes the initiation of the turbo-jet design known only as Boeing's Model 464-49.

Most of the material for this history was found in the files of the Air Materiel Command, Wright-Patterson Air Force Base, and at Headquarters, United States Air Force, Washington. Some of the information was obtained through interviews with key personnel of the Engineering Division, Air Materiel Command, and the Engineering Division, Research and Development, Washington. All sources cited in the footnotes were located at the Air Materiel Command.

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READING AIDS

Numbers in the text refer to documents in Appendix I.

Asterisks in the text refer to footnotes.

The conversion factor of 1.151553 was used to change nautical miles to statute miles and knots to miles per hour.

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THE XB-52 AIRPLANE

General Description and Purpose

Turbo-Prop Version

The new, heavy, turbo-prop bomber intended as a high-altitude, high-speed, long-range, special mission aircraft was designated the XB-52.[1] As of 16 October 1948, the XB-52's combination of aerodynamic refinement and turbo-propeller engines was the only known means of achieving both long-range and high-speed characteristics.

Approximately three years after initiation of the project, during which time many changes were made in the original requirements, the design studies by the Boeing Aircraft Company of Seattle, Washington, resulted in a bomber 130.8 feet in length, 45.8 feet in height, with a 185-foot wing span and a gross weight of 280,000 pounds.* It was powered by eight-bladed, dual rotation propellers in combination with four Wright Aeronautical Corporation XT-35-W-5 gas turbines.** With a 10,000-pound bomb load and 19,875 gallons of fuel, the airplane's estimated maximum speed at a 35,000-foot altitude was 446 knots (513 miles) per hour and the combat range was 6,000 nautical (6909 statute) miles.*

The crew of the XB-52 consisted of pilot and co-pilot seated in tandem and two bombardier-navigators positioned side-by-side in the aft lower portion of the forward pressurized cabin, and a tail

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* "USAF Airc. Characteristics Summary," 15 Oct. 1948 (S), Hist. Office.

** Eng. Div. Weekly Info. Rpt., 24 Sept. 1948, p. 23 (S), Hist. Office.

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gunner located in a separate pressurized compartment.[118] Access between the two crew areas was attainable only when the plane was not pressurized.[109] Provisions were made for two, twin .50 caliber, power operated turrets in the tail,[108] and for a maximum single bomb load of 25,000 pounds.* Other features were Loran, seat ejection for all crew members, bicycle type landing gear, thermal anti-icing, folding fin and rudder, blind landing equipment, and bombing radar.**

Turbo-Jet Version

The possibility of converting the XB-52 to a jet bomber in order to obtain improved performance to accomplish the strategic mission and to succeed the B-36 as a long-range plane was congidered early in 1948. In October, Boeing was authorized by a directive of the Board of Senior Officers of the United States Air Force to convert the turbo-prop XB-52 to a turbo-jet.***

The design, Model 464-49, proposed by Boeing in December 1948 specified a 330,000-pound bomber having the same over-all dimensions as the old XB-52 except that the wings were swept to 35° on the quarter cord and it was powered by eight Pratt-Whitney XJ-57-P-1 turbo-jet engines. With a 10,000-pound bomb load and 27,600 gallons of fuel, the plane's maximum speed at a 35,000-foot altitude was estimated as 530 knots (610 miles) per hour; the combat range was 6,000 nautical (6909 statute) miles. Provisions were made for one twin .50 caliber

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* Loran is code name for long-range navigational system designed primarily for offshore aircraft patrol in the Pacific.
** "USAF Airc. Characteristics Summary," 15 Oct. 1948.
*** Min. of the AMC Conf., 15 Feb. 1949, p. 4 (S), Hist. Office.

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tail turret and a maximum single bomb load of 25,000 pounds. The five-man crew was located in two pressurized areas; other features were thermal anti-icing, bombing radar, bicycle type landing gear, and Loran.*

Military Characteristics

As early as June 1945 the Army Air Forces discussed military characteristics for new [post-war] bombers.[17] By November of that year, definite characteristics for a high-speed, high-altitude, long-range, heavy land plane for destroying surface objectives by bombs had been formulated and approved. Requirements specified an airplane capable of carrying 10,000 pounds of bombs for 5,000 miles while operating at a speed of 300 miles per hour at a 35,000-foot altitude. The maximum bomb load of 80,000 pounds--either one Grand Slam bomb or the equivalent in various sizes of general purpose bombs--would constitute the offensive armament, while the defensive would consist of 20mm. cannons mounted in no-drag power mounts and located in sufficient numbers to provide all-around firing. Maximum armor protection consistent with weight and performance requirements was necessary for crew, fuel, engines, and other vital airplane components. The minimum crew was set at five, plus necessary fire control operators and a six-man relief crew.

The Requirements Division, Washington, desired that in designing the aircraft emphasis be placed on quick change features for engines

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* "USAF Airc. Characteristics Summary," 15 Dec. 1948 (S)

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and main structural components; simplicity of design; ease of maintenance under field conditions; features permitting accurate bomb dropping, navigation, and ease of maneuverability; ease in refueling, rebombing, and rearming; reduction in fire hazards; and the use of assisted take-off devices or increased engine ratings to reduce the take-off distance.[1]

It was learned, after several conferences between the Air Materiel Command and the Assistant Chief of Air Staff-3, that an airplane meeting the above characteristics would weigh from 400,000 to 500,000 pounds. Consequently, Boeing submitted a design, Model 462, for a six-engine version weighing 360,000 pounds, with a 3,110-mile radius and a cruising speed of 410 miles per hour.[17] This design proposal specified a bomber 161 feet long and 48 feet high, with a 221-foot wing span.[7] Further studies indicated that the Air Materiel Command was greatly concerned over the bomber's high gross weight which was attributed to the combination of range and speed requirements.[13] The Office of the Assistant Chief of Air Staff-3 considered the XB-52 "an unrealistic type" because of its monstrous size,* and Major General E. E. Partridge, Assistant Chief of Air Staff-3, stated that the XB-52 design failed to meet Army Air Forces requirements.[18] In view of these objections, the Air Forces decided to discuss new heavy bomber military characteristics and to review the XB-52 design.**

During the discussion of the medium bomber in connection with XB-52 problems, Boeing presented design study 464 which covered a four-engine

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* Eng. Div. Weekly Info. Rpt., 20 Sept. 1946, p. 1 (C).
** Ibid.

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version of the turbine powered airplane having a tactical operating radius of 2,500 miles, an average cruising speed of 400 miles per hour at 35,000 feet, and a gross weight of 230,000 pounds. Major General L. C. Craigie, Chief of the Engineering Division, Wright Field, strongly recommended a changeover from the six to the four-engine XB-52.[17]

Major General C. E. LeMay, Deputy Chief of Air Staff for Research and Development, stressed the need for a bomber having a minimum tactical operating radius of 5,000 miles, plus reserve fuel for an additional 2,000 miles, and a high cruising speed of 400 miles per hour to accomplish its special purpose mission from projected base areas. Boeing representatives thought a 300,000-pound plane with the desired characteristics was possible provided certain concessions outlined by General LeMay were incorporated.[18] In December 1946, the Assistant Chief of Air Staff-4 directed initiation of design studies for a four-engine general purpose bomber with a 12,000-mile range, a tactical cruising speed of 400 miles per hour, capable of carrying the atomic bomb,[19] and with a gross weight of 480,000 pounds.[84] Studies by Boeing resulted in two designs for a specialized, very heavy bomber with characteristics approximating those specified by the Assistant Chief of Air Staff-4. The two models differed only in bomb load capabilities; the special mission 464-16 carried only 10,000 pounds whereas the general purpose 464-17 maximum bomb-bay capacity was 90,000 pounds. The Army Air Forces evaluated the two proposals and finally decided to proceed with the development of the 464-17.[21] Military Characteristics of 23 November 1945 were superseded in June 1947 by new characteristics for a heavy bomber having the improved performance requirements.[52]

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The Special Bombardment Subcommittee of the United States Air Force Aircraft and Weapons Board* concluded that the 400-mile XB-52 was too slow to live in combat. The subcommittee promptly drew up and recommended approval of new military characteristics which called for a bomber with a range of 8,000 miles and a cruising speed of 550 miles per hour.[84] Representatives of the United States Air Force, the Air Materiel Command, the Strategic Air Command, and the Air University reviewed the requirements. All concurred in the new speed and range requirements, as well as the old altitude and bomb load, but proposed revision of the new characteristics to include radar-controlled tail armament only, a crew of five, and provisions for refueling in the air.[65] The gross weight was to remain unchanged at 480,000 pounds.[84]

Brigadier General F. H. Smith, Jr., Requirements Division, was of the opinion that the new strategic bomber should have a minimum cruising speed of 550 miles per hour in order to accomplish operations between American bases and the target. Air Materiel Command and RAND** studies indicated that the desired 8,000-mile range was attainable only at a speed not in excess of 500 miles per hour.[67] After considerable discussion, the United States Air Force, the Air Materiel Command, and RAND agreed to change the characteristics by reducing the speed requirement. The consensus at that time was that the airplane would weigh approximately 300,000 pounds,[74] but it was later discovered that the reduction in speed would not affect the previously established

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* The first meeting of the Air Force Aircraft and Weapons Board was held in the Pentagon in Washington 19-22 August 1947.

** RAND is the code name applied to the numerous new research and development project studies made by the Douglas Aircraft Company.

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480,000-pound gross weight.[84] The Aircraft and Weapons Board presented revised military characteristics which covered a special purpose bomber with a 500-mile per hour cruising speed and an 8,000-mile range to Generals Kenney, McNarney, and Vandenberg for approval.[74] Military Characteristics dated 23 June 1947 were superseded by those approved on 8 December 1947.[74a]

Several additional revisions were made in the characteristics during the period March 1948 through October 1948. The first was in March,[100] after Boeing submitted a proposal for a bomber having the desired range and speed but weighing only 285,000 to 300,000 pounds. Another revision, several months later, specified a 360,000-pound plane with an average cruising speed of 387 knots (446 miles) per hour, and a range of 10,104 nautical (11,635 statute) miles.[127] The latest data, as of 15 December 1948, defined a 280,000-pound plane [Model 464-35-07] capable of transporting 10,000 pounds of bombs and 19,875 gallons of fuel for 6,000 nautical (6909 statute) miles at a maximum speed of 446 knots (513 miles) per hour at a 35,000 foot altitude, and also made provisions for a five-man crew and for tail armament only.*

Contractual Information

Design Competition

A design directive written in the form of an abbreviated type specification, which allowed the greatest possible latitude in design, was circulated to the aircraft industry in February 1946[2] shortly after the Army Air Forces established new military characteristics

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* "USAF Airc. Characteristics Summary," 1 Jan. 1949 (S).

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for heavy bombardment aircraft.[1] Emphasis was placed on the importance of the high speed requirement and on the use of new high horsepower engines capable of attaining the desired performance. Reliability, ease of maintenance, reduction in fire hazards, good visibility, quick change features, and simplicity of design were other points for consideration in the initial design.[2]

Three manufacturers--the Boeing Aircraft Company, the Glenn L. Martin Company, and the Consolidated Vultee Aircraft Corporation--submitted cost quotations and preliminary design data for a bomber to meet the requirements set forth in the design directive.[5] After evaluation of the proposals both the Air Materiel Command and the Assistant Chief of Air Staff-3 concluded that Boeing's Model 462 powered by six T-35 gas turbines and six tractor propellers[3] was the design which promised the best performance per dollar cost to the Army Air Forces.* In view of the evaluation results plus the company's outstanding record in the building of heavy bombardment aircraft,[5] Boeing was declared winner of the design competition,[9] and the Air Materiel Command was authorized to award the company a Phase I development contract.[6]

Phase I

Boeing believed that its Model 462, a 360,000-pound, high-wing bomber with a high speed of 450 miles per hour and a tactical operating radius of 3,110 miles,[7] represented the optimum plane possible

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* Ltr., Col. W. D. Eckert, Chief, Proc. & Indust. Plan. Div., Wash., to Chief, Current Proc. Br., WDGS, Wash., 4 June 1947 (U), Contr. Files, W-PAFB, Corresp. Vol. 1, Contr. W33-038 ac-15065.

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in balanced design based on the design directive of 13 February 1946. Boeing suggested a co-ordinated research program of all related elements concurrent with the design studies in order to eliminate prolonged delays in subsequent phases of the heavy bomber development. A price of $1,785,176 quoted by Boeing covered preliminary engineering, construction and test of a wind tunnel model, design and construction of a full scale mock-up, gun fire protection, testing and studies of the power plant test rig, and miscellaneous research, studies, and tests incidental to the Phase I development of Model 462 (XB-52).[3]

Acting on authority contained in Addendum 20 to Technical Instructions 2167, the Air Materiel Command issued Authority for Purchase No. 391334[8] to cover the proposed procurement[37] from fiscal year 1946 funds. Permission for Boeing to begin work without further delay and to make expenditures up to $1,785,176 was granted by cost-plus-a-fixed-fee Letter Contract W33-038 ac-15065 approved 28 June 1946, as amended 20 June 1947.[11] The definitive contract, approved on 2 September 1947, called for delivery of all studies, test reports, drawings, data, and mock-up no later than 31 January 1948.[61]

The Deputy Chief of Staff, Materiel, and representatives of the Deputy Chief of Staff, Operations, and the Air Materiel Command discussed the future of the XB-52 at a conference on 14 February 1948. The conferees' decision, at that time, was to continue the XB-52 project with Boeing.[95] The contractor submitted a proposal, in January 1948, for Phase I design studies of its heavy bomber Model 464-35-0, and suggested a change order or supplemental agreement to the existing contract as a means of financing the work.[86] The

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Under Secretary of the Air Force, Mr. A. S. Barrows, authorized the Procurement Division of the Air Materiel Command to negotiate Purchase Request No. 63002 for continuation of Phase I studies of a plane incorporating the revised characteristics dated 8 December 1947.[105] Change Order No. 4, amounting to $563,786.50 chargeable to 1948 fiscal year funds and covering the above-mentioned research and development procurement,[115] was approved on 7 April 1948.

The Procurement Division reported in June 1948 that Phase I development was nearing completion and that a total of $2,348,962.50 had been invested.[123]

Phase II

Generals LeMay, Powers, and Maxwell and a Boeing representative attended an XB-52 conference held at Headquarters, Army Air Forces, in November 1946.[18] The conferees decided to continue Phase I of the XB-52 contract, and also to amend the contract to cover a design study of a larger bomber to accomplish a specialized long-range mission.[19] Boeing's new proposal, dated 14 February 1947, called for the expenditure of $2,892,587 for wind tunnel tests, models, and reports, mock-up, drawings, developmental investigations and tests of its Model 464-17,[28] a four-engine design which incorporated the desired 10,000-mile range, 400 mile per hour cruising speed, minimum crew, and atomic bomb load requirements.[21]

Brigadier General S. R. Brentnall, Chief of Engineering Operations at the Air Materiel Command, stated that Phase II, an extension of Phase I work as directed by the existing letter contract,[28] was necessary to assure continued and uninterrupted development of the

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XB-52 inasmuch as there was no other heavy bomber in the program capable of attaining the required range.[37] The Research and Engineering Division, Office of the Assistant Chief of Air Staff-4, became greatly concerned over the obligation of so much money for the XB-52, and did not understand the necessity for spending an additional $2,500,000 for the fabrication of the plane prior to completion of wind tunnel tests. Brigadier General D. L. Putt, Deputy Chief of the Engineering Division at Wright Field, explained that the original $5,000,000 set aside from the 1947 program for Phase II work had been cut down to $2,800,000, which,[44] with the exception of $400,000 spent for construction and proof testing of one set of horizontal tail surfaces,[37] was obligated for engineering and wind tunnel tests of the XB-52.[44] The explanation apparently satisfied the Assistant Chief of Air Staff-4 because consent was given to expend 1947 funds for the initial Phase II work.[37] The Air Materiel Command issued Authority for Purchase No. 445720 for $2,892,587, and entered into Supplemental Agreement No. 1 to Letter Contract W33-038 ac-15065 on 13 June 1947.[50]

Early in March 1947, Boeing proposed the design and construction of an experimental nacelle and suitable supporting structure on which to mount the complete power plant assembly in order to accumulate 200 hours of operational time on the T-35-1 installation. A price of $996,765 was quoted for the additional Phase II work.[32]

After discussions, in December 1947 and early January 1948, of the pros and cons regarding continuation of the XB-52 project, personnel of United States Air Force Headquarters and the Air Materiel Command decided in favor of Boeing because of the time savings

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involved and the availability of obligated funds for future use.[83] Action by the Air Materiel Command, in February 1948, included change ordering $2,892,587 from fiscal year 1947 funds for the work applicable to the new configuration (464-35-0) and contracting for continuation of Phase II in the approximate amount of $4,500,000 from fiscal year 1948 money.[97]

A proposal presented in April 1948 for a complete Phase II called for the design, development, construction, and testing of two experimental XB-52's (Model 464-35-0) in accordance with revised characteristics; the design and fabrication of an engine ground test rig, test nacelle, and power plant installation; a 20-hour test run of one engine on the test rig; the design and construction of ring cowls; and the design and purchase of exhaust systems. The estimated cost, including fixed fee, totalled $28,348,373 plus $1,070,000 for contractor selected spare parts. Boeing promised to exert every effort to have the two airplanes ready for flight within 33 months after the date of authorization to proceed.[119] The Procurement Division estimated an additional cost of $4,825,000 for engineering design changes and the installation of tactical equipment in the above-mentioned XB-52's.[123]

In order to maintain the planned continuity and to complete Phase II, the Air Materiel Command stated the necessity for obligating $2,892,587.33 from Fiscal Year 1947, $4,000,000 from Fiscal Year 1948, $15,000,000 from 1950 funds, and $6,200,000 from each of the fiscal years 1951 and 1952. The Chief of the Procurement Division advised the Under Secretary of the Air Force of the probable

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negotiation of a percentage type cost-plus-a-fixed-fee contract to cover the procurement because the research and development budget was insufficient to permit allocation of such a large sum to one project in one fiscal year without seriously curtailing or postponing other essential developments.[123] Purchase Requests No. 445720 and No. 63026[125] were the basis for the authority to proceed with negotiations which resulted in Supplemental Agreement No. 5 to Contract W33-038 ac-15065, approved 17 November 1948 in the amount of $6,893,526.30 to cover the first two-year period.[139]

Proposed Cancellation of the XB-52 Contract

The design of the XB-52 was continually undergoing changes during the early development period; therefore, it was a difficult matter to determine whether or not Boeing would produce a satisfactory bomber. The XB-52, as proposed, met requirements; however, the success of the airplane depended on the availability of a satisfactory T-35-3 engine. In May 1947, General LeMay stated that the XB-52 would be too large and cost so much that its production and procurement would be limited, possibly to 100 articles.[46]

Phase I was well under way when Phase II was requested.[19] The Phase II contract, in the amount of $2,800,000, had been signed, but some doubt still existed as to the plane which would result. Colonel G. F. Smith, Aircraft Projects Section at Wright Field, suggested three things that could be done; namely, stop work but leave funds obligated; cancel the contract and lose the money; or tear up the contract. Brigadier General A. R. Crawford, Chief of the Research and Engineering Division, Washington, decided that the contract should be

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continued pending completion of the wind tunnel studies. Upon Boeing's completion of the studies, the matter would be taken up with higher authority.[44] General LeMay favored consideration of bids from late starters--those companies who failed to bid on the original project but wanted to get into the picture now that a large part of the Air Forces production funds was slated for the XB-52. He advocated continuation of the contract until other proposals were investigated, and recommended that the XB-52 project be given six months' "grace" pending final decision concerning its future.[46]

The Aircraft Branch, Deputy Chief of Staff, Materiel, Washington, advised General Craigie that basically the current XB-52 conception represented little improvement over the B-36C. The size was excessive and it appeared doubtful that existing power plants would attain the ultimate planned range. All in all, it was quite possible that the XB-52 would be obsolete even before its completion. Boeing was already overloaded with other developmental and production contracts; therefore, the Aircraft Branch felt that a better bomber would be obtained if all the engineering brains in the industry were pooled in competition.[70] General Craigie suggested that the XB-52 be changed from its existing configuration to an 8,000-mile airplane with improved performance. Because of budget reasons, however, the designation of the plane would not be changed.[66] The Requirements Division, Deputy Chief of Staff, Operations, concurred in the recommendation to stop development of the design and asked that a new contract be awarded on open competition of all interested manufacturers instead of directly to Boeing.[68] The project would be at a "standstill" until a decision was made; therefore,

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the Chief of the Aircraft Branch, Engineering Division, Washington, recommended that the new characteristics, which specified a lighter weight airplane having better performance and embodying recent advances in aeronautical science, be immediately circularized to the industry for competitive proposals.[70]

Approximately $7,000,000 had been allotted from 1948 fiscal year funds for continuation of Phase II.[66] Colonel J. S. Holtoner, Chief of the Aircraft Branch in Washington, stated that cancellation of the project would result in the loss of the original $1,500,000 already spent on Phase I design study and the reversion to the Treasury of the $2,800,000 already obligated for Phase II. He pointed out, however, that the $2,800,000 could be used if Boeing won the new contract and the $4,800,000 allotted for Government-Furnished-Equipment could be used on the new concept of the XB-52. Inasmuch as the over-all program cost was estimated at $500,000,000, the amount lost by cancellation seemed infinitesimal.[70]

Personnel from the Offices of the Deputy Chief of Staff, Materiel, and Deputy Chief of Staff, Operations, and the Air Materiel Command attended an XB-52 conference held early in December 1947 at Headquarters, United States Air Force. Considerable discussion took place on whether or not the design of the new airplane should be on a competitive basis or awarded to Boeing on a change order to the existing contract. The Air Materiel Command favored the latter, not only because Boeing was the best qualified heavy bomber contractor, but also because a new competition would require a lot of valuable time and approximately $4,000,000 would be lost to the Air Force.

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The justification for competitive bidding, as brought out in the discussion, included the following facts: that a change order would cause adverse public opinion or political repercussions; that Boeing already had a majority of Air Force business; that if Boeing was the best contractor, it would have no trouble winning the competition; and that, in either case, little delay would occur in development because Boeing would be working on the preliminary design. The conferees' conclusion was to have the military characteristics approved, get the decision of the Secretary of the Air Force, Mr. W. S. Symington, and act accordingly.[74] Lieutenant General H. A. Craig, Deputy Chief of Staff, Materiel, advised the Air Materiel Command in December 1947 to cancel Contract W33-038 ac-15065 and to salvage all funds possible from the cancellation.[75]

Boeing protested vigorously when informed of the proposed cancellation and the new XB-52 competition. Such action, the company president stated, was unjustified from the Government's standpoint and would operate to its disadvantage; also, it was a serious injustice to the contractor. Attention was called to the original competition, acceptance of Boeing's first proposal after evaluation of bids from at least two other manufacturers, issuance of the definitive contract for Phase I, and the proposal to modify the XB-52 design to conform to new requirements. Boeing pointed out that the original proposal more closely approached the existing characteristics than those requirements specified in the Notice of Competition. Boeing failed to understand why, if the Air Force had been justified in awarding the original contract to it, the project should be thrown open to a

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new competition and the contract amended to cover only studies and data instead of the design of an airplane. The contractor stated that, so far as was known, it had satisfactorily performed work on the XB-52 project and that the major portion of other Air Force production contracts held by the company would be completed prior to the start of XB-52 production.[78]

Boeing noted disadvantages of a new competition. Even if Boeing won the second time, there would be an inevitable delay in development because of work stoppage during the period of competition; and if some other company received the contract, a duplication of work already performed would result and would cost the Government both time and money.[78]

Boeing stated that reopening competition was contrary to the Air Force policy of free competition and the award of business on the basis of merit. Such action also provided a "second chance" to the other competitors who would profit by the progress already made by Boeing. Participation in other projects had been passed up when Boeing entered the heavy bombardment competition in April 1946; also, some of the company's ablest talent had been tied up on the project for the preceding 18 months. Therefore, Boeing requested the Secretary of the Air Force to reconsider the proposed action.[78]

The Air Materiel Command again came to Boeing's defense, in late December 1947, by requesting reconsideration of the decision to cancel the XB-52 contract. Continuation of the project would enable Boeing to make preliminary design studies of the new configuration.[79] General Partridge opposed continuation of the contract, and gave several reasons for desiring a new competition. He stated that the

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contract had been awarded for an entirely different airplane from the one currently desired and that the design presented by Boeing was not satisfactory to the Air Force. He went on to say:

> The new heavy bomber will play a primary role in the implementation of our Future Plans. The failure of the bomber will jeopardize the stature of the Air Force and the security of the nation. Successful accomplishment of the mission of the aircraft demands that it incorporate the best performance consistent with the military characteristics required, that can be achieved by the Aircraft Industry. This can only be assured through competitive study by the entire industry. It is not felt that we can afford the terrific result in arbitrarily awarding the contract to one company whose designs may well be inferior to others.[81]

After consideration of the matter, the United States Air Force tentatively agreed to carry out development of the new bomber by changing the existing XB-52 contract. This decision in favor of Boeing resulted because funds already obligated could be used and because time savings were involved.[83] Shortly thereafter, Mr. Symington wrote Boeing that the above-mentioned directive was not firm and that the development of an airplane to meet new military characteristics would be held in abeyance pending final decision as to the XB-52's future.[93]

Late in February 1948, the Engineering Division, Air Materiel Command, reported that action was being taken to change order remaining 1946 fiscal year funds and add $592,000 to complete Phase I of the XB-52 development; change order $2,800,000 worth of work from 1947 fiscal year funds and make that amount applicable to the new configuration; and amend the contract to call for continuation of partial Phase II in the amount of $4,500,000 from fiscal year 1948 funds.[97]

The Secretary of the Air Force acknowledged the interest taken in the XB-52 project and strongly urged Boeing to exert every effort to

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accelerate development of that "most important aircraft."[104] On 17 November 1948, Boeing and the Air Force entered into Supplemental Agreement No. 5 to Contract W33-038 ac-15065 for two experimental XB-52 bombers, Model 464-35-0.[139]

Engineering Development

The original idea of the Army Air Forces was to secure a high-speed, high-altitude, long-range bomber for the destruction by bombs of surface objectives.[1] A design competition resulted in the award of a Phase I development contract for Boeing's Model 462,[6] which showed extensive possibilities for future growth[4] and promised the best performance per dollar cost to the Army Air Forces.*

In September 1946,** the Assistant Chief of Air Staff-3 reported that the six-engine design, Model 462, did not meet requirements.[18] Thereupon, Boeing conducted new studies and produced a four-engine design, Model 464; but that, too, fell short of heavy bomber requirements.[17] The plane remained a four-engine model, but many other design revisions were noted as development progressed.

The first major change in the 464 series was made in January 1947[21] after General LeMay had strongly recommended a 12,000-mile bomber if it was to be of any value to the Air Forces. General LeMay had also suggested that the airplane be designed to carry the atomic bomb instead of a disposable bomb load, and that its contemplated long-range operation be special and not sustained.[18] Boeing's Model 464-17, a general purpose bomber, most nearly met the foregoing requirements

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* Ltr., Col. W. D. Eckert, Chief, Proc. & Indust. Plan. Div., Wash., to Chief, Current Proc. Br., WDGS, Wash., 4 June 1947.

** Eng. Div. Weekly Info. Rpt., 20 Sept. 1946, p. 1.

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and was therefore selected for further development.[21]

In an attempt to achieve the desired range the XB-52 configuration was changed again in August 1947. Model 464-25 called for the incorporation of four main landing gears in the fuselage with nacelle outriggers, reduction of defensive armament to one tail and two forward .50 caliber turrets, and increase in the bomb load to 12,000 pounds, and a revision of the fuel cell construction.[59]

The plane resulting from the next important design change was known as Model 464-35. The model was designed to fulfill Air Force requirements of 6 January 1948[135] based on the latest military characteristics approved 8 December 1947. The range, without refueling, was indicated as 8,000 statute miles; the sustained cruising speed was indicated as 500 miles per hour at 35,000 feet over 4,000 miles of enemy territory;[94] and the bomb load was increased to 15,000 pounds.[96]

In May 1948, Boeing was asked to expand the performance study of the XB-52 powered by Westinghouse J-40 engines. This jet version incorporated a minimum of changes from the basic turbo-prop airplane and was equipped with external fuel tanks, at no increase in take-off weight of 280,000 pounds. Designation of this model was 464-40. The changeover to jet power plants and higher powers increased the speed but reduced the bomber's range. The range reduction caused little concern, however, because of the higher performance available in climb, ceiling, and in cruising and maximum speeds. Boeing considered the 464-40 jet model a desirable tactical plane because of the excellent range-speed combination.[135]

Further studies indicated that approximately 4,000 miles could

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be added to the range of the turbo-prop 464-35-0 and the jet 464-40 by refueling-in-air. Boeing suggested that refueling take place immediately following take-off and climb to a suitable altitude in order to eliminate difficulties which might be encountered in refueling at a distant base. 135

In October 1948, the Deputy Chief of Staff, Materiel, stated that large improvements in the heavy bomber class of aircraft would come with the radical developments which would require completely new airframes. Also, he said that unless supersonic propellers became a reality, future heavy bombers would be turbo-jets but that it was still too early to eliminate the turbo-prop airplanes. He called attention to the fact that "an urgent requirement exists for the B-52 in its present configuration to insure against the eventuality that foreign bases from which shorter range aircraft can operate are denied to us." 138

An entirely new configuration, similar in appearance to the Boeing XB-47 medium bomber,* was presented in Boeing's proposal for Model 464-49. The design differed from the old XB-52 in several respects, such as swept-back instead of straight wings, eight Pratt-Whitney XJ-57-P-1** turbo-jet instead of four Wright XT-35-W-5 turbo-prop power plants, additional fuel, one turret instead of two, and elimination of certain equipment. Despite the approximate 50,000-pound increase in weight, the contractor expected to produce a heavy bomber having improved performance over the old turbo-prop airplane.* On the

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* "USAF Airc. Characteristics Summary," 1 Jan. 1949.

** Westinghouse J-40 engines were originally scheduled for the jet XB-52 (Model 464-40); however, the new jet Model 464-49 will be powered by the XJ-57-P-1 engines being developed by Pratt-Whitney.

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26th of January 1949, after a meeting of the Board of Senior Officers,* Headquarters, United States Air Force, issued a directive authorizing Boeing to continue under the existing contract with the conversion and development of the jet XB-52. Pending the board's decision, Boeing had tentatively scheduled the mock-up inspection of the jet version for 1 May 1949.**

Major Problems

During the XB-52 development, the problem most frequently encountered was that of excessive size and weight,*** attributable to a combination of range and speed requirements.[13] As General Partridge stated, it was a recognized fact that increased speed was one of a bomber's most valuable assets because speed reduced a plane's vulnerability while penetrating heavily defended areas.[31] Some of the factors which affected the range and speed were the various configuration changes, defensive armament, landing gear, bomb load, and crew arrangement.[59] Statistical data presented at a Wright Field conference in October 1946 indicated that the airframe contributed 29 per cent of an airplane's maximum gross weight, while the remaining 71 per cent covered power plants, armament, equipment, bombs, and fuel as directed by military characteristics. Because little could be accomplished to limit equipment or to reduce requirements, it was concluded

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* "Final Rpt. of Board of Senior Officers," 17 Jan. 1949, p. 5 (S), Hist. Office.
** Min. of the AMC Conf., 1 Feb. 1949, p. 4 (S).
*** Engr. Div. Weekly Info. Rpts., 20 Sept. 1946, p. 1, and 25 Oct. 1946, p. 2 (C).

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that a bomber utilizing available power plants and capable of a 5,000-mile radius at an acceptable cruising speed would weigh approximately 500,000 pounds.[51]

The Wright Field Aircraft Laboratory stated that the weight should not exceed 480,000 pounds.[45] Many design changes occurred, as development progressed, with the resultant weight estimates ranging from 230,000 pounds to infinity.* The weight finally agreed on for the turbo-jet model was 280,000 pounds, whereas that of the turbo-jet model was 330,000 pounds.**

The Aircraft Projects Section of the Air Materiel Command pointed out that the success of the XB-52 depended upon immediate compromises involving major weight changes which would be acceptable for the airplane, the elimination of all equipment items not vital to the accomplishment of the primary mission, a complete and comprehensive weight reduction and weight control program, the availability of adequate funds for the development of the T-35-3 engine, and adequate propeller research and development.[51]

In an attempt to reduce the size and weight of the XB-52, Boeing and the Air Materiel Command carried on an extensive program. As armament was one of the main contributors to a plane's weight, the necessity of defensive armament*** on high-speed aircraft such as the XB-52 was questioned.[31] At the first meeting of the Aircraft and Weapons Board, General LeMay offered the following comments concerning

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* See section of this history entitled "Military Characteristics," pp. 3-7.
** "USAF Airc. Characteristics Summary," 1 Jan. 1949.
*** The British had deleted such armament from their heavy bombers.

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armament for the XB-52:

> I don't see how we can fight our way into a target that is well-defended without armament--now, all-around armament on the airplane. It may well be that we can do it for a little while with only tail gunnery, but certainly we won't be able to do it very long. So I think that we must have at least a provision in this airplane, for all-around armament, because we are going to have to fight with it and we are going to have to fight hard.[57]

Boeing declared that the retractable, all-around armament would have a negligible effect on the bomber's speed and range. Although every compromise was being made in favor of speed over defensive armament, the Air Forces hesitated to go all out for the "no defensive armament" theory until such time as the armament could be conclusively proved unnecessary.[31] Original Military Characteristics[1] specified all-around armament and a speed of 300 miles per hour for the XB-52; however, the Requirements Division of the Office, Assistant Chief of Air Staff-3 insisted that the speed be at least 400 miles per hour.[31] Consequently, revised characteristics called for a reduction to tail armament only[76] and an increase of 100 miles per hour in the speed.[52] The weight of the bomber was estimated as 480,000 pounds.[84]

The next step was to find a satisfactory turret arrangement and fire control system for the XB-52.[100] A 220° arc of fire was desired. Investigation indicated that the best armament arrangement, from a weight standpoint, was the two-deck, .50 caliber, twin gun turrets located vertically opposite each other in the tail and controlled by one gunner by means of AN/APG-3* radar and a double-ended periscopic

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* AN/APG-3 is a radar term applied to airborne gun-directing equipment similar to AN/APG-1.

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sight.[117] The idea of using a single tail turret for the XB-52 was dropped because development of that item for bomber installation was incomplete as of March 1948;[108] however, the jet Model 464-49 (XB-52) design had provision for the single turret.*

Landing gear was another factor contributing to the XB-52's excessive weight.[59] The landing gear finally decided on was the bicycle type consisting of four dual gears in tandem with one dual wheel outrigger on each wing.[102] Boeing proposed an auxiliary landing gear for the design Model 464-17 to support the extra weight, during take-off, of the two droppable wing fuel tanks located outboard of the outboard nacelles; however, the Aircraft Laboratory stated that idea was unsound.[23]

The possibility of dropping the outboard landing gear components, which weighed approximately 7,000 pounds, after take-off was considered. That idea was dropped because to land safely on the two inboard gears the gross weight of the airplane would have to be decreased by jettisoning the bomb load, bomb-bay fuel, external fuel tanks, and part of the remaining fuel.[47]

It was intended to lighten the bomber and thus use less fuel to operate after take-off, but no safe landing was possible unless the gross weight could be reduced by one-half the weight originally supported by the permanent landing gear before take-off. The Aircraft Laboratory pointed out that little would be gained by dropping part of the permanent landing gear.[23] However, in April 1948, Boeing was still thinking of dropping a portion of the main landing gear to

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* "USAF Airc. Characteristics Summary," 1 Jan. 1949.

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provide additional space for fuel and to save weight.[112]

In order to achieve the planned very long range and very high speed characteristics, the crew for the XB-52 had to be limited.[91] A crew of 12 to 15, dependent on the number of firing stations used, had been considered a minimum when the project was first initiated;[1] however, because of the added weight and the resultant decrease in speed and range, the characteristics set up by the Heavy Bombardment Committee in September 1947 specified a crew of five only.[65]

It was of the utmost importance that the duties and position of each crew member be justified.[98] Consequently, numerous studies were made to determine the best arrangement for the reduced crew.[91] Four nose mock-ups depicting various crew arrangements were inspected the latter part of January 1948; and of the three selected for further study,[98] the one which appeared most advantageous placed the pilot and co-pilot in tandem, the two bombardier-navigators side-by-side, aft end below the co-pilot, and the primary bombardier on the bottom center line of the aircraft.[91]

New military characteristics dated in March 1948 called for a five-man crew, with four of the members located in a forward pressurized compartment and the tail gunner located in a separate pressurized cabin in the tail.[109]

Probably the most important problem faced by Boeing and the Air Materiel Command was the selection of an engine-propeller combination suitable for installation in the XB-52.[14] As early as June 1945, when bomber military characteristics were first discussed, Headquarters, Army Air Forces, stressed the importance of jet or turbine

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engine development. Personnel from the Office of the Assistant Chief of Air Staff-3 pointed out that the utilization of such engines would result in an airplane of much greater gross weight than one designed around the projected R-4360 with turbo feed back.[17] At the time of the project's initiation the high speed requirement was emphasized, but adequate power plants were unavailable.[2]

Boeing's first proposal called for the use of the T-35-1 gas turbine and tractor propeller.[3] In October 1946, Boeing stated that extreme range was of primary importance, and high speed secondary in the propeller design.[16] When the Wright Aeronautical Corporation proposed the revised T-35-3 gas turbine having a lower fuel consumption and capable of increased power at high altitudes, the specially designed propeller became less important.[20]

A dual rotation propeller with a 23-foot diameter was extremely desirable. Because of the long delay which would result in the engine program, the Air Materiel Command and Boeing abandoned the dual rotation idea and decided to use a four-bladed, single rotation propeller and to space the engine nacelles to accommodate the 23-foot blades.[30] The Engineering Liaison Section, Air Materiel Command, called attention to the fact that even a small loss such as one caused by a poor spinner-shank junction could easily result in failure of an airplane to achieve its long-range objective. The Engineering Liaison Section requested the National Advisory Committee for Aeronautics to conduct research investigations in its 16-foot, high-speed, wind tunnel in connection with problems encountered in arriving at an optimum power plant design for the XB-52.[55]

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At the Air Materiel Command engine mock-up early in 1948, the effect on the nacelle length of the engine accessory gear box drive installation was discussed. It was found necessary to lengthen the nacelle by 26 inches. The penalty of this additional length on four nacelles was a decrease of 355 miles in range and 3 miles per hour in speed, and an increase in the bomber's gross weight.[111]

Boeing needed the XT-35-W-3 engine with dual rotation propeller mock-up by January 1950 in order to complete the XB-52 program.[113] It was finally decided to use the T-35-1 engine until the T-35-3 became available. The propeller was a Curtiss-Wright 19-foot, 8-bladed, dual rotation article.* The T-35-3 gas turbine scheduled for installation in the XB-52 (Model 464-35-0) was redesignated the XT-35-5.**

Even as early as November 1947 the Air Force contemplated the use of turbo-jet engines to supplement the turbo-prop in the XB-52.[69] The first jet version, Model 464-40, called for Westinghouse J-40 power plants.[135] The new turbo-jet Model 464-49 specified the use of Pratt-Whitney XJ-57 engines;*** however the J-40-6's were being procured as mock-up and flight engines for the first airplane inasmuch as the XJ-57 was only in the early development stage as of March 1949.****

Flying Wing versus Conventional Aircraft

RAND and Northrop Aircraft Company studies indicated that the Flying Wing design was more efficient than the conventional type

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* Ltr., Mr. D. A. Dickey, Chief, Prop. Lab., Eng. Div., W-PAFB, to Prop. Div., Curtiss-Wright Corp., Caldwell, N. J., 28 July 1948 (C), W-PAFB CF-B, MX-839.
** Eng. Div. Weekly Info. Rpt., 24 Sept. 1948, p. 23.
*** "USAF Airc. Characteristics Summary," 1 Jan. 1949.
**** R&D Info. Rpt., Mar. 1949, pp. 25-26 (S), Hist. Office.

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airplane. However, Boeing decided to "stick to" the conventional fuselage design for the XB-52.[38] Almost a year later, in January 1948, the Secretary of the Air Force suggested further engineering studies relative to the use of all-wing type aircraft to meet design requirements for heavy bomber operations.[88]

Boeing reported that the all-wing type appeared to have certain advantages where extremely large aircraft were concerned but that design refinements achieved on the conventional type resulted in an XB-52 with over-all dimensions small enough to preclude realization of any potential advantage for the all-wing heavy bomber configuration. Aeronautical engineers agreed that the all-wing type had certain disadvantages such as marginal stability and control,[88] pusher dual rotation propellers, and less utility in loading and accommodating future bombs and guided missiles.[92] Boeing encouraged research and development of the experimental all-wing aircraft to eliminate its inherent deficiencies, but recommended against the exclusive development of that type heavy bomber. The contractor asserted that the proposed XB-52 had none of the "Wing's" problems and, therefore, should be given first development priority so that the Air Force would not be left without an effective bomber.[88]

General Craig expressed concern over the future long-range heavy bomber.[89] In an attempt to resolve the question of building the bomber as a wing or a conventional airplane, the Air Materiel Command evaluated the relative merits of the claims presented by both Northrop and Boeing. Advantages and disadvantages of the two types were considered. In support of the conclusion to continue with the XB-52

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development, the Engineering Division of the Air Materiel Command stated:

> In consideration of the factors and in view of the strategic planning which will be predicated on this country's having heavy bombers meeting the current military characteristics at a given time, it is strongly recommended by the Air Materiel Command that the course of action be followed which will offer the best possibilities of solving the engineering problems associated with this development within the given time period. This planning definitely dictates a conventional design for the heavy bombardment airplane currently under discussion.[92]

After a comparison of the flying wing and XB-52 configurations, the Air Force decided to proceed with the XB-52 project, which seemed to be less of an over-all gamble than the wing and which offered better stability and control, easier maintenance, more flexibility in the center of gravity travel, more flexibility for radar and armament installations, and a gain in development time.[101]

Proposed Conversion to Strategic Reconnaissance Aircraft

The possible conversion of the XB-52 to a strategic reconnaissance aircraft was first discussed in early 1948. By April, tentative photographic and electronic requirements had been established. The Air Materiel Command requested a study of the XB-52 configuration to determine its suitability for accommodating a 10-man crew, 7 K-40 cameras and other photographic equipment, and electronic equipment; interchangeability of bombs and cameras was also desirable. The Air Materiel Command requested that if the XB-52 configuration proved unsatisfactory for this equipment installation the design be altered to accommodate the equipment and crew.[121]

Boeing's studies resulted in a proposal for the RB-52, which

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was basically the same as the XB-52. Provisions were made in the RB-52 for a crew of 13, 6 ECM stations, 12 flash bombs, and 2 turrets instead of 1.*

Mock-up Inspection

At the time of the initial proposal, Boeing fully expected a completed XB-52 mock-up to be available for the Government's inspection and acceptance on or before 31 August 1947.[3] Numerous configuration changes during the early design period delayed completion of the mock-up, and a three-month postponement of the inspection date became necessary.** By the middle of November the mock-up was approaching the final stage and Boeing hoped the inspection could be made early in December.*** Pending procurement of the necessary prop-spinner-cowl, the inspection was again put off until early January 1948.**** General Craig, on 11 December 1947, recommended cancellation of Contract W33-038 ac-15065 but stated the mock-up should be held, as scheduled, provided no additional expenses were incurred subsequent to that date.[75] Despite the fact that work on the old configuration would be discontinued in favor of a design based on military characteristics dated 8 December 1947, Colonel Smith, Engineering Division, Wright Field, believed the inspection of the old configuration would provide valuable information toward the evaluation of new bombers and future programs.[77]

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* "USAF Airc. Characteristics Summary," 14 Feb. 1949 (S).
** Eng. Div. Weekly Info. Rpt., 18 Apr. 1947, p. 3 (C).
*** Eng. Div. Weekly Info. Rpt., 14 Nov. 1947, p. 2 (C).
**** Eng. Div. Weekly Info. Rpt., 21 Nov. 1947, p. 2 (C).

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Boeing finally completed the mock-up of the high-altitude, 400,000-pound XB-52 powered by four XT-35-W-3 turbo-prop units and single rotation propellers. The mock-up featured a crew of nine located in a forward pressurized cabin, a bicycle type landing gear, and an armament system comprised of one twin .50 caliber, retractable, lower forward deck turret and one four-gun .50 caliber tail turret. The inspection was conducted at the contractor's plant during the week of 26 January 1948. 102

The wooden mock-up represented an airplane having performance requirements and characteristics as set forth in military characteristics of 23 November 1945, revised 8 October 1946; [1] but, for the most part, the engineering data were also applicable to the new requirements. The inspection covered one complete fuselage, empennage, and right half of the wing, plus four additional nose mock-ups depicting various crew arrangements. Considerable emphasis was placed on arrangement of the crew because the new configuration embodied increased speed, reduced crew, armament, range, and weight. 102 Representatives of the Strategic Air Command selected the three most desirable nose mock-ups for study to determine the best crew arrangement. Both the contractor and the government representatives considered* the inspection highly successful.

The purpose of the January inspection was to evaluate the five XB-52 mock-ups and thus provide Boeing with a guide for the design of a bomber meeting new requirements. Consequently, an entirely

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* Eng. Div. Weekly Info. Rpt., 6 Feb. 1948, pp. 1-2 (C).

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different mock-up of the new configuration was needed for inspection. Boeing estimated the availability date of the new mock-up as late July 1948.[114] As on previous occasions, however, the contractor was forced several times to defer the inspection. A strike in May 1948 caused delay in the mock-up construction. Certain work was then subcontracted, but work stoppage at those plants further upset inspection schedules.* In October 1948, work on the XB-52 mock-up was transferred to Boeing's Renton plant because production of the B-50B and B-50D airplanes demanded additional space at the Seattle facility. Because of that delay, the mock-up inspection was tentatively scheduled for 28 November 1948.[137]

Conclusion

Research for this study was completed in November 1948. Almost three years had elapsed since the design directive for a very heavy, high-speed, long-range, special mission, turbo-prop bomber was circulated to the aircraft industry.[2] The XB-52 project, during that period, was nothing more than a costly series of design studies of an airplane to meet the everchanging heavy bomber military characteristics.** It was not until the middle of November 1948 that Boeing was finally awarded a contract for the design, construction, and testing of two experimental planes, Model 464-35-0.[139]

Inasmuch as performance of the XB-52 did not come up to expectations, the Air Force was greatly concerned about the tremendous amount

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* Eng. Div. Weekly Info. Rpt., 1 Oct. 1948, p. 26 (S).
** See section of this history entitled "Military Characteristics," pp. 3-7.

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of money spent on the turbo-prop version. Early in 1948, Boeing recommended the installation of jet power plants in the XB-52.[135] Boeing's studies indicated that better performance was obtainable with the jet engines; however, it was still too early to eliminate the turbo-prop airplane studies.[138]

The Board of Senior Officers recommended in January 1949 that the XB-52 configuration be changed to the jet version, Model 464-49, without recirculation to the industry; also, that the T-35 turbo-prop engine development be terminated and the J-57 turbo-jet engine development be continued, as this engine was slated for installation in the new XB-52.* Consequently, Boeing was notified to discontinue all work on the turbo-prop bomber and to expend all effort on the turbo-jet version.**

The mock-up of the turbo-jet XB-52 was tentatively scheduled for 1 May 1949, and the estimated completion date was April 1954.**

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* "Final Report of Board of Senior Officers," 13 Jan. 1949, pp. 5-6.

** R&D Info. Rpt., Mar. 1949, pp. 25-26.

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8.5 Power Plant - Engine Installation

9.1 Propeller Laboratory Comments

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In addition, the Classified Central Files and the Bomber Section of the Engineering Division at USAF Headquarters in Washington furnished particularly good documents concerning policy matters and the viewpoints of higher echelons. An interview with Colonel Sessums, in which the important phases of the project were discussed, proved most valuable during the research period.

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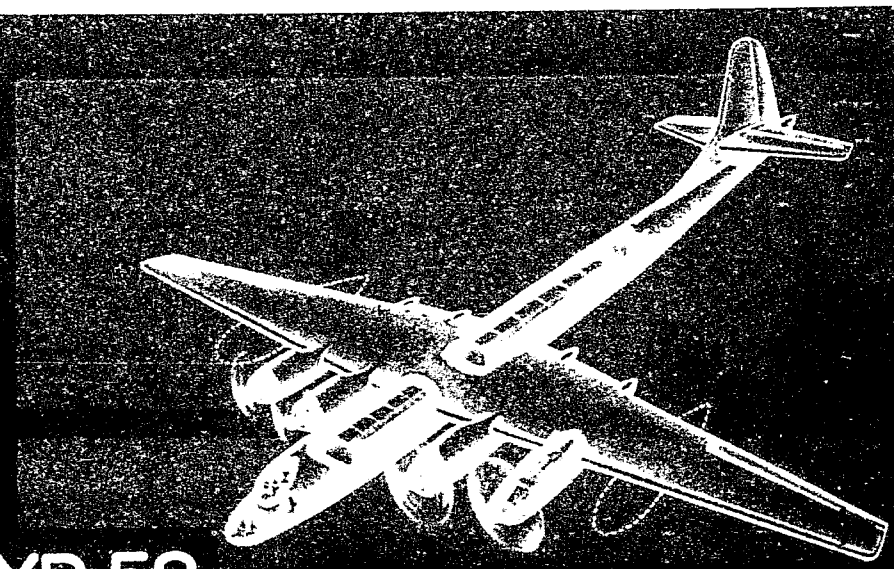


XB-52

BOEING

DESCRIPTION

The XB-52 is designed as a general purpose heavy bomber. It is designed for T-35-3 engines with minimum number of changes to permit initial flight with T-35-1 engines. There is flak protection for engines and quick change engine nacelles. Cabin is pressurized and ventilated. Fuselage is 10' 10" diameter at the nose and increases to 11' 6" at the rear of the bomb bay. The bomb bay doors open outward. A tail turret is radar operated. Landing gear consists of (4) main and (1) nose gear. The nose wheel is steerable. An E-4 automatic pilot is provided. All crew members are located in the nose compartment. Vertical cameras are located in unpressurized section of fuselage. Thermal anti-icing is provided for wings and for pilot's and co-pilots windows. Windshield wipers are installed. Radar and optical bombsight equipment is provided. Radio and radar equipment includes; AN/ARC-3 command set, AN/ARC-8 liaison set, AN/ARN-6 radio compass, RC-193A marker beacon, RC-103-A instrument approach and AN/ARN-5, APA-59 bombing, AN/APN-9 position finding, SCR-695 IFF and RCW. Radio and radar antennae are internal.

CONTRACTUAL

MOCK-UP DATE: 30 NOV. 1947

CONTRACT DATE: 28 JUNE 1946

PROJECT NO: MX-939

CONTRACT NO. W-33-038-AC-15065

NO. ON CONTRACT: NONE (PHASE I PLUS PARTIAL PHASE II)

ESTIMATED FLIGHT DATE: 1 JAN. 1950

ALLOTED TO DATE: 9,568,200.

1 JUNE 1947

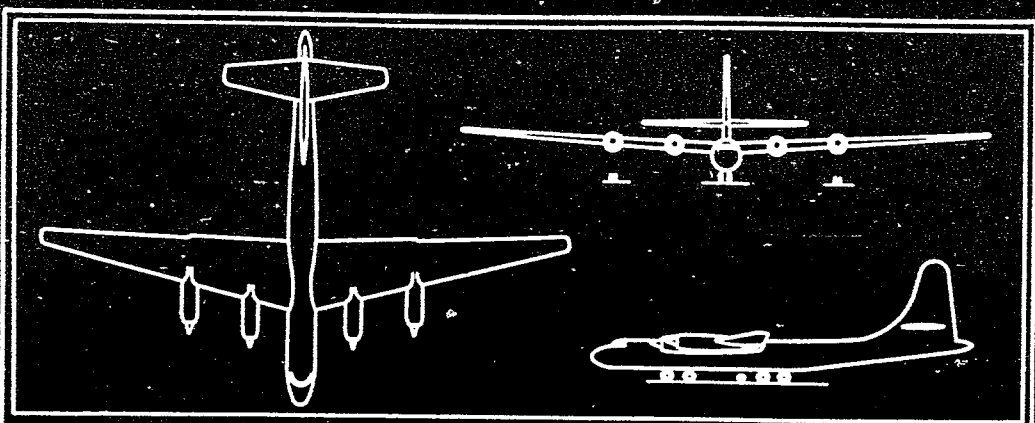
CONFIDENTIAL

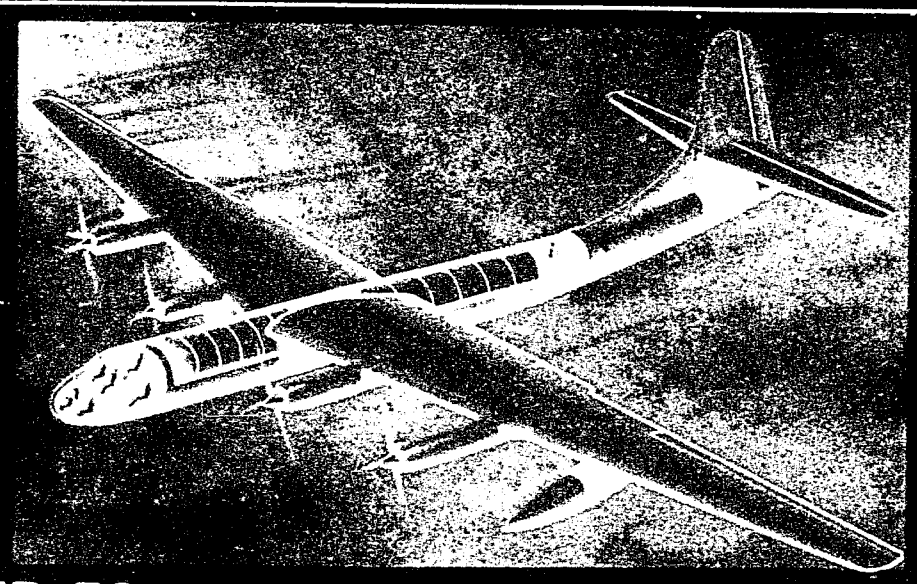
Four-engine Turbo-Prop XB-52 (Design Model 464-17)

0051

3

CONFIDENTIAL





XB-52

BOEING

DESCRIPTION

The XB-52 is designed as a heavy bomber. It is designed for XT-35-W-3 engines with minimum number of changes to permit initial flight with T-35-1 engines. Quick change engine nacelles. Cabin is pressurized and ventilated. Fuselage is 10' 10" diameter at the nose and increase to 11' 6" at the rear of bomb bay. The bomb bay doors open outward. A tail turret is radar operated. Landing gear consists of (4) main and (2) outriggers. The nose wheel is steerable. An E-4 automatic pilot is provided. All crew members are located in the nose compartment. Vertical cameras are located in unpressurized section of fuselage. Thermal anti-icing is provided for wings and for pilot's and co-pilots windows. Radar and optical bombsight equipment is provided. Radio and radar equipment includes: AN/ARC-3 command set, AN/ARC-8 liaison set, AN/ARN-6 radio compass, RC-193A marker beacon, RC-103-A instrument approach and AN/ARN-5, AN/APQ-31 bombing, AN/APN-9 position finding, SCR-695 IFF and RCM. Radio and radar antennae are internal.

CONTRACTUAL

MOCK-UP DATE: 30 NOV. 1947

CONTRACT DATE: 28 JUNE 1946

PROJECT NO: MX-838

CONTRACT NO. W-33-038-AC-15065

NO. ON CONTRACT: NONE (PHASE I PLUS PARTIAL PHASE II)

ESTIMATED FLIGHT DATE: 1 JAN. 1950

ALLOTED TO DATE: 8,568,200.

15 NOVEMBER 1947

CONFIDENTIAL

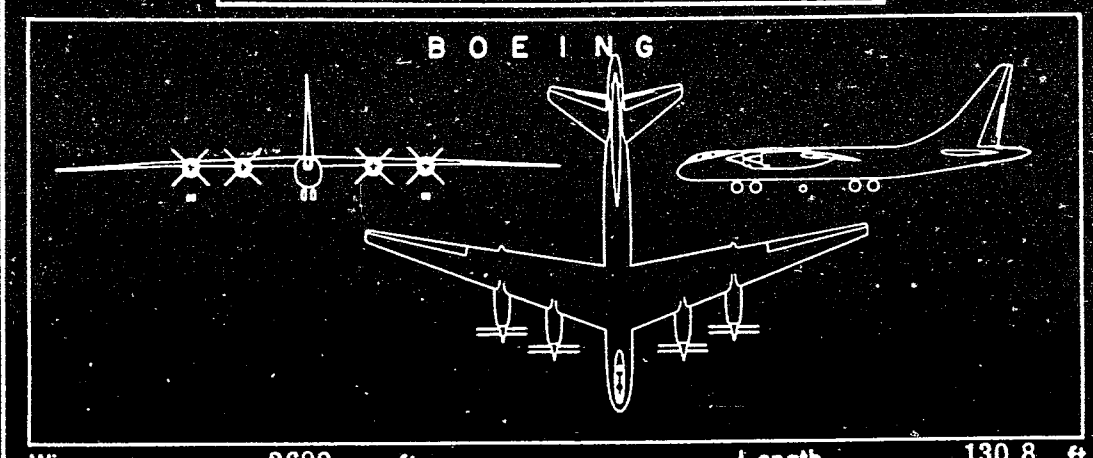
Four-engine Turbo-Prop XB-52 (Design Model 464-25)

0052

SECRET

Characteristics Summary

BOMBER XB-52



Wing area..... 2600 sq ft
Span..... 185.0 ft
Length..... 130.8 ft
Height..... 45.8 ft

AVAILABILITY

Number available

ACTIVE	RESERVE	TOTAL

PROCUREMENT

Number to be delivered during fiscal year

STATUS

EXPERIMENTAL

1. Two experimental models on contract
2. First experimental flight: June 1951 (estimated)

ENGINES

(4) Turbo-Prop
XT 35-W-5
Dual Rotation
Wright
S.L.Static ESHP-RPM

T.O: 9540-7200
Max: 9180-7080
Nor: 9180-7080

FEATURES

Crew: 5
Cabin Pressurization
Thermal Anti-icing
Bombing Radar
Loran
Blind Landing Equip.
Ejection Seat
Bicycle Landing Gear

ARMAMENT

Turrets: 2
Guns: (4) .50 cal
Ammunition: 1600 rds
Max Bomb Load:
(1) 25,000 lb
Max Bomb Size:
25,000 lb

15 DEC. 1948 SECRET XB-52

Four-engine Turbo-Prop XB-52
(Design Model 464-35)

T-6290

4

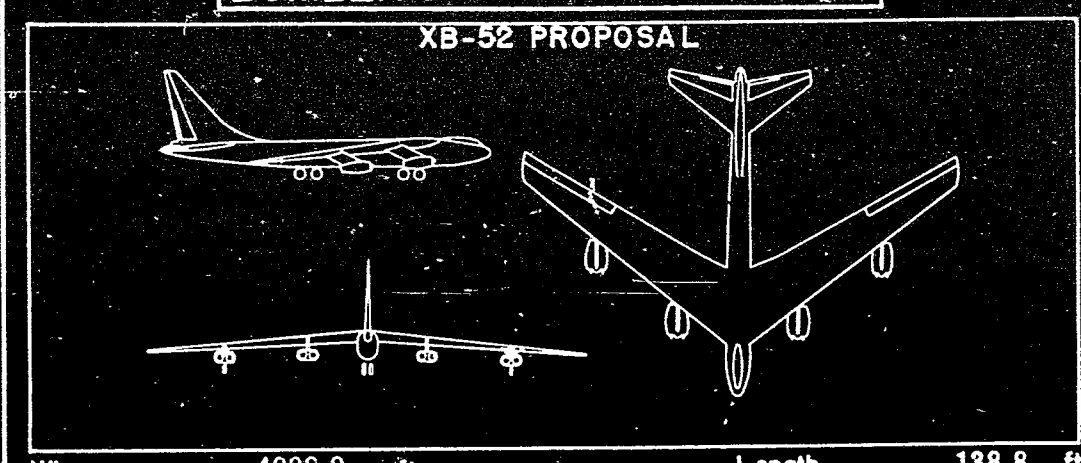
2

SECRET

Characteristics Summary

BOMBER · BOEING MODEL 464-49

XB-52 PROPOSAL



Wing area.....4000.0 sq ft
Span..... 185.0 ft
Length..... 138.8 ft
Height..... 45.0 ft

AVAILABILITY			PROCUREMENT				
Number available			Number to be delivered during fiscal year				
ACTIVE	RESERVE	TOTAL					

STATUS

PROPOSAL

1. This airplane represents a proposal for XB-52 with turbo-jet engines.

ENGINES

(8) Turbo-Jet
XJ-57-P-1
Pratt-Whitney

S.L.Static	LB-RPM
T.O:	9250- -
Max:	9250- -
Nor:	—— -

FEATURES

Crew: 5
Cabin Pressurization
7.45 psi press. diff.
Thermal Anti-icing
Bombing Radar
Loran
Bicycle Landing Gear

ARMAMENT

Turrets: 1
Guns: (2) .50 cal
Ammunition: 1200 rds
Max Bomb Load:
(1) 25,000 lb
Max Bomb Size:
25,000 lb

15 DEC. 1948 SECRET BOEING 464-49 XB-52 PROPOSAL

Eight-engine Turbo-Jet XB-52
(Design Model 464-49)

6

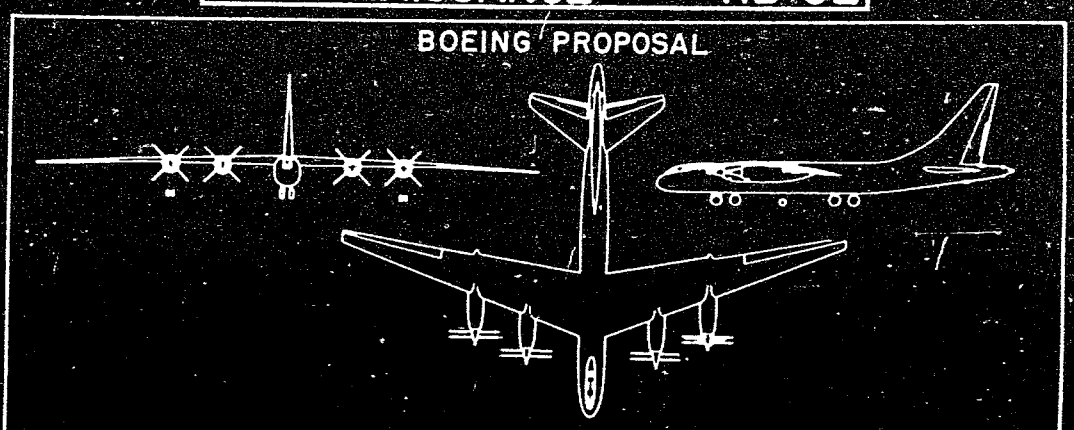
0054

SECRET

Characteristics Summary

RECONNAISSANCE RB-52

BOEING PROPOSAL



Wing area.....	2600 sq ft	Length.....	130.8 ft
Span.....	185 ft	Height.....	45.8 ft

AVAILABILITY			PROCUREMENT				
Number available			Number to be delivered during fiscal year				
ACTIVE	RESERVE	TOTAL					

STATUS

PROPOSAL

1. Reconnaissance proposal based on XB-52 airplane.

ENGINES

(4) Turbo-Prop
XT-35-W-5
Dual Rotation
Wright
S.L.Static ESHP-RPM

T.O:	9540-7200
Max:	9180-7080
Nor:	9180-7080

FEATURES

Crew: 13
Provisions for 6 ECM Stations
12 Flash Bombs
Bicycle Landing Gear

ARMAMENT

Turrets: 2
Guns: (4) .50 cal
Ammunition: 1600 rds

4 JANUARY 1949

RB-52 PROPOSAL

Four-engine Turbo-Prop
Strategic Reconnaissance RB-52

7

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1.2

THE XB-52 AIRPLANE

Appendix, Volume I

DECLASSIFIED

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[redacted]

Auth: CG-SAC-1-43
Initials:
Date: 8/16

Classification cancelled/changed to FOR OFFICIAL USE ONLY
by authority of
by _____ date _____
JUN 8 1960

THE XB-52 AIRPLANE

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RSI Cont No
S 15631

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13 Ltr.
8-(13 Apr)
Bom. & Rec. Sys.

~~CONFIDENTIAL~~ 40

HEADQUARTERS, ARMY AIR FORCES

WASHINGTON, D.C.

SECRET

23 November 1945
(Revised 8 October 1946)
(Para. 1 c(2) revised)

SUBJECT: Military Characteristics for Heavy Bombardment Aircraft

TO: Assistant Chief of Air Staff - 4

1. The following principal characteristics for military airplanes have been approved.

a. Type - Heavy Bombardment

b. Class - High speed, high altitude, long range, land airplane.

c. Mission - The destruction by bombs of surface objectives.

d. Requirements

		Minimum Requirements
(1)	Performance (At design gross weight condition less one-half fuel unless otherwise specified)	
(a)	High speed at tactical operating altitude for 15 minutes	450
(b)	Tactical operating altitude	35,000
(c)	Service ceiling	~~40,000~~
(d)	Service ceiling - 1/2 engine	15,000
(e)	Tactical operating radius with 10,000 lb. bomb	5,000
(f)	Average speed for above radius	300 ~~475~~
(g)	Take-off over 50' obstacle at design gross weight	7,500
(h)	Landing over 50' obstacle at design gross weight condition less droppable fuel and bombs	4,500

Classification Cancelled or Changed to
Top Secret ~~Secret~~
~~Confidential~~ ~~Restricted~~
Changed NOV 1948
AUTHORITY, C. G., AIR MATERIEL COMMAND
REPORT CO-356 APRIL 6 1948
By: ALDEN R. CRAWFORD, Brig. Gen., U.S.A.

(2) If after the above requirements have been met, additional performance may be realized, consideration in the design of this aircraft for utilizing this performance should be given to those features such as high speed,

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W-74199-M - 13

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13 Gen. 8-1/3 pp)

41

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AUTHORITY, C. G., AIR MATERIEL COMMAND
REPORT CO 356 14 APR 48
By: ALDEN R. CRAWFORD, Brig. Gen., U.S.A.

SECRET

armament and passive protection which will reduce its vulnerability in penetrating heavily defended zones.

e. Armament

(1) Bombs - The maximum bomb load shall consist of one 80,000 lb. (Grand Slam configuration) bomb carried internally. Maximum design bomb loads shall be made up primarily around 500 lb. G.P. bombs with a minimum of 120 required and alternate loads shall be made up as efficiently as possible of 100 lb., 2000 lb., 4000 lb., 12,000 lb., 22,000 lb., or 44,000 lb. bombs. Leakproof bomb bay range extension tanks shall be provided to give maximum possible interchangeability between fuel and bomb load. Provisions for air-to-ground guided missiles and for the control thereof shall be required as offensive armament.

(2) Guns - Accurate fire control devices will be provided for offensive and defensive armament. Defensive armament shall consist of 20mm cannons mounted in no-drag power mounts. These weapons shall be located for all-round firing with a minimum number of blind spots. Weapons may be controlled remotely if necessary or feasible to achieve aerodynamic cleanness. Computing sights shall be provided at all sighting stations.

(3) Armor - Armor protection (flak curtains or deflector plate) shall be provided for engines, vital airplane components, crew and internal fuel against fighter, ground fire, and guided missiles. The maximum protection consistent with airplane weight and performance requirements is necessary.

f. Crew

(1) The minimum crew shall consist of pilot, co-pilot, flight engineer, one bombardier-navigator, one radio operator, and the minimum number of fire control operators deemed necessary. The arrangements of the crew shall provide for efficient performance of missions over the maximum radius of operation and shall permit the interchange of station by crew members. Accommodations will be provided for relief crews, consisting of one command pilot, one relief pilot, flight engineer, two bombardier-navigators, and one radio operator.

g. Equipment

(1) Radio and radar equipment for bombing, navigation, fire control, and countermeasure purposes shall receive prime consideration and shall be in accordance with current Military Requirement policy governing same.

(2) Instruments and navigational equipment shall be the minimum consistent with the requirements for effective day and night operations of the airplane on military missions in all weather conditions.

(3) The airplane shall be pressurized in accordance with current Military Requirements policy. Adequate window defrosting and air conditioning shall be provided to permit maximum crew efficiency at all altitudes and weather

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conditions.

SECRET

(4) Adequate equipment shall be provided for anti-icing to allow all weather operation.

h. Structure and Design Features

(1) These features of design that will permit accurate bomb dropping, accurate navigation, the most effective defensive firepower, and maneuverability for formation flying, will be of primary consideration in the design of this airplane.

(2) Reliability and ease of maintenance under field conditions should be emphasized. Quick change features for engines and the main structural components are essential. Simplicity and ease of refueling, rebombing, and arming should be stressed to insure extreme field flexibility. Consideration should be given in basic design to features providing maximum independence of operation for maintenance and servicing with a minimum of specialized ground equipment.

(3) Emphasis must be placed on reduction of fire hazards through engineering design. Fire extinguishers must be easily operated in flight to control engine fires. A maximum reduction of fire probability through battle damage must be obtained by careful engineering.

(4) Emphasis must be placed on features to expedite rebombing and re-arming time so that such time shall not exceed preflight and refueling time.

(5) Consideration will be given to the use of increased engine ratings or assisted take-off devices for reducing the take-off distance below those specified in paragraph d(1) (h).

(6) Simplicity of design and suitability to quantity production should be emphasized.

FOR THE COMMANDING GENERAL:

/s/ Alfred R. Maxwell
ALFRED R. MAXWELL
Brig. General, U.S.A.
Chief, Requirements Division
Office of Asst Chief of Air Staff-3

Classification Cancelled or Changed to
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AUTHORITY, C. G., AIR MATERIEL COMMAND
REPORT CO-356 / APR
By: ALDEN K. CRAWFORD, Brig. Gen., U.S.A.

(SEE NEXT PAGE FOR DISTRIBUTION)

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13 Jan
1-1/2PP)

43

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TSESA-2/HFW/ies

TSESA-2 SECRET 13 February 1946

SUBJECT: Proposal for Heavy Bombardment Airplane

TO: B.A.C.

1. Requirements have been established for a new heavy bombardment type aircraft by the Army Air Forces. It is the intention of this Command to contract for a Phase I development of an airplane to meet or approximate these heavy bomber characteristics. Winner of this design competition will be awarded a Phase I contract during this fiscal year. Policy as set forth in ATSC letter, TSESA/GEP/lh dated 8 February 1946, subject, "Policy Regarding Research and Development Aircraft" will be applicable to eventual procurement of physical articles.

2. For the information of the Contractor, the basic data required to be submitted is outlined in Enclosure A, "Data for Evaluation of Preliminary Aircraft Design". It is also considered desirable that a small scale model of the airplane proposed be furnished. The requirements of Phase I developments are contained in Enclosure B entitled "Design and Development Data".

3. Requirements for this heavy bomber are contained in a brief "Design Directive", Enclosure C. This Design Directive is written in the form of an abbreviated type specification and is written in rather general terms to allow the greatest possible latitude in design. It is desired that the requirements set forth be considered as a goal and that the proposal be for an interim airplane to approximate all requirements, except that emphasis must be placed on meeting the high speed requirement. Because of the lack of adequate power plants at this time, it will be necessary to make some compromises to design a well-balanced airplane. It is the intent that design proposals should present the best possible overall airplane consistent with power plants or combination of power plants that will integrate with a combined Phase I and Phase II program of approximately three years. Every consideration should be given to the utilization of new power plants now under development which will provide high horsepowers required to obtain the desired perfor-

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~~Top Secret~~ Secret
~~Confidential~~ Restricted

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~~CONFIDENTIAL~~

AUTHO: ITY, C. G., AIR MATERIEL COMMAND
REPORT CO-356 1 APR 48
By: ALDEN R. CRAWFORD, Brig. Gen., U.S.A.

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ATSC letter dated [illegible] Bomberdment Aircraft.

[illegible]. Military characteristics require [illegible] or 22,000-lb. bomb and an alternate of [illegible] number of [illegible] fuselage airplane, the maximum size bomb which will be the 44,000 lb. bomb. Provisions should be made for the maximum possible [illegible] bombs consistent with the 44,000-lb. requirements. Considerations in the preliminary design phase emphasis on reliability, ease of maintenance, reduction of fire hazards, good visibility, quick change features, [illegible] cockpit design and a general [illegible] of detail [illegible] during the war period because of [illegible]. The problem of bomb [illegible] bomb ejection, etc., will [illegible].

4. Accordingly, [illegible] submit preliminary design [illegible] contract. In accordance with the policy [illegible] contract that the contract to be awarded [illegible] Due to the necessity of [illegible] it is necessary to allow [illegible] addition to the period of [illegible], it is necessary to establish by AF [illegible] the deadline date for submittal of proposals. All data should be marked for the Bombardment Branch, Aircraft Projects Section, Engineering Division, AFSC.

FOR THE [illegible]:

[illegible]
Colonel, Air Corps
Chief, Aircraft Projects Section
Service Engineering Subdivision
Engineering Division

Encl.:
A. Data for Evaluation of Preliminary Aircraft Design
B. Design and Development Data
C. Design Directive

Copy to:
AAFIR
[illegible] District
Dayton Representative

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BOEING AIRCRAFT COMPANY

SEATTLE 14, WASHINGTON

April 18, 1946.

IN REPLY REFER TO REFERENCE NO.

ORI-380.

[redacted]

To: Commanding General,
Air Materiel Command,
Wright Field, Dayton, Ohio.

Attention: TSESA-2, Bombardment Branch,
Aircraft Project Section,
Engineering Division.

Reference: (a) ATSC letter of 2-13-46,
TSESA-2/HEW/ies.

Subject: CPFF Proposal for Heavy Bombardment Airplane,
BAC Model 462, Phase I.

1. Pursuant to the invitation contained in reference (a), this Company herewith submits a proposal to cover the Phase I development of a Heavy Bombardment Airplane, which has been designated as Boeing Aircraft Company Model 462.

2. The Model 462 is a six-engine, high wing airplane, powered with Wright T-35 gas turbine engines in combination with six tractor propellers. It is the opinion of the Contractor that the basic configuration, as proposed, represents the optimum airplane possible in a balanced design based upon the design directive, and within the limitations of existing components and anticipated developmental considerations. In this connection the Contractor believes that, concurrent with Phase I airplane design studies, a coordinated research program of all related elements should be undertaken to the extent that prolonged delays during subsequent phases may be eliminated.

3. For the preliminary design engineering of the airplane described in BAC Specification D-7603, dated April 19, 1946, construction of wind tunnel models and wind tunnel testing, structural testing, studies of power plant test rig, gun fire protection, miscellaneous research, studies and tests incidental to the Phase I development of the Model 462, and the supplying of engineering data in accordance with BAC Specification D-7610, dated April 19, 1946, as well as the design and construction of full scale mock-up in accordance with Contractor's Specification D-7627, dated April 19, 1946, we quote as follows:

[redacted]

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[redacted] Aircraft Compa[redacted]

Con-300.

	Hours	Rate	Cost
A. Preliminary Design & Miscellaneous Testing			
Engineering Labor	182,000	2.56	$465,920.00
Overhead		92%	428,646.00
Shop Labor	34,000	1.92	65,280.00
Shop Overhead		125%	81,600.00
Material & Equipment			85,000.00
Estimated Cost			$1,126,446.00
B. Mockup			
Shop Labor	60,000	1.92	$115,200.00
Shop Overhead		125%	144,000.00
Material			25,000.00
Estimated Cost			$ 284,200.00
C. Wind Tunnel Models			
Engineering Labor	8,000	2.56	$ 20,480.00
Overhead		92%	18,842.00
Shop Labor	40,000	1.92	76,800.00
Shop Overhead		125%	96,000.00
Material & Equipment			77,400.00
Estimated Cost			$ 289,522.00
Total Estimated Cost			$1,700,168.00
Fixed Fee @ 5%			85,008.00
TOTAL			$1,785,176.00

4. The foregoing proposal contemplates that any contract resulting from this proposal will be on a CPFF basis.

5. The mockup of this Model 462 airplane shall be completed and available to the Government for final inspection and acceptance at the Contractor's plant, Seattle, Washington, on or before August 31, 1947. All of the drawings and data will be completed for delivery to the Air Materiel Command on or before October 31, 1947.

6. It is recognized that the preliminary development of a Heavy Bombardment Airplane, such as herein proposed, will require a considerable amount of research, development and testing of various features, and that certain Government facilities, located at Fort Lewis, Washington, or at some similar local proving ground, may be required for these tests. It is assumed that arrangements can be made with the Government for the use of necessary portions of these facilities, if required; also that certain GFE, to be determined at a later date, will be furnished to the Contractor.

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ORL-380.

7. In addition to the foregoing it is contemplated that approximately 20 hours of flight time will be required for the development and testing of an unconventional type of landing gear, for which a Model B-29 airplane will be required.

8. It is believed that this Contractor has facilities for accomplishing practically all of the wind tunnel work required for this Phase I project; however, a portion of this type of work may require additional facilities such as the NACA icing tunnel.

9. There is being transmitted to you under separate cover, in accordance with Shipment Notice No. 249,393, the documents above referred to, together with certain other data and drawings.

10. A 1/150th scale model of the presently contemplated Model 462 airplane will be delivered to you personally by our Chief Engineer, Mr. E. C. Wells, who will be available at the Air Materiel Command in the event his assistance is required for interpretation of the data submitted covering the airplane herein proposed. Your favorable consideration is solicited.

BOEING AIRCRAFT COMPANY

William M. Allen

William M. Allen
President

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1.2 Airc. General
/ — (1/12)
Both. Br., Eng. Div. COPY

SE 229 Boeing Seattle TWX 11 April 25 1946 RCP

G Schairer and L A Wood to E C Wells c/o W P Crews
Dayton Ohio

SE 533L. Boeing model 462 has extensive possibilities for future growth. Range computations are based on fairly high figure consumptions currently being quoted for gas turbine engines. These will undoubtedly be improved. Average SFC is .51. B-29 is .41. B-17 is .42. The maximum gross weight of the airplane can be very materially increased if the takeoff distance can be improved since the airplane performance following takeoff at present weights is very much better than is required. Takeoff can be improved by use of Jato or by the use of higher lift coefficients which might be obtained with better flaps on boundary layer control, etc. Boundary layer control for this use appears feasible in the immediate future. Boundary layer control to reduce airplane drag in cruising configuration does not appear to be a probable item for future incorporation in this airplane since virtually no research information on this subject is yet available. In any case a completely redesigned wing would be required. A possible saving in drag due to boundary layer control would be approximately 25 per cent of airplane flight plan drag which would result in approximately 15 per cent improvement in range provided boundary layer control equipment would not increase the basic weight of the airplane. It would seem probable that all initial installations in boundary layer control would increase weight empty sufficiently to counteract drag savings insofar as range is concerned. This is probably not true of boundary layer control intended to increase maximum lift. Believe we can fly weight at 500 thousand and can have weight takeoff with new flap or Jato or boundary layer control.

WTX

END WL TWX

IN THIRD LINE FROM END, PLS CHECK FIGURE OF 500 THOUSAND
COPY SAYS AT 500 THOUSAND AND CAN DO

OK THANKS. WE THOUGHT IT SHOULD BE SO.

HAVE SOME MORE IF PLS

GA

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15.7 Contractual Corres.
3 — (1/1p)
Bomb. Br., Eng. Div.

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TSFSA-2/HEW/emh
23 May 1946

AIR MATERIEL COMMAND

TSENG (TSFSA-2) 23 May 1946

Design Competition, Heavy Bombardment Aircraft

Commanding General
Army Air Forces
Washington 25, D. C.
ATTN: AC/AS-4

1. The Air Materiel Command has completed evaluation of heavy bomber proposals which have been submitted by three manufacturers. In accordance with a design directive issued by Air Materiel Command, these requirements were based on the Heavy Bomber characteristics of 23 November 1945.

2. The following Contractors submitted proposals: Consolidated Vultee Aircraft Corporation, Glenn L. Martin Company, and Boeing Aircraft Company. The following is a tabulation of the overall point score of the three competitors:

Contractor	Point Score
Boeing Aircraft Company	746
Glenn L. Martin Company	694
Consolidated Vultee Aircraft Corporation	748

3. It is the considered opinion of the Air Materiel Command that the Boeing proposal most nearly meets the requirements set forth in Military Characteristics than either of the other two proposals, and further has far greater potentialities. This opinion was concurred in by the representative of Headquarters, Army Air Forces, AC/AS-3, who was present at the evaluation.

4. In view of the results of this evaluation and the outstanding record of Boeing Aircraft Company in the building of heavy bombardment aircraft, your concurrence is requested in awarding a Phase I development contract to Boeing Aircraft Company.

FOR THE COMMANDING GENERAL:

L. C. CRAIGIE
Brig. General, U. S. A.
Chief, Engineering Division

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15.7 Contractual Corres. 5
4 —— (1/1-)
Bomb. Pr., Eng. Div.

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AFACD

Ltr fr WD dtd 23 May 1946
WD Hq Army Air Forces, Washington 25, D. C.

29 May 1946

1st Ind.

TO: Commanding General, Air Materiel Command, Wright Field, Dayton, Ohio

The Air Materiel Command is authorized to proceed with Phase I contract for development of heavy bombardment aircraft with Boeing Aircraft Company as requested. Paragraph 4 of basic communication.

JOHN C. MOORE
Colonel, Air Corps
Deputy Asst. Chief of Air Staff-4

TI-2167
AD. 420
dtd 31 May 46

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AAFMC-265-WF-9-2-12-500M

INTER-OFFICE MEMORANDUM

ARMY AIR FORCES
MATERIEL CENTER
Office of The Commanding General

TSESA-2/JAB/mlw
Wright Field, Dayton, Ohio
Date 31 May 1946

TO: TSBUY - Chief, Procurement Division

SUBJECT: XB-52 Airplane, Boeing Aircraft Co. Model 462

1. Attached hereto is Authority for Purchase No. 391334, dated 31 May 1946, covering procurement of Phase I Development of the Boeing Model 462. This constitutes preliminary engineering, wind tunnel models, tests, data and mock-up. It is considered desirable that Boeing Aircraft Company commence work immediately on this project. In order to cover these expenditures, it is requested that a Letter Contract be issued permitting expenditures to the full extent (100%) of the bid price and permitting reimbursement to the Contractor for these expenditures, pending completion of a definitive contract.

2. Authority for this procurement is contained in T. I. No. 2167, Addendum 20, dated 31 May 1946.

L. C. CRAIGIE,
Brig. General, U.S.A.,
Chief, Engineering Division.

Attach.
AFP 391334

C.B., AMC
Geraldine Pope
TSBPA3
3 December 1946

Signature [redacted]

V-31846 31

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46 Jan. 13

TELETYPE MESSAGE

AIR SERVICE COMMAND TELETYPE NETWORK

filing

FROM: AIR MATERIEL COMMAND DATE: 5 JUNE 1946

TSESA-2-JAB/skp

GEORGE E. PRICE,
Colonel, Air Corps
NAME, RANK AND TITLE OF AUTHENTICATING OFFICER

TO: BOEING AIRCRAFT COMPANY
SEATTLE 14, WASHINGTON

CLASS:

TELETYPE NO. TSESA-2-6-41. THIS IS TO ADVISE THAT BOEING AIRCRAFT COMPANY HAS BEEN DECLARED WINNER OF THE HEAVY BOMBER COMPETITION RECENTLY CONDUCTED BY THE AAF. DIRECT ANY REPLY TO AIRCRAFT PROJECTS SECTION, ENGINEERING DIVISION, ATTN: LT. J. A. BOYKIN, TSESA-2.

cc: AAFPR

C.. .DINATION

C. G. OR C. O.	CONTROL OFFICE	MAINTENANCE	P. & T	SUPPLY	BUDGET & FISCAL	OTHERS

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"COPY"

"COPY"

Seattle 14, Washington
June 5, 1946
Reference SE-3784G

Mr. M. P. Crews
1002 Harries Bldg
Dayton 2, Ohio

Subject: Model 461-9 Airplane

Dear Pappy:

The Model 461-9 is a re-design of the 461 airplane originally submitted to the Navy in their patrol landplane competition. The Navy is determined not to use the T-35 turbine since they have no control over its development or procurement and so they have asked us to reconsider our original proposal on the basis of using Westinghouse X-25D turbines. These engines are scheduled to be available in 1948 and have good weight and fuel consumption characteristics. Their power rating is a little low for the job to be done and we had to use six of them, but the resulting airplane looks quite reasonable to us and we are planning to continue our design study on it.

The performance computed by Navy methods shows a high speed of 480 mph at 25,000 feet and an all-out range of 9,000 miles with no bombs at a maximum takeoff weight of 230,000 pounds. The takeoff distance at this weight is 7,000 feet. The use of BACo propeller charts instead of Navy data will reduce the high speed by about 20 mph and the range by about 5%, and will have no effect on takeoff distance.

Corrections of about the same magnitude as above should be made on the original T-35 powered 461 data when comparing it to 462 data.

Our original work on both the 461 and 462 airplanes was based on an engine operating schedule that did not result in optimum range performance, and we now believe that by reducing turbine speed as we reduce power that we can improve the engine specific fuel consumption and consequently airplane range by about 5%. This range improvement is applicable to the original 461 and 462 data as shown in brochures D-7631 and D-7612, but not to the Westinghouse data given you in this letter.

We will keep you informed of significant developments in the study of both these airplanes.

Best regards,

R. H. Jewett

Encl:
15-23635 (2 copies)
461-9 Performance Curve (2 copies) P.S.-This should be submitted to Lt. Col. Nabell in accordance with Ed Wells verbal agreement with them.

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Letter Contract W 33-038 ac-15065

Boeing Aircraft Company
Seattle, Washington.

~~Confidential~~
RESTRICTED

CSAmc per cw-356, 15 Apr. 45
C Bartholomew
NSCO
6/3/48

Per Formal Contract
C Bartholomew
NSCO
2/19/48

APPROVED: JUN 28 1946 1946
By Direction of the Secretary of War under the Provisions of Public Law 703, 76th Congress, as amended by Section 13 Of Public Law 580, 77th Congress; Title 11 of the First War Powers Act, 1941, and Executive Order No. 9001, dated 27 December 1941.

H. A. SHEPARD
Colonel, Air Corps
Deputy Chief, Procurement Division.

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TSH Form No. T-6A
(26 Mar 46)

Letter Contract

HEADQUARTERS
AIR MATERIEL COMMAND

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TSEPS3B/GWE/ded

By authority of the Civilian Production Administration the preference ratings indicated are assigned to the deliveries on this Letter Contract

Contract No. W-33-038-ac-15065
(16412)
Wright Field, Dayton, Ohio

7 June 1946

NAME: Boeing Aircraft Company

ADDRESS: Seattle, Washington

Dear Sirs:

1. An order is hereby placed with you for the furnishing to the Government of the following supplies or services:

Item 1 - Preliminary engineering, wind tunnel models, tests, engineering data, and mock-up for Boeing Aircraft Company Model 462 airplane, AAF Model XB-52.

Classification cancelled
or changed to Confidential
AUTH: CG. AMC ltr AMC 0-356.15 Jun 46
By CBartholomew
Name and Grade 2 S-3

Date 6-3-48
Classification cancelled
or changed to RESTRICTED
AUTH: Per Formal Contract
By CBartholomew
Name and Grade HSCC
Date 2/19/48

MX-839

...NTS HAVE ... THE ... INVENT.
BUDGET AND FISCAL DIVISION
12 JUN 1946

2. Except as otherwise expressly provided to the contrary herein, you are directed, upon your acceptance of this order (or upon its approval if required by paragraph 9) to proceed immediately to procure the necessary materials, and to commence the manufacture of the supplies or performance of the services, called for in paragraph 1, and to pursue such work with all diligence to the end that the supplies may be delivered or services performed at the earliest practicable date.

3. All applicable articles (other than the article "Termination at the option of the Government") now required by Federal Law, Executive Order, or War Department Procurement Regulations to be included in contracts for supplies or services of the kind herein described are incorporated herein by reference. There is also incorporated herein by reference the article prescribed by Paragraph 365.A. of War Department Procurement Regulations in effect at the date of this Letter Contract.

4. By your acceptance hereof, you undertake without delay to enter into negotiations with the War Department looking to the execution of a definitive contract which will include all applicable articles then required by Federal Law, Executive Order and War Department Procurement Regulations to be included in contracts for supplies or services of the kind herein described. The definitive contract will also contain a detailed delivery schedule and prices, terms and conditions as agreed to by the parties, which may or may not be at variance with the provisions of this order. It is expected that such definitive contract will be placed with you prior to 15 September 1946.

5. You are not authorized to expend or obligate, in furtherance of your performance hereunder, more than $1,755,704.00 in the aggregate. Pending the execution of a defin-

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TSB Form No. 71-60
(26 Mar 46)

7. After your acceptance hereof, formal contract(s) shall be entered into in accordance with regulations from time to time [illegible]

8. Any claim arising [illegible] Assignment of Claims Act of [illegible] not confidential or restricted [illegible] set off for any indebtedness [illegible] under this order.

9. Your acceptance of this [illegible] relative to this letter and two copies thereof and returning [illegible] contracting Officer not later than [illegible] will constitute this order a contract on the [illegible] of the Secretary of War or such individual as said Secretary [illegible]

10. This instrument [illegible] 78th Congress, as amended by Section 12 [illegible] Powers Act, 1941, and Executive Order No. [illegible]

11 & 12. Paragraphs [illegible] dated 23 August 1945, and paragraphs [illegible] PASO Form No. 100, dated [illegible] exception thereof, are hereby [illegible]

13. Paragraph [illegible] entitled Subject Matter added to [illegible] hereby made a part hereof.

14. The Formal [illegible] will contain a Price Adjustment [illegible] mutually agreeable to the [illegible] from and after the date [illegible] Letter Contract.

UNITED STATES OF AMERICA

[signature]

[illegible] A.C.

ACCEPTED June 24th 46

BOEING AIRCRAFT COMPANY
(Contractor)

By [signature]
(Name, Official Title) William M. Allen, President

NOTE: Type or Print Names under all signatures

The Finance Officer, U.S.Army, Republic Bldg., 25th Third Avenue, Seattle, Wash. is designated as the officer to make payments in accordance with this contract

The sums to be expended by the Government hereunder are chargeable to the following allotments, the available balances of which are sufficient to cover the same: P DEL-09 S 33-038

Point of Inspection and Acceptance and
F. O. B. Point Seattle, Washington
Type Contract Contemplated [illegible]
Authority for Purchase No. [illegible]
Priority Rating MM
Equipment Class [illegible] A
Classification ... Confidential
Program [illegible]
Project No. MX-599
Letter Contract (3-c)

Confidential [illegible]

[illegible] W 33-038 ac-15065
W-33949

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HEADQUARTERS
AIR MATERIEL COMMAND

TSEP25B/ESB/eb
Wright Field, Dayton, Ohio
18 June 1947

SUBJECT: Letter Contract dated 7 June 1946
designated W 33-038 ac-15065

TO: Boeing Aircraft Company
Seattle, Washington

Amendment No. 6 to subject Letter Contract.

1. Subject Letter Contract, asheretofore amended placed an order with you for the supplies or services therein described.

2. It is now desired to increase the amount you are authorized to expend or obligate from $1,755,704.00, as set forth in paragraph 5 thereof, to $1,785,176.00.

3. If the foregoing is acceptable to you, kindly so indicate by signing three (3) numbers of this Amendment and return same to the Contracting Officer forthwith, whereupon subject Letter Contract shall be deemed amended accordingly.

4. This Instrument has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 15 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

NOTE: Type or print names under all signatures.

THE UNITED STATES OF AMERICA

BY: James B. Leist
JAMES B. LEIST
(Contracting Officer)

ACCEPTED 20 June, 1947

BOEING AIRCRAFT COMPANY
(Contractor)

BY: M. P. Crews
(Name: Official Title)
M. P. CREWS, Dayton Representative

AFFIX CORPORATE SEAL

The Finance Officer, U. S. Army, Republic Bldg., 1511 Third Avenue, Seattle, Washington, is designated as the officer to make payments in accordance with this contract.

The sums to be expended by the Government hereunder are chargeable to the following allotments, the available balances of which are sufficient to cover the same:

DEBIT: 212/60705, 662-2000 F 611-00 S 33-038 - - - $29,472.00

AFP: 521584 Class: 01-A

Ref: R&R from TSEPA5
dtd 17 June 47
H. W. Blakeslee

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T.1 Aircr. Lab Comments
4-(1/13pp) HqATSC Form No. 50-507 (20 Jan / (Old AAFMC-268)
Encl B, Engr Div.

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No. of pages 13

ARMY AIR FORCES

AIR MATERIEL ~~AIR TECHNICAL SERVICE COMMAND~~ COMMAND

ENGINEERING DIVISION

MEMORANDUM REPORT ON TSEAC6/HSL/dls

SUBJECT: Comments on Model Specification Boeing Aircraft Company Model 462 (XB-52) Airplane

Date 8 July 1946

CONFIDENTIAL

OFFICE Aircraft Laboratory Contract or Order No.

SERIAL No. TSEAC6-4262-11-1 Expenditure Order No. 426-253

A. PURPOSE:

1. To comment on Boeing Aircraft Company Model Specification No. D-7603 dated April 19, 1946 covering the Boeing Model 462 airplane (XB-52) as requested in D&DTR No. TSESA-2-565 dated 5 June 1946.

B. FACTUAL DATA:

2. The D&DTR mentioned above requested the submittal of detail recommended changes to the Model Specification covering all requirements for which the Aircraft Laboratory holds development responsibilities. The intent was to collect such recommendations for change as were considered pertinent at this time in order that the contractor could revise the Specification to make it suitable as a procurement document.

3. The comments requested are contained in Appendix 1 of this report and are based on data previously forwarded to this Laboratory for Evaluation purposes on D&DTR No. TSESA-2-433 dated 25 April 1946. The Evaluation comments were presented in Memorandum Report No. TSEAC-6-4265-11-1 dated 6 June 1946.

4. Through contacts with the project office, it was established, and agreed, that the Model Specification, although satisfactory as a preliminary Specification for Evaluation procedures, was not suitable for use as a controlling document in the Phase 1 development portion of the contract for the reason that it lacked sufficiently definite guarantees and pertinent detail. It was further established that, as a result of the Evaluation, there would occur many revisions to the airplane affecting both weight and balance, e.g., rearrangement of crew, armament, radar, navigation equipment and similar items. In some instances, as for example the addition of a tail gunner (and a communicating tunnel), the effect on the balance, weight and fuel would be considerable.

5. Therefore, it was agreed with the project office not to re-check performance, weight and balance, or alighting gear wheel size at this time and to submit only a "check list" of items which would form the basis of discussion with Boeing Aircraft Company representatives for the purpose of

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revisions to the Model Specification by the contractor. It is understood that the Model Specification will be resubmitted for further check at some date in the near future.

6. Appendix 1 of this Memorandum Report contains comments on the Model Specification (by specific reference to paragraph numbers thereof) together with general engineering comments, action on which by the contractor will result in revisions to various other paragraphs of the Model Specification all of which cannot be specifically referenced herein at this time.

7. Inasmuch as no new data were submitted with the reference D&DTR (the data being precisely the same as that for evaluation) no data are returned herewith.

8. In summary, attention is called to the statements in paragraphs B-4 and B-5 of this Memorandum Report as to the purpose of these comments. This Memorandum Report should be considered as an interim report, to be followed by a subsequent Memorandum Report based on a thorough check of the expanded and revised Model Specification after same has been resubmitted by the contractor.

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11 Aircraft Lab Reports
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HqATSC Form No. 80-507 (20 Jan 45
(Old AAFMC-266)

Eng. Div. Memo. Rpt.
TSEAC6-4262-41-1
8 July 1946

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C. CONCLUSIONS:

9. The contractor should be advised of the comments contained in Appendix 1 of this Memorandum Report and requested to comply with the action indicated therein.

D. RECOMMENDATIONS:

10. It is recommended that the action indicated in Appendix 1 be complied with.

Distribution:

TSESA2
TSEAC8

Record only

Prepared by H. S. Lipman
(Name)

Approved by C. K. MOORE, Col., A.C.
Chief, Aircraft Laboratory

Approved by FRED R. DENT, JR., Col., A.C.
for Ch., Aircraft & Physical
Requirements Subdivision

Concurrence:
GEORGE E. PRICE, Col., A.C.
Ch., Aircraft Projects Section

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APPENDIX 1

Aircraft Laboratory Comments on Boeing Aircraft Company Model Specification Report No. D-7603 dated 19 April 1946 and General Engineering Comments on the Model 462 (XB-52) Airplane.

NOTE: Where used below page and paragraph numbers relate to those in the Model Specification.

1. Reference paragraph A-1, page 1.

Delete the first item which refers to the Design Directive. Reason: This document is only semi-official and has served the purpose for which it was prepared i.e., an interpretation of the Military Characteristics for purposes of Evaluation. Further reference is unnecessary in view of the existence of the Model Specification.

Change the third item to read: "Army Air Forces Specification C-1603-E dated 2 April 1946 including Amendment No. 1 dated 3 May 1946".

Change the fourth item to read: "Army Air Forces Specification 1815-A dated 7 April 1945 including Amendment No. 1 dated 29 March 1946".

As regards the fifth item the following comments are submitted. The Ninth Edition of the Handbook of Instructions for Airplane Designers dated January 1946 has not been called out by the contractor. Instead he has specified the Eighth Edition including the revisions through No. 7 and Amendment No. 2 thereto. The failure to call out the Ninth Edition is understandable when it is realized that currently the only distribution made of this document has consisted of a few advance copies to offices of the AMC. However, in view of the newness of this design and the probability that it will be in the design stages for some time to come, it is considered advisable and desirable to specify the Ninth Edition at some point in the life of the contract. This may be possible at present, at a later date during Phase 1, or just prior to Phase 2 of the contract. The project office should take this matter up with the contractor and arrive at a mutually agreeable arrangement whereby the Ninth Edition will be made applicable.

With reference to the sixth item, the effective date should be inserted.

Delete the seventh item. Reason: The applicable Specifications listed above this item should be used as more than merely a "guide" in the design of this aircraft. Furthermore, as regards the last sentence of this item, deviations from all Army Air Forces requirements are required to be listed in appropriate appendices to the Model Specification.

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1.1 Aircraft Lab Comments
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Reference the first item at the top of page 2. This reference should be deleted for the same reasons as given for the deletion of the Design Directive reference.

2. Reference paragraph B-1, page 2.

Delete "Heavy Bomber" and insert "XB-52".

3. Reference paragraph D-2, page 2.

This deviation is considered satisfactory inasmuch as the new Ninth Edition Handbook, paragraph 0.17 exempts from this requirement all aircraft having a ferry range of 3,000 miles or more.

4. Reference pages 4, 4a, and 4b.

The performance curves on these three pages should be revised in accordance with the ultimate decisions (now pending) [illegible] which are dependent upon crew arrangement, equipment, gross weight, et cetera, and new curves submitted for check.

5. Reference paragraphs E-1a and E-1a(1), pages 5 and 6.

The performance values on these pages were not checked at this time for the reasons previously stated in this report. For Aircraft Laboratory preliminary estimates of performance, submitted at the time of evaluation, see Memorandum Report TSEAC6-4265-11-1 dated 6 June 1946.

6. Reference paragraph E-1b(2), page 7 and paragraph E-2e(5)(d), page 18.

These paragraphs require considerable expansion as to detail. They should be revised and resubmitted by the contractor for further check. As a means of assisting in this development the following comments are submitted:

The speed of this airplane and the large distance from the c.g. at which the crew is located indicate that some form of forced ejection will be required to aid the crew members in escaping from the airplane in case of emergency while in flight. Some methods are outlined below:

a. Ejection of the crew members out the top of the airplane would be satisfactory for some conditions. However, the large size of the airplane makes the reliability of this method doubtful. This method could not be used for any members of the relief

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crew if ultimately provided and located in the waist section behind the wing because of their proximity to the tail.

b. Ejection of the crew members out the bottom of the airplane would be satisfactory. However, in this method, the seat must first be inverted with the crew member remaining in the seat, and the seat ejected downward head first. This is a more involved method and requires more space to revolve the seat, and structural consideration to provide an opening through the bottom for each crew member. This method could be used for relief crew members in the waist section.

c. The nose section could be jettisoned from the fuselage by means of explosive bolts. A stabilizing parachute would be required on the nose section. Some force would be necessary to clear the crew members from the nose section. A section of the waist could also be built as a capsule which could be jettisoned similar to manner described for the nose section.

d. A tail gunner, if ultimately provided, could escape by first jettisoning the tail end by means of explosive bolts, and then eject the gunner horizontally out the opening thus provided.

The methods outlined in b and c would be preferred, the particular method depending on the more practical arrangement of the equipment and structural design of the airplane.

7. Reference paragraph E-2, page 8.

In the eleventh line delete the words "maximum" and "appreciably".

8. Reference paragraph E-2a and its sub-paragraphs including information on pages 8, 11, 12 and 14.

The information shown on reference pages indicates three gross weights for this airplane. The values are labeled "Design Gross Weight", "Alternate No. I" and "Alternate No. II". The first two named are identical as to value, while the latter represents an increase of 40,000 pounds over the former. Paragraph E-2d(1)(a) indicates that the "Design Gross Weight for Stress Analysis Purposes" agrees in amount with "Alternate No. II". All the foregoing is contrary to the accepted basis of Army Air Forces design for Heavy Bombers inasmuch as the "Design Gross Weight" must not be exceeded by any

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other loading; in other words, there shall be no "Maximum Alternate Gross Weight". The foregoing was brought to the attention of the project office at the time of evaluation and considerable discussion occurred as to the advisability of procuring the airplane at the "Alternate II" weight value submitted by the bidder. Substantially, the only difference between the "Design Gross Weight" (or "Alternate No. I") and "Alternate No. II" consists in an extra amount of fuel carried, the gallonage being increased from 28,333 (Design Gross Weight) to 34,193 and from 21,590 (Alternate I) to 34,193. The maximum bomb carrying utility of the airplane would not be affected by procuring this airplane at the gross weight value for "Design Gross Weight" since this is the same weight as "Alternate I" in which 50-1,000 pound bombs are carried. The principal feature sacrificed by this decision would be additional Tactical Operating Radius approximating 400 miles. In view of the foregoing, and considering other factors associated with "Alternate Gross Weight II", it appears to the Aircraft Laboratory that the airplane should be procured at the submitted "Design Gross Weight" value of 360,000 pounds.

9. Reference paragraph E-2d(1)(a), page 14.

As previously mentioned the stress analysis gross weight does not agree with Design Gross Weight. The Design Gross Weight shall be the maximum conceivable gross weight at which this airplane will be flown. This Design Gross Weight is the one referred to in AAF Specifications No. C-1803-E, Table I, note (c) and No. R-1803-1B. paragraph E-2c(4).

10. Reference paragraph E-2d(1)(b)(1), page 14.

Maneuver load factors of +2.00 and -1.00 shall be developed at Design Gross Weight.

10.a. See paragraph 29 of this Appendix.

11. Reference paragraph E-2d(1)(d), page 14.

Delete the present paragraph and substitute the following: "The limit diving speed at design gross weight shall be 115 per cent of V_H for this gross weight as required by AAF Specification C-1803-E, Table I, Column 7 and note (g)."

12. Reference paragraph E-2e(2)(a), page 15.

It should be definitely stated that both the upper and lower flap-aileron sections will be completely statically balanced about the effective aileron hinge line. Also the outboard flap-aileron section should be effectively irreversible for extended positions or statically

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balanced about the instantaneous center of the rotation if the natural vibration frequency is not sufficiently high to preclude flap flutter.

13. Reference paragraph E-2e(3)(a), page 17.

This paragraph should be amended to call for duplicate control system circuits for all main controls in accordance with requirements of the Designers Handbook (either the Eighth or Ninth Edition).

14. Reference paragraph E-2e(3)(c), page 17.

At the end of the paragraph add the following: "These controls shall be operable from the cockpit".

15. Reference paragraph E-2e(5)(c), page 18.

This paragraph requires considerable expansion including a detailed statement as to the locations and size of all openings.

16. Reference paragraph E-2e(5)(d), page 18.

For comments on this paragraph see paragraph 6 of this Appendix.

17. Reference paragraph E-2e(6), page 18.

The specification does not specifically stipulate a vibration isolating mounting for the power plants. Hence, it is recommended that paragraph E-2e(6) be amended to require specifically a power plant mounting vibration isolation as outlined in the ninth revision of the Handbook of Instructions for Airplane Designers.

18. Reference paragraph E-2e(7), page 19.

The paragraph should be amended to specify that service locks for landing gear will be provided to prevent inadvertant retraction after airplane is parked.

19. Reference paragraphs E-2e(7)(a) and (7)(b), page 19.

As previously stated further comments on the selection of wheels and brakes are not possible at this time. For preliminary recommendations on wheels and brakes see page 9 of Memorandum Report TSEAC6-4265-11-1 dated 6 June 1946.

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20. Reference paragraph E-2f, page 19.

The number of the Boeing Specification covering finishes, and its date, should be inserted.

21. Reference paragraph E-5f(1)(c), page 24.

If a pneumatic system is used for the bomb bay door operation, the performance requirements, including life tests of the component units of the system, shall comply with the hydraulic system Specification AN-H-2b except that air shall be used as the fluid medium. Consultation with AMC engineers on the pneumatic system will be arranged, similar to that for the hydraulic system specified under paragraph 23 of this Appendix.

22. Reference paragraph E-6c(22), page 30.

This paragraph should be expanded to definitely state the components that will be hoisted.

23. Reference paragraph E-9, page 34.

Change the paragraph to read as follows: "Hydraulic System.- Hydraulic system of the open center type in accordance with Specification AN-H-2b shall be provided for operation of the landing wheel brakes and other hydraulically operated equipment."

NOTE: Arrangements shall be made for the contractor's engineers to consult with the AMC hydraulic engineers during the early stages of the system design, preferrably after the schematic diagram has been completed. Design, performance, and testing of the component units of the system will be established at this conference and a program for any new developments will be initiated in order to insure a satisfactory system by the time of the initial flight.

24. Reference page 48, Appendix I-B.

The missing report numbers should be filled in and the reports submitted to the AMC.

25. Reference page 52a, Appendix II-B.

Deviation No. 1.

This deviation is considered satisfactory. See paragraph 3 of Appendix 1 of this Memorandum Report.

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Deviation No. 2.

This is not actually a deviation from the Handbook inasmuch as the Handbook does not require skis for bomber type aircraft. The deviation should be deleted.

26. Reference page 53a, Appendix II-C.

Deviation No. 1.

This point was discussed at the evaluation conference in bomber projects office with representatives of AC/AS-3 who agreed that no relief crew would be required in this airplane. However, if rearrangement of crew and equipment occur this matter should be reconsidered.

27. In revising the Model Specification the contractor should be directed to follow the form set forth in AAF Specification 1801-D dated 27 May 1946. This form has recently been revised in accordance with Army and Navy conferences and should be followed.

28. General Comments.

a. Flutter and Vibration

(1) It is recommended that both symmetric and unsymmetric wing bending versus inner panel torsion flutter calculations be made on the basis of theoretically computed wing frequencies and deflection shapes as soon as practical. Unsymmetrical analyses should include rolling of the airplane and symmetrical modes should include both translation and pitching if possible. The results of these calculations should be submitted to the AWC for comment and/or approval when complete.

(2) The inboard propeller tip clearances to the fuselage (24 inches) appear to be adequate to preclude excessive transmission of vibration into the fuselage due to aerodynamic propeller tip interference effects. However, there is no transverse clearance between propeller discs which are contiguous due to the propeller center lines being spaced 20 feet apart and the propellers are staggered behind the inboard propellers. It is considered that this configuration of the propellers is likely to result in excessive vibration due to interference of the propeller discs with aerodynamic impulses in impinging slip streams. It is therefore recommended that the contractor initiate a preliminary study directed towards establishing an optimum propeller configuration which will involve a minimum of propeller aerodynamic interference effects which tend to cause objectionable vibration.

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b. Aerodynamics.

(1) In view of the many factors involved in the selection of wing loading, aspect ratio, taper ratio, Mach Number effects, power loading, and similar items, it is requested that the Boeing Aircraft Company submit (for purposes of study by the AMC), any studies made which led to establishing this configuration.

Note: The following comment applies to the alternate gross weight condition II in which external fuel tankage is carried and is not applicable in the event the airplane is procured at a design gross weight of 360,000 pounds as previously recommended in this report. In other words this comment is submitted for its academic interest or for consideration in the event the airplane is procured with alternate gross weight II as the Design Gross Weight.

(2) A brief investigation by the Aircraft Laboratory relative to moving the external fuel tanks from under the outboard nacelles to a central location at the wing tips indicates that the maximum increase in range will be 1 1/2 per cent. The calculations are based on limited data and any decision to utilize a tip tank installation should be tentative and dependent upon the results of wind tunnel tests. The foregoing does not consider the total overall effect on the design, e.g., structural weight penalties.

c. Structures.

(1) Ground Loads Criteria, General.

At present there are no criteria for quadruple landing gears. Criteria for the design of this type gear will have to be developed on the basis of tests, either already accomplished or to be accomplished, and shall be approved by the AMC. The Aircraft Laboratory has taken steps to locate any available data (foreign or domestic) pertaining to the design of such a gear. Paragraph E-2d(1)(c), page 14 should be completed in accordance with load factors ultimately approved by the AMC.

d. Alighting Gear.

(1) The nose landing gear should be made to retract forward, if possible, so that gravity extension can be used. If this cannot be accomplished emergency extension must be provided.

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(2) The turning radius required must be submitted for comment prior to final design of the nose gear steering system.

(3) A device must be incorporated in the nose gear design to prevent shimmy when the steering mechanism is not being used.

(4) Detailed information on the fluid interaction of the landing gear shock struts to equalize loads in same must be submitted for review before the final landing gear design is made.

(5) Towing provisions must be incorporated in accordance with the latest applicable revision of the HIAD.

(6) The landing gear shock absorbers must be designed in accordance with the latest revision of Specification 40228 and tested in accordance with the latest revision of Specification 40638.

(7) A diagram showing clearly the c.g. location with respect to the landing gear in the side and front view must be submitted at an early date in order to complete recommendations on wheel and brake sizes, and similar items.

(8) Complete detail drawings of the landing gear installation including up and down locks and the shock strut must be submitted for comment prior to final design.

(9) All items not mentioned as deviations are assumed in accordance with the HIAD.

28. e. Miscellaneous.

(1) The contractor should be cautioned that the full use of full span flaps may not be practicable owing to the added severity of stalling characteristics, flaps down, as evidenced in other full span flap arrangements on AAF aircraft.

(2) Owing to the many new problems involved in the nacelle-propeller design, the nacelle tests should be comprehensive enough to prove the adequacy of the ducting and cooling systems. In addition, since there was nothing shown which would prevent the lower portion of the wing and nacelle from encountering hot exhaust gases, adequate provisions should be made for the protection of these surfaces.

(3) There are no changes in the comments on stability, control and stalling characteristics previously submitted on pages 8 and 9 of Memorandum Report TSEAC6-4265-11-1 dated 6 June 1946.

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(4) The contractor should be requested to prepare and submit a study of ditching stations for the entire crew. In this connection, all crew members whose normal stations are forward of fuselage station No. 131 should be moved aft of this station. The appropriate offices at the AMC should be consulted for latest information on ditching restraints (belts, harnesses, supports, etc).

2°. Reference paragraph E-2d(1)(b)(2) and sub-paragraphs, page 14.

Gust load factors shall be based on speed - V_D (based on power available) instead of the reduced value shown in structural data (Boeing Aircraft Report D-7614) and as set forth in the Model Specification. (This point was previously covered on page 9 of Memorandum Report TSEAC-4262-11-1 dated 6 June 1946).

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1.1 Airc. Lab. Comments
2 — (1/2P)
Bomb. Br., Eng. Div.

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Heavy Bomber Studies

Design Branch
Aircraft Laboratory
Engineering Division
Attn: Major J. F. Wadsworth

Bombardment Branch
Aircraft Projects Section
Engineering Division

17 August 1945 1.

1. Reference is made to recent conferences and telephone conversations between Major J. F. Wadsworth, TSFAC, and Lt. Boykin, TSFSA-2, and Major Williams, TSFSF, on the above subject.

2. There exists a great deal of concern over the high gross weight of the Boeing XB-29 airplane. Since this high weight can be directly attributed to the combination of range and speed requirements for the airplane, it is necessary that studies be conducted which will result in information that will permit this Command to advise A-3 (Requirements) as to the effect of speed and range requirements on the weight of the airplane. It is therefore requested that the Aircraft Laboratory undertake design studies based on the XB-29 airplane substantially as follows and in the following order:

a. To determine possible reductions in the overall weight of the airplane, maintaining constant design range, investigate the effect of reduced cruising speed:

(1) By means of installing Lycoming R-7750 engines.

(2) By means of installation of any composite power plants that appear attractive.

b. To determine possible reductions in the overall weight of the airplane, maintaining high cruising speeds by reducing the Tactical Operating Radius to 2000 miles, investigate the effect of reduced number of engines of either the gas turbine or reciprocating types.

c. To follow the effect of design cruising speed on airplane weight, expand the study directed in (a) above to follow airplane weights required to obtain constant range with varying cruising speeds. It is suggested that the method employed in Boeing Report No. D-7160, "Preliminary Study, Long Range, High Speed, High Altitude Heavy Bomber," dated 1 September 1945, will lend itself well to this study.

3. The above studies will be directly applicable to a conference to be called by A-3 about one month from the present date for the purpose of initiating preparation of new Military Characteristics for bombardment aircraft. It is expected that this conference will stress the development of a "work-horse" bomber to succeed and to have somewhat improved performance over the B-29 airplane.

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1.1 Airc. Lab. Comments
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4. E. O. Number 106-253 may be used for the above study.

GEORGE T. PRICE
Colonel, Air Corps
Chief, Aircraft Projects Section
Service Engineering Subdivision
Engineering Division

TSW/JAP/vlk
3-1319
Bldg. 105

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Conference was held in Bombardment Branch 20 August [illegible], for the purpose of discussing propeller reduction gear ratio on the [illegible] Turbine for proposed installation in the XB-[illegible] airplane and the propeller selection for the XB-[illegible]. The following personnel were present:

Hamilton Standard - Propeller:	Messrs. Baker, Harrel, Rosen, Thacher.
Curtiss Propeller:	Messrs. Ames and Irvin.
Propeller Laboratory:	Messrs. Crowley, Caldwell, Klein and Lerman.
Power Plant Laboratory:	Messrs. Burnett and Keating.
Boeing Aircraft Company:	Mr. Wells.
Bombardment Branch:	[illegible] and Mr. [illegible]

The XB-[illegible] was initially developed with an 8.82:1 propeller reduction gear ratio. Boeing's new [illegible] propeller speed of [illegible] times engine speed, would necessitate new reduction gear development. Colonel Harmon estimated that, due to the present state of development of the unit, work must be concentrated on the present unit and additional gear ratios could not be undertaken at this time. Power Plant laboratory estimated that a new gear ratio would cost roughly $1,000,000 and require approximately one year's time.

Take-off speeds will be low and the average cruising speed will be slightly reduced. It was definitely decided to use the standard gear ratio.

Discussion was then held on the propeller selection for the XB-[illegible]. Colonel Harmon stated that special emphasis must be placed on the cruising speed and take-off distance.

The following performance figures were given to give personnel an idea of XB-[illegible] requirements:

Speeds between [illegible] and [illegible] feet,
with an average of [illegible] mph.
Take-off distance [illegible] feet [illegible] that not exceed [illegible] feet.

The importance of propeller reduction gear development, with test [illegible] and power propeller would be available ahead of the delivery requirements on the XB-[illegible], was stressed. Curtiss-Wright Corp. was asked for an estimated development program, which was [illegible]. Hamilton Standard representative stated that this was a matter to be taken [illegible] matter.

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1 to 4 months required for basic preliminary aerodynamic study.
6 to 8 months in developing detail design, if the basic principle of the propeller actuating mechanism was proven. This time would extend considerably if new and novel and actuating features were incorporated.
7 months' additional time required to deliver a type test propeller.
9 months' additional time to deliver quantity sufficient to supply one airplane.

The general problem for the propeller and its close tie-in with engine development was stressed, and each of the propeller manufacturers stated their desire to be furnished gas turbines on which they could test their propellers. Power Plant representatives stated that the first T-35 engine should be available for limited flight test late in 1948. However, the number of T-35's presently on order by the Power Plant Laboratory are not sufficient to furnish either the propeller companies, Propeller Laboratory or Power Plant Laboratory with any engines for test purposes. It was estimated that propeller manufacturers each would need two engines for this work.

The desirability of a test nacelle for the B-52 was mentioned and, if such a nacelle is constructed, it should be designed so that it could later be installed in a full scale wind tunnel at Moffett Field. Although the speed available in this tunnel will be low compared to anticipated speed of the airplane, it would serve to obtain worthwhile information on propeller control and propeller stress checks.

Considerable discussion was held regarding the optimum diameter for the XB-52 propeller, and it was decided that both Curtiss and Hamilton Standard would proceed with their studies and return to Wright Field in approximately two months, each having definite recommendations regarding propeller diameter, at which time a review by the Propeller Laboratory and Aircraft Projects Section would be made. Boeing Aircraft Company should also make preliminary studies.

The problem of definitely pinning down responsibility relative to control development was discussed, and Mr. Bennett of the Power Plant Laboratory stated that a specification was now being circulated for approval which should accomplish this, although excellent coordination would be required between all interested parties. Instructions were given that this new specification would be made applicable in the case of XB-52 engine and propeller development.

The conference was then adjourned and reformed in the Propeller Laboratory, at which time the propeller representatives were quoted more specific performance data on the XB-52 airplane, including engine data assumed by Boeing. These data were extracted from Boeing Report D 7013, dated 4/14/46. Mr. Wells was to furnish additional aerodynamic data to Curtiss, Hamilton Standard and Wright Field, showing results of their studies with regard to compromise between take-off and cruising conditions.

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HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	17
FILE NO.	A

SUBJECT: Presentation of 1948 Research and Development Budget

TO: AC/AS-3, Attention: General Maxwell

DATE 1 [illegible] 1946

COMMENT No. 1
General Crawford/ee/71500

FROM: AC/AS-4

1. The following are comments of this office on your R&R of 30 August 1946, same subject as above, the original of which is being retained in the files of this office, with one copy having been transmitted to the Air Materiel Command for their information and files:

a. The recommendation that consideration be given to a review of current heavy ber characteristics, under which a Phase I contract for the Boeing XB-52 airplane is urrently being prosecuted, with the view of arriving at more realistic performance criteria which are within the capabilities of the industry to meet, is concurred in. This proposal is acceptable in this case since Boeing design studies have probably not progressed to a point beyond which changes cannot be made without greatly increased costs and appreciable delay in completion of this current Phase I contract, and the indication that a heavy bomber airplane of the range required by the Air Forces cannot be met without prohibitive size unless other currently specific performance criteria are reduced. Arrangements will, therefore, be made for a meeting to be held at Dayton to be attended by representatives of Air Materiel Command, A-3, A-4 and the Boeing Company to consider what modifications are feasible and appropriate in current heavy bomber requirements, which will result in the procurement of a more acceptable airplane meeting desired range requirements without increasing the currently estimated gross weight of the airplane. The proposed date of this meeting will be coordinated with your office.

b. Requested funds for the 1948 Phase I development of a medium bomber may, h the approval of this office, be transferred to the development of a substitute type airplane, if logical reasons indicate a transfer of planned development is desirable. It would appear, however, from your comments pertaining to both medium and light bombers that a review of current light and medium bomber characteristics with the idea of modification of such characteristics to result in the light bomber requirements being scaled down sufficiently to result in an appreciably lighter airplane than the current light bomber characteristics permit, and a realistic revision of current medium bomber characteristics to result in the development of an airplane of a 2,000 to 2500 mile radius category, and of performance characteristics capable of practical attainment by the aeronautical industry, is in order. It is suggested, therefore, that personnel of A-3, A-4 and A.M.C. consider this subject at the same time the review of current heavy bomber characteristics is made. Due to the comparatively advanced state of design of current light bomber contracts, changes in initiated designs of these airplanes is not concurred in. An alternate solution might well be the diversion of requested 1948 Phase I money to the development of a light bomber designed in accordance with new characteristics, with two (2) sets of characteristics being written for medium bombers. One of these medium bomber characteristics would cover the development of a conventionally powered aircraft; the other would cover jet powered aircraft. This division of medium bomber type aircraft characteristics would permit recognizing the capabilities and limitations of the type power plant installed and would in turn result in a logical placing of the B-29 and B-50 in the conventionally powered aircraft category, with B-51 and B-53 placed in the category of jet powered

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HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	
FILE NO.	

SUBJECT: Presentation of 1948 Research and Development Budget

TO: AC/AS-3, Attention: General Maxwell

DATE

COMMENT No. 1 (cont'd)
General Crawford/ee/71500

FROM AC/AS-4

medium bomber developments.

c. Since 1948 budget estimates have already been submitted to the War Department, it is too late to consider the submission of funds for the development of an internally stowed lighter from requested Fiscal Year 1948 funds. The desirability of an alternate development to the current MacDonald contract may, however, be considered when amount of Fiscal Year 1948 funds is approved by Congress.

d. Requested funds for the development of additional all-weather fighters over the developments currently underway from 1946 funds is of a questionable urgency. It is concurred in that the proposed 1948 development should be placed in a relatively low priority and should be considered a logical candidate for elimination in the event requested development funds are considerably curtailed by Congressional action.

e. The current interceptor fighters (XP-91, XP-92) are under contract from 1946 funds, for both Phase I and Phase II development. The inclusion of Phase II development in existing contracts was due to the availability of additional money during the last 30 days of the F.Y. 1946, which time did not permit being obligated for other lesser cost development projects. Instructions have been issued to Dayton, however, that Phase II development will not be initiated if review of the Phase I work indicates a reasonable doubt as to the satisfactoriness of the design, without approval of this office.

f. The most recent statement of A-3 views on training aircraft requirements are interpreted to indicate that there is an existing requirement for the development of four types of trainers; a combined primary and basic trainer, a two-place jet fighter trainer, a multiplace jet trainer, and a combination crew trainer and light personnel cargo airplace powered with conventional engines. It is understood that this later airplane is visualized as being generally of the current B-25 type. F.Y. 1947 funds are currently available for the development of a two-place jet fighter, although the cnntinued availability of such funds will depend upon War Department decision as to the amount of reductions to be imposed against Congressional F. Y. 1947 Air Force appropriations. Requested 1948 funds include money for the development of a multiplace jet trainer and a combined primary and basic training airplane, although the availability of such funds will depend upon Congressional action. It is believed essential, however, that a definite statement of the desired priority of development of the types of trainers currently visualized be announced. It is also recommended in view of the current general conversations with which industry has been made familiar with the contemplated development of a two-place jet fighter, that this airplane reamin in first priority of trainer development.

g. It is considered desirable that the tentative priority of a carry-on airplane for the C-82 type, with a payload of 20,000 lbs, over the development of a 50,000 lb payload transport, should be reversed. F.Y. 1947 funds are available for the Phase I development of a 50,000 lb payload transport and it is doubtful if appropriations can be secured

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HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	
FILE NO.	

SUBJECT: Presentation of 1948 Research and Development Budget

TO: AC/AS-3, Attention: General Maxwell

DATE

COMMENT No. 1 (cont'd)
General Crawford/ee/71500

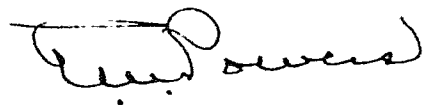
FROM: AC/AS-4

for the development of a 20,000 lb payload transport, when indications are that the C-82 with a more powerful engine installation can approach the desired payload requirements.

h. Funds have been included in the 1948 estimates for the Phase I development of an 100,000 lb capacity transport and for the installation of engines in gliders to meet the current thinking on assault transports.

i. F.Y. 1946 funds were used for financing the development of an 8,000 lb payload glider and 1947 funds are currently available for the financing of a 16,000 lb payload glider. The continued availability of funds for the development of a 16,000 lb payload glider will depend on the decision of the War Department as to the amount of reduction to be had in Congressional appropriations for Air Force development.

2. Your other comments pertaining to requested funds for development of aircraft accessories are constructive and appear to be well taken. A copy of these comments have been left with the Air Materiel Command for their information in reviewing the reallocation of development money among various classes of projects, when the exact amount of Congressional reduction in requested funds is definitely known.



E. M. POWERS
[illegible] U. S. A.
[illegible] Air Staff-4

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Dated
Oct. 1, 1946.

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REFERENCE
SE-5721

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Mr. George W. Brady,
Chief Engineer,
Curtiss-Wright Corporation
Propeller Division,
Caldwell, New Jersey

Subject: Propeller Design Information for XB-52

Reference: Boeing letter SE-534N, dated September 3, 1946

Dear Mr. Brady:

In this letter further information on the XB-52 airplane is presented. It is anticipated that an extensive development program will be carried out in order to obtain the optimum airplane configuration. As part of this program a rather comprehensive series of wind tunnel tests have been planned. Present indications are that considerable progress in aerodynamic as well as in general airplane design will be made. Consequently it is anticipated that this airplane will be an important type. A good part of the improved performance over existing designs is, of course, due to power plant development. It is therefore desirable that the design of the power plant and propeller installation be advanced as rapidly as possible in that the design of the whole airplane will be influenced to a large extent. For this reason it is desired that the propeller performance and design be thoroughly investigated at the start. It is requested that in addition to the design of the propeller for the first T-35 engine another study also be made on the optimum propellers for the B-52 airplane.

The difference between these studies may be summarized as follows:

Study #1. Gear ratio--.113; propeller diameter-- approximately 16 feet; tip speed losses at high speed of secondary importance, (to be used with first T-35 engine).

Study #2. Gear ratio--as required; propeller diameter--as required; low tip speed losses up to M = 0.7 (airplane).

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In view of the fact that this airplane is being designed primarily for extreme range at high cruising speeds, it is felt that in the first study with the presently fixed gear ratio, high speed should be of secondary importance in affecting the propeller design. Thus the propeller diameter should be chosen to avoid tip speed losses at the higher cruising speeds only.

The important propeller design factors for a long range airplane are:

a. Takeoff thrust; and
b. Cruising efficiency

For this airplane it appears that takeoff and performance with one engine out immediately following takeoff will limit the maximum gross weight. These conditions are fairly well represented by thrust at 100 mph. The effects of changes in thrust on range and weight are as follows:

a. 1% increase in thrust at 100 mph equals 75 miles increase in range
b. 1% increase in thrust at 100 mph equals 1/2% increase in takeoff gross weight

Other parameters vary in the following manner:

c. 1% increase in takeoff weight increases range 150 miles if the weight increase is all fuel;
d. 1% increase in average cruising propeller efficiency equals 100 miles increase in range;
e. 100 pound increase in propeller weight per propeller decreases range 36 miles.

In the second propeller study which will define the optimum propeller configuration with no limitations on either gear ratio or diameter, again the emphasis must be placed on takeoff thrust and cruising efficiency. However, tip speed losses in this case should be kept reasonably low up to airplane Mach numbers of 0.7 at which speed the wing will become critical. This study should be completed in the near future in order that the space requirements for the optimum propeller may be designed into the first airplane.

Very truly yours,

BOEING AIRCRAFT COMPANY

ORIGINAL SIGNED BY G. S. SCHAIRER

G. S. Schairer
Staff Engineer
Aerodynamics and Power Plant

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HqAMC Form No. 10-514 (Rev. 1 Aug 45)

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th: CG, AMC
Initials: [illegible].
Date: 11/26/46.

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

HEADQUARTERS

AIR MATERIEL COMMAND

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO ATTENTION OF FOLLOWING OFFICE SYMBOL:

TSENG

No action taken on this
Superseded by 3rd Conf.
held in Hdqs AAF 7 Jan 47 MDS

WRIGHT FIELD, DAYTON, OHIO

26 November 1946.

SUBJECT: Conference at Wright Field with A-3 Personnel on XB-51, XB-52, XB-53 and Military Characteristics in General

TO: Commanding General
Army Air Forces
Washington 25, D. C.

Attention: AC/AS-4.

1. Submitted herewith is a summary of conference held at Wright Field 17 and 18 October with AC/AS-3 personnel on the XB-51, XB-52, XB-53 and Military Characteristics in General.

2. The purpose of referenced conference was to discuss items on the subject airplanes which were delaying these projects and to obtain decisions or appropriate plans for action which would permit continuation of work by the respective contractors.

3. Personnel present were as follows:

AC/AS-3	AMC
General Maxwell	Colonel Brentnall
Colonel Hudnell	Colonel Moore
Colonel Bailey	Colonel Smith - Colonel Davis
	Lt. Colonel Warden
	Lt. Colonel Reichert
	Major Williams
	Mr. Boykin

4. XB-52:

a. In previous conferences with personnel of AC/AS-3, it was pointed out that an airplane having a 5,000 mile tactical radius and meeting the other Military Characteristics of a very heavy bomber would have a gross weight of between 400,000 and 500,000 pounds.

b. In February 1946, a design directive based on approved Military Characteristics of a very heavy bomber was

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[redacted] criticism
[redacted] statements.

[redacted] in itself.
[redacted] of personnel that
[redacted], to emphasize
[redacted]. This has been reiterated
[redacted] that this step
[redacted] but this would
[redacted] than an
[redacted] not developed [illegible]

[redacted] number was discussed as
[redacted] showing a
[redacted]. Although pre-
[redacted] Air Forces, stated
[redacted] "the core" of the
[redacted] to remain
[redacted] The latter, [illegible]
[redacted], Attachment A.
[redacted] appear that the cost
[redacted] to carry
[redacted] Wright Aeronautical
[redacted] only the following

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Ltr., A[illegible] AAF, [illegible] Nov 46, subject: Conference at Wright Field with A-[illegible] Personnel on XB-51, XB-52, XB-53, and Military Characterization in General

(3) The Air Materiel Command would continue its development efforts to provide defensive armament and fire control systems for high speed airplane.

b. Action Required: Air Materiel Command to submit summary to AC[illegible]-3 for Final Decision. Action was accomplished by AMC letter, dated 22 October 1946, and necessary authority to proceed with action relative to the armament on the XB-53 was covered by 1st Indorsement, dated 24 October 1946.

[illegible]. XB-51:

a. In February 1946, design directives based on approved military characteristics for light bomber were circulated for design competition. Martin proposal (XB-51) meets military requirements. AC/AS-3 personnel requested a study of R-4360 engines in lieu of T3-110. Size and weight of this design have been criticized and comments from AC/AS-3 personnel have led to doubt by AMC as to future policy with respect to this development. Specifically, letter from AC/AS-4 to AC/AS-3, subject, "Presentation of 1948 Research and Development Program," dated 30 August 1946, is quoted as follows:

#

"The light (tactical) bomber should have the highest priority of all bomber types. Inasmuch as neither the B- series "medium" bombers (which mostly have light bomber range performance) nor the XB-51, nor the XB-[illegible] are expected to be entirely satisfactory as light bombers, it is believed that at least one, and possibly two sources should initiate new developments in 1947. It can be confidently assumed that the 1947 characteristics will have to be scaled down in order to allow design of an airplane more suitable for tactical use and presumably not weighing over [illegible] pounds."

b. AMC proposed that, if AC/AS-3 considered that the [illegible] were highly unsatisfactory and intended to correct this [illegible] by re-writing military characteristics to [illegible] time, then it appeared to be highly [illegible] action immediately, in order not to [illegible] its completion and to utilize the funds [illegible] airplane in accordance with the [illegible]. No [illegible] answers reached relative to any

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[illegible] military characteristics. [illegible] line. Approxi-

[illegible] lbs. - T. O. Distance 4,700
[illegible] lbs. - T. O. Distance 3,750

[illegible] operating radius of 500 miles. [illegible] appears to attain the previously stated [illegible], namely as light an airplane as possible [illegible]. In view of the 7,000 weight [illegible], it is desirable to continue with the turbine [illegible].

[illegible] Characteristics for Light Bombers: This [illegible] the thoughts expressed by members of AC/AS-3, [illegible] the gross weight of the XB-51 is too great for a light [illegible] tactical or air support. It is believed that military [illegible] should be written to design a ground support airplane [illegible], to permit with essentially the following [illegible]: Take-off distance less than 5,000 feet without [illegible]; cruising speed 250 MPH; tactical operating radius approxi- [illegible] miles; sprint speed 500 MPH or better, and a 4,000 [illegible]. If such a military characteristic is to be [illegible], it is believed truly desirable to take immediate action [illegible] characteristics and direct the development funds [illegible] the XB-51 into such a channel. This is considered [illegible] advisable in view of the probable reduction of [illegible] in subsonic speeds.

[illegible]: In view of the projected T-35 Wright turbine [illegible] as an additional supplement to subject conference, [illegible] recommended that the XB-51 be converted from a six [illegible] to [illegible], essentially in accordance with [illegible] as presented in the conference. The Contractor [illegible] making additional studies using four T-35's [illegible] improved performance. These studies should be

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HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

IN REPLY REFER TO:

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ADDRESS REPLY TO: COMMANDING GENERAL, ARMY AIR FORCES, WASHINGTON 25, D. C.

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[illegible] with the equipment, [illegible] to the more [illegible] operation.

[illegible] which, with [illegible] straight wings; and [illegible] to be considered in [illegible] restriction on take-off dis- [illegible] there was the possibility of dropping a [illegible] over after take-off, leaving only sufficient [illegible] practically empty.

[illegible] It was agreed that in order to accomplish the task from pre- [illegible] aircraft must have a minimum tactical operating [illegible] miles plus adequate reserve of fuel at a high cruising [illegible] miles per hour or better. It was decided in this case that reserve [illegible] or better 2,10 miles was adequate. This provides an [illegible] with 10,000 miles range with 10,000 pounds of bombs - a range [illegible] miles than the design range of the B-36.

[illegible] It was pointed out that this completely alters the design concept of the airplane from a general purpose, flexible, completely armed, [illegible] with that load type of bomber.

[illegible] It was brought out by the Boeing representatives that there were [illegible] features which required staff study by the AAF and design [illegible] their economy, as well as new design problems of sufficient com- [illegible] make it desirable to proceed first to building a high speed [illegible] similar along the lines of the "Weed" design (successor to the B-50) [illegible] 4,000 mile bomber. Discussions followed as to the [illegible] of the heavy bomber versus a new medium (2,500 mile) bomber. It was felt that politically there would be more support for the bigger [illegible] and therefore funds would be more assured, whereas we have a considerable potential now in the B-47 - B-50 class of medium bomber.

[illegible] It was then agreed to by all concerned, to change the [illegible] to the design study of the larger bomber in accordance with [illegible] requirements outlined above. Such a design is definitely [illegible] projected T-34 turbine prop engine which is expected to be [illegible] by 1951 to produce the high cruising speed desired with a [illegible] equivalent to that of a slow speed airplane using the improved [illegible] engine. The Boeing Company is to return with preliminary design data within approximately two months which will indicate the size of type ~~engine~~ design outlined above and the cost of including [illegible] equipment, etc., as may be controversial.

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HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

IN REPLY REFER TO:

7 DEC 1946

SUBJECT: XB-52

TO: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio
ATTENTION: TSTEX

CONTRACT FILES
W33-038ac-15065
12/13/46

1. Confirming the decision reached at the recent XB-52 conference held in Headquarters, AAF, Wednesday, 27 November 1946, it is directed that AMC proceed with the following plan:

a. Boeing Aircraft Company will continue, to completion, Phase I study of the XB-52 aircraft as contained in the present contract.

b. In addition to Phase I study on the XB-52, Boeing Aircraft Company will initiate a study for the design of a bomber to meet requirements for accomplishing a specialized long range mission. These estimated requirements are:

(1) Approximately 12,000 mile range.
(2) A tactical cruising speed of 400 miles or better.
(3) Capability of carrying the Atomic Bomb.
(4) To carry only minimum crew and minimum GFE.

2. No action will be taken for initiating Phase II on the XB-52 without specific approval from this Headquarters.

BY COMMAND OF GENERAL SPAATZ:

Ans 4-17-47

E. M. POWERS
Major General, U. S. A.
Assistant Chief of Air Staff-4

Contract No.
W33-038 ac 15065

CONFIDENTIAL

ADDRESS REPLY TO: COMMANDING GENERAL, ARMY AIR FORCES, WASHINGTON 25, D. C.

V-75811

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CONFIDENTIAL

December 13 1946

370-26

Hamilton Standard Propellers
Division of United Aircraft Corporation
362 South Main Street
E. Hartford, Connecticut

Attention: Mr. Carl F. Baker
Chief Engineer

Subject: Propeller Design Information for B-52 Airplane

References: (a) Curtiss wire from Leadbetter to Robbins dated December 4, 1946
(b) WAC Preliminary Specification AC-121
(c) Boeing letter SE-572-N dated October 2, 1946

Gentlemen:

Wright Aeronautical Corporation has just proposed to the Air Material Command a revised T-35 gas turbine (reference b) which increases the available power at altitude by over 50 percent. This considerably alters the airplane designed around the present T-35 units (takeoff power - 5500 SHP). For this reason a specially designed propeller to be used with the first T-35 engines (Study #1 reference c) is becoming of less importance. It is suggested that an existing propeller might be used for these first engines.

The new performance data for the airplane with the higher-rated engines are as follows:

	Altitude	Speed	Shaft HP
Takeoff	S. L.	100	7300 (9000)*
Cruising	35,000	420	5000
High Speed	25,000	460	6000

* (Possible takeoff power with redesigned gear box)

It should be pointed out that the takeoff power of 7300 SHP given above, and listed in reference (b), is reduction gear limited and will go to approximately 9000 SHP with a redesign of the reduction gears. It is felt that Air Material Command will be very much interested in this aspect when shown the improvements in takeoff performance and range resulting therefrom. Consequently the ability of the propeller to absorb the 9000 SHP for takeoff should be considered.

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As stated in a previous letter, takeoff thrust and cruising efficiency are of utmost importance since the Army has indicated a desire for extreme range in the B-52 airplane. For that reason the effects of changes in various parameters on range and weight are reiterated as follows:

a. 1% increase in thrust at 300 mph equals 75 miles increase in range;
b. 1% increase in thrust at 100 mph equals 1/2% increase in takeoff gross weight;
c. 1% increase in takeoff weight increases range 150 miles if the weight increase is all fuel;
d. 1% increase in average cruising propeller efficiency equals 100 miles increase in range;
e. 100 pounds increase in propeller weight per propeller decreases range 36 miles.

Tip speed losses should still be reasonably low at 0.7 Mach number and, as yet, no gear ratio or propeller diameter limitations have been selected. However, space requirements for the optimum propeller must be defined in the near future in order to fix the design of the first airplane.

Very truly yours,

BOEING AIRCRAFT COMPANY

/s/ G. S. Schairer
G. S. SCHAIRER
Staff Engineer
Aerodynamics and Power Plant

Cc: M. P. Crews (3) - Dayton
J. P. Murray - Washington D. C.
D. B. Martin - New York

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7 Jan 47

MEMORANDUM FOR RECORD

Subject: XB-52 Conference

1. A conference was held 11:30 Tuesday, 7 January 1947 in Headquarters, Army Air Forces, among members of Air Materiel Command, Boeing Company, AC/AS-4, and AC/AS-3. Purpose of conference was to evaluate Boeing's proposal for a new XB-52.

2. Those present were:

Major General LeMay	- Research and Development
Major General Powers	- AC/AS-4
Brig. General Crawford	- Research & Dev'g. Div., AC/AS-4
Colonel Holtoner	- " " " " "
Major Brady	- " " " " "
Brig. General Kendall	- Requirements Division, AC/AS-3
Colonel Bailey	- " " " "
Lt. Colonel McPherson	- " " "
Lt. Colonel Thorne	- " " "
Colonel P. Smith	- Aircraft Projects, AMC
Lt. Colonel Warren	- " " "
Colonel Beckler	- Research & Dev'g. Div., AC/AS-4, Proj. Sec.
Lt. Colonel Risser	- " " " " " " "
Mr. M. Wells	- Boeing Aircraft Co.
Mr. E. Roberts	- " " "

3. Subject meeting was result of conference held 27 November 1946 in HQ., AAF, where it was decided that the XB-52 in its present form was not satisfactory and that Boeing would present a new design study for consideration very shortly thereafter.

4. Mr. Wells presented Boeing's new design study which was as follows:

... Model [illegible]-15 - a four engine [illegible] with a maximum gross wt. of [illegible] lbs. and normal gross wt. of [illegible] lbs. ... is specialized version designed specifically to carry [illegible],000 lbs. of bombs at least 1,[illegible] miles. Without [illegible] or defensive fire power this specialized version has a range of 1[illegible],[illegible] miles. The -15 model is also alternate to meet long range bombing, carrying 10,[illegible] lbs. The remainder of the ... tanks. ... defensive fire power [illegible],[illegible] lbs. of bombs this would have a range of 1[illegible],[illegible] miles at a cruising speed of [illegible] m.p.h.

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XB-52 Conference

b. Model 464-17 is the same airplane as the -16, but has capabilities of an alternate load up to [illegible],000 lbs. The -17 version has the following capabilities:

Gross Weight	Weight of Loads	Range	V cruise
[illegible],000 lbs.	10,000 lbs.	12,[illegible] mi.	[illegible] mph
400,000	10,000	10,200	[illegible]20
450,000	90,000	7,500	[illegible]20
400,000	90,000	5,200	[illegible]20

c. The proposed power plant for this airplane is the Wright T-35-3. However as the development timing on the T-35-3 is behind the development of the new XB-52 it is proposed to initially use the T-35-1 until such time as the T-35-3 is ready for installation.

d. A small amount of discussion followed Mr. Wells' presentation of the above proposals. Everyone present appeared satisfied and pleased with the performance of this new airline.

7. Lt. Colonel Warden pointed out several salient features of the airline that would materially assist in the criticism of this line in the future. Essentially these were:

a. Fuel protection - It was generally agreed that fuel for [illegible]% of range would be in bottle tanks. The remainder would be in droppable tanks or have some system of purging.

b. Crew - Proposed crew is eleven men, but the question of a relief crew was brought up. However, it was generally considered that with modern crew rest personnel could be provided in duplicate to go forward to the duty as gunners when not performing their primary functions.

c. Armor protection - [illegible] Lusk remarked that pilot armor [illegible] necessary to provide adequate armor protection for the crew with no crew protection.

d. In conclusion it was decided that Boeing would [illegible] the model 464-17 to accommodate the XB-52 and development under original XB-[illegible] contract.

W. C. [illegible]
Major, Air Corps

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8.3 P.P.--Fuel System
5 — (1/2mp)
Bomb. Br., Eng. Div.

6

COPY

HEADQUARTERS, ARMY AIR FORCES
Washington

13 January 1947

SUBJECT: Leak Proofing Aircraft Fuel Tanks

TO: Commanding General
Air Material Command
Wright Field, Dayton, Ohio
ATTENTION: TSTEX

1. Recently a great amount of discussion has taken place in this Headquarters on the subject of leak proofing and purging of aircraft fuel tanks. Criticism has come from various sources because of the lack of an effective purging system and all around leak proofing in the fuel tanks of the B-36 airplane.

2. In developing heavy bombers, the size of the present B-36 and those of the future, the question of the weight required to leak proof tanks against the resulting sacrifice in range considered critical. It is therefore deemed essential that a policy be formulated establishing fuel tank safety requirements resulting in the least possible compromise in range.

3. To realistically establish a policy to cover leak proofing and purging of fuel tanks and enable a true evaluation of proposals, it is directed that AMC review the following questions and forward to this Headquarters the desired information.

a. At present what is the most efficient purging system thus far developed? Request a comparison of relative weights and efficiencies of various systems.

b. How efficient does AMC consider the purging system on the production of the B-36?

c. Considering the B-36 and the XB-52, how much weight would be saved if only 75% of the total extreme range fuel tanks were leak proof tanks? The remaining tanks would be either droppable or have a purging system?

d. Again with reference to the B-36 and B-52, what per cent of the total fuel is used in the first 3000 miles of an extreme range mission under a normal flight plan and carrying 10,000# of bombs? Under the same conditions, what per cent of the total fuel is used in the first 1500 miles?

e. What is the status of research and development for rendering a fuel tank safe from fire or explosion either by purging or some other system?

4. In view of the importance of this matter and the desire to establish a policy at the earliest possible time, it is directed that the required information be forwarded to this Headquarters not later

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9.3 P.P.—Fuel System
5— (2/2cm) 1

COPY

13 January 1947

than the 27th of January 1947.

BY COMMAND OF GENERAL SPAATZ:

/s/ F. O. Bunker, Colonel, A. C.

for ALDEN P. CRAWFORD
Brig. General, U. S. A.
Chief, Research & Engr. Div.
AC/AS-4

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0117

ATSC Form No. 10-3
(19 Mar 45)

ROUTING AND RECORD SHEET AIR TECHNICAL SERVICE COMMAND

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Place initials of dictator and typist, telephone number and location to right of signature

Use entire width of sheet, both sides.

Number all comments consecutively.

Separate comments by horizontal lines across page

SUBJECT: Landing Gear Requirement for Very Large Airplanes

TO: Aircraft Laboratory
Engineering Division
(TSEAC)
Attn: Colonel Moore

FROM: Bombardment Branch,
Aircraft Projects Section
Engineering Division
(TSEOA-2)

DATE: 13 Jan 47 COMMENT NO. 1

1. Attached letter is forwarded for your comments and necessary action.

2. In conference at Headquarters, Army Air Forces, it was concluded that the XB-52 configuration should be in accordance with Boeing Aircraft Design Study 450-17. Copies of these studies will be forwarded to Aircraft Laboratory when available. This design includes the use of two 1600 gallon droppable wing tanks, located outboard from the outboard nacelles at a take-off gross weight of 408,000 pounds. The landing factor falls below Army minimum requirements. Inasmuch as this overload condition will be a special mission requirement, Boeing has proposed an auxiliary landing gear to support the weight of two external tanks during the take-off roll only. Such an expendable landing gear would be a one flight proposition only. It is believed that General Crawford's letter is prompted by information on such a landing gear.

3. It is thought that the Aircraft Laboratory may desire to make independent studies for answer to attached letter. Detailed information from Boeing will be forwarded at such time as it becomes available.

GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

HEW/emh
3-4305
Bldg. 126
Rm 222

Attach.
Ltr fr Hq AAF, dtd 1/2/47,
same subj.

TSEOA-2 TSEAC-2A 26 Feb. 1947 2

1. In making this reply, it is not clear from the correspondence (reference letter, dated 2 January 1947, from AC/AS-4, subject as above) whether the office of origin has in mind:

a. The idea of dropping elements of the "permanent" gear (see Paragraph 2. of the letter) or,

b. The proposal mentioned in Comment No. 1. of this RAL regarding the droppable auxiliary gears which are independent of the main gear and located under the external tanks for the purpose of supporting same during the take-off run.

NOTE: The phrase "abortive take-off" as used in this report, includes those abortive missions requiring return to home base prior to 20% completion of any mission, as well as those "abortives" occurring on or immediately after take-off.

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WP-C-14-45-2 MR

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AMC Form No. 10-3 (19 Mar 45) 1.1 Aire. Lab Comments 5-(2/4pp)

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ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

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SUBJECT Landing Gear Requirement for Very Large Airplanes.

TO TSEOA-2 FROM TSEAC-2A DATE 2-25-47 COMMENT NO. 2

2. a. Prior to a discussion of either 1.a. or 1.b. above, it should be pointed out that, in the case of very heavy aircraft, particularly bombers, having very low design strength factors, high ratios of take-off weight/landing weight, and high take-off speeds, the take-off condition at maximum alternate gross weight will design the tires and may define the strength of the complete permanent alighting gear. If some elements of the gear are dropped after take-off, the remaining elements may be designed by landing conditions, but even this is not a certainty. The shock absorber design also will present a difficult problem owing to the wide variance between the weight conditions under which the oleos will be required to function in preventing high decelerations from reaching the primary structure. Stated otherwise, it is very possible that landing conditions may not supply the critical factors in the landing gear design for very heavy aircraft, but that design for take-off may control.

b. Even though take-off conditions may ultimately control the design of the gear, it appears that establishing as a landing design condition a loading with all fuel expended is not realistic or sound practice. Such a condition is not representative of service operating conditions where reserve fuel in the tanks at the completion of the mission would always be provided to cover contingencies.

c. In addition, the adoption of "all fuel expended" as a design condition would imply that, after an "abortive take-off", no immediate landings could be made without incurring the risk of serious damage to the airplane, and probably the occupants.

d. Therefore, the idea stated in Paragraphs 1. and 2. of the referenced letter that it may be possible to design a landing gear with only sufficient strength to land the airplane in the light weight condition (i.e. fuel and bombs expended) and still provide sufficient strength for take-off fails to take into account the several items mentioned above.

3. With reference to Paragraph 1.a. above, it appears that with very large and heavy aircraft very little could be gained by dropping elements of the permanent gear after take-off. The effect on the range of an airplane in the XB-52 class of dropping one-half the main gear elements is to increase the all-out range in the order of 5%. It should be emphasized that this amount represents in fuel much less than what is considered an ordinary reserve for normal missions. The portion of the total fuel that is saved by not carrying the dropped gear elements for the entire mission is small in comparison with the total fuel required for the mission. It should be borne in mind that it is not a question of adding a weight of fuel equal to that of the droppable gear elements to the airplane prior to take-off, but simply the fuel saved, (extension of range possible), by lightening the airplane after it is airborne by 1/2 the total gear weight. Actually, the savings in pounds would be somewhat less than appears obvious, inasmuch as extra weight would be required for the jettisioning gear and apparatus, including extra weight in fittings, mechanisms, quick removable pins, power means for extracting the pins, controls, etc. In addition, assuming that the structure had been designed for loads imposed by the original complete gear, extra structural (weight) would be required for carry-through of landing loads imposed on and transmitted

WP-L-16 JUNE 46 1 MM

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AMC Form No.-10-3 (19 Mar 45)

1.1 Aero Lab. Comments 5-(3/4/47)

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AIR MATERIEL COMMAND

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SUBJECT Landing Gear Requirement for Very Large Airplanes.

TO TSEOA-2 FROM TSEAC-2A DATE 2-18-47 COMMENT NO. 2

by the remaining gear elements. In the case of the XB-52, assuming that the main gear weight approximates 20,000 pounds, about 8,500 pounds could be saved by dropping, for example, the outboard main gears.

4. Another very important point in connection with dropping elements of the permanent gear is that no landing, abortive or otherwise, could be safely attempted until the gross weight had been reduced to at least 1/2 the weight originally supported by the permanent gear at take-off. Bombs and external tanks could be jettisioned and the gross weight thus reduced somewhat, but this weight would overload the remaining gear at landing far beyond its capabilities. It would be necessary to expend fuel by cruising flight until the gross weight had been lowered to the required figure. The fuel required to thus be expended amounts to about 18,400 gallons of the 20,400 gallons built-in tankage; or, in other words, about 90% of the fuel remaining in the airplane after the external tanks had been jettisoned.

5. With reference to Paragraph 1.b. above, with the auxiliary droppable gears supporting the external tanks during the take-off run, the main gear would be required to support about 400,000 pounds. Everything said above in Paragraphs 3. and 4. also apply to this condition, ~~the margin increase being of the order of 10% and~~ the landings after "abortive-take-offs" being limited to 430,000 pounds gross weight, i.e. the weight supported by the complete main gear at take-off. It is assumed that the airplane will maintain flight after it has lifted clear of the ground, i.e. the pilot will not permit a return to the runway.

6. Some general comments relative to the XB-52 airplane and its gear design are believed pertinent and are presented immediately following. Two major problems exist in this connection:

a. Tire design to withstand the high centrifugal forces, heat dissipation, and rolling impact loadings occurring at the high take-off speeds for this airplane (approximately 145 to 160 M.P.H). An investigation of this problem, including tests, is planned for during the current year.

b. Concrete runway loadings resulting from possible (necessary) increased tire ratings, in combination with probable wheel spacing relationships. This airplane with presently proposed wheel loadings and spacing arrangement (four permanent gears) will require concrete runways approximately 1" thicker than calculated for the B-36 and B-36A airplanes with the twin-tandem (4 wheels per side) gear, i.e. 14-1/2" compared with 13-1/2". The foregoing considers:

1. Taxiing and take-offs of the airplane at maximum alternate gross weight of 480,000 pounds with about 80,000 pounds of the gross weight supported by the auxiliary, droppable gear under the external tanks, and

2. An immediate landing ("abortive take-off") in which the auxiliary gear and external tanks were dropped prior to the landing (gross

WT-L-16 JUNE 46 1 MM

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AMC Form No. 13 5-(TSEAC-2)
(19 Mar 45)

ROUTING AND RECORD SHEET CONFIDENTIAL

AIR MATERIEL COMMAND

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Separate comments by horizontal lines across page.

SUBJECT Landing Gear Requirement for Very Large Airplanes.

TO TSEOA-2 FROM TSEAC-2A DATE 2-18-47 COMMENT NO. 3 2

Page 4

weight approximately 400,000 pounds). It should be noted that the landing conditions discussed in Paragraph 4. above with half the permanent gear elements remaining on the airplane approximate 200,000 pounds, which would load the runways just as critically as the 400,000 pound landing on the complete gear. Runway thicknesses considered above are based entirely on Corps of Engineers data previously made available to the AMC in connection with other design studies.

7. It is requested that a copy of your reply to AC/AS-4 be furnished this office.

C. K. Moore

C. K. MOORE,
Colonel, Air Corps,
Chief, Aircraft Laboratory,
Engineering Division.

H. O. Lippman

HSL/mmn
2-6232
Bldg. 50

Incl. n/c

CONFIDENTIAL

WF-L-16 JUNE 46 1 AGI

(CONTINUE ON OTHER SIDE)

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HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

IN REPLY REFER TO:

AC-15065

27 JAN 1947

SUBJECT: XB-52

TO: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio
ATTENTION: TSTEX

CONTRACT FILES
W33-038 ac 15065
2/21/47

1. Confirming decisions reached at the XB-52 conference held in this Headquarters on 7 January 1947, it is directed that AMC proceed under present XB-52 contract with the development of the XB-52 to conform with the new design proposal (known as Model 464-17) submitted by Boeing Aircraft Company.

2. It is to be noted that there will be no change of funds or type designation under the XB-52 contract.

BY COMMAND OF GENERAL SPAATZ:

E. M. POWERS
Major General, U. S. A.
Assistant Chief of Air Staff-4

33

ADDRESS REPLY TO: COMMANDING GENERAL, ARMY AIR FORCES, WASHINGTON 25, D. C.

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S.1 P.F. Lab. Comments
6 — (1/10)
Eng. Div., Bomb. Br.

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T-35 Engine Development for YB-52 Airplane

TSPCA TSEPP-4A 24 Jan. 1947 1
Att: Col. G. F. Smith

1. This is to confirm agreements made at a conference held between members of the Aircraft Projects Section and Power Plant Laboratory, on 22 January 1947.

2. It was agreed that because of airplane requirements the emphasis would be placed on the XT35-W-1 engine development with an understanding that the XT35-W-3 engine program would be delayed.

3. Aircraft Projects Section will procure twelve YT35-W-1 engines, four 10-hour engines and eight 50-hour engines. Two of the 10-hour engines will be used for engine development purposes with the other two 10-hour engines being used for propeller test and control tests. The 50-hour engines will be for airplane installation.

4. Any funds over and above those needed for the twelve engines will be used for XT35-W-1 engine development purposes.

5. The Power Plant Laboratory will use 1948 Fiscal Year funds allocated to Wright Aeronautical Corporation projects for YT35-W-1 development to insure having a 50-hour engine available for the first airplane.

6. If the above agreements are concurred in by Aircraft Projects Section, it is requested that concurrence be in order hereon.

MAP:meg
2-1038
1R-A

R. J. [illegible]
Colonel, Air Corps
Chief, Power Plant Laboratory
Engineering Division

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January 27, 1947

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSESA (Lt. Col. H. E. Warden)

Subject: Revision to Proposal and Quotation on 12 T35-1 Turbo Prop Engines and on Development Testing of T35-1 Engines

References:
(a) Wright Aeronautical Corporation letter GETydn dated January 19, 1947.
(b) Conferences at Wright Field January 21 and 22, 1947 attended by Lt. Colonel Warden of Air Materiel Command and Messrs. Holland and Tubb of Wright Aeronautical Corporation.
(c) Conference at Wright Field January 23, 1947 attended by Colonel O'Keefe and Messrs. Chenowith, Wolfe and Bennett of Air Materiel Command and Messrs. Farrar, Kinsey, Holland and Tubb of Wright Aeronautical Corporation.

Enclosure: (A) Price Analysis - Additional Full Scale and Component Development Testing of T35-1 Turbo Prop Engine through 50 Hour Preliminary Flight Rating Test

1. In Reference (a) this company submitted a proposal and quotation on twelve (12) T35-1 (Type II) turbo prop engines. Reference (a) also affirmed that, if the Government places on contract by September 1, 1947 the development testing program necessary to cover the development of the T35-1 engine to that point, this company will deliver engines capable of passing a 50-hour Prototype Flight Engine Test as defined in previous correspondence by this company. It was decided, however, that the Government will procure engines capable of passing a more difficult 50-hour Preliminary Flight Rating Test as outlined in an Army Air Force specification.

2. This company is pleased to revise the quotation and proposal submitted in Reference (a) on the basis of information given and decisions reached in conferences References (b) and (c).

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18.2 [illegible]
28-12/s (20)

109

To: Commanding General -2- January 27, 1947
Subject: Revision to Proposal and Quotation on 12 T35-1 Turbo Prop Engines and on Development Testing of T35-1 Engines

3. Without change in the prices quoted this company will be pleased to deliver the 12 T35-1 engines in the following configurations:

> First two engines in the present configuration of the T35-1 engine. Third and fourth engines will be delivered in accordance with the configuration dictated by development progress to the time of delivery but will be modified, if necessary, after delivery to the configuration which successfully passes the 50-hour Preliminary Flight Rating Test. The remaining eight engines will be delivered as 50-hour Preliminary Flight Rating Test engines.

It is understood that the first two engines may be delivered to the Government prior to July 1948 and that these two engines, upon acceptance by the Government, are to be returned to the custody of this company for use in the future development of the T35 turbo prop engine.

4. Except as mentioned immediately above the deliveries quoted in Reference (a) will be held firm.

5. Delivery of the above mentioned ~~twelve~~ ten (8?) engines as 50-hour Preliminary Flight Rating Test engines instead of T35-1 (Type II) engines is conditional upon the Government's placing a contract prior to September 1, 1947 to cover the additional full scale and component development testing necessary to attain the stage of development defined by the test specification covering the 50-hour Preliminary Flight Rating Test. This specification was discussed in conferences Reference (c). In order to make it possible to deliver these more highly developed engines without delaying the delivery dates already quoted it is necessary that the development program be considerably accelerated. Greater emphasis will be placed on the testing of full scale components under more severe conditions. This company is therefore pleased at this time to submit the following proposal covering the additional full scale and component development testing of subject engine beyond the T35-1 (Type II) development point through the successful completion of a 50-hour Preliminary Flight Rating Test as defined in the Army Air Force specification discussed in conferences Reference (c). It is suggested that this additional testing be added to Contract AC-14145 as Section Number 3, Exhibit Number 3C.

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8.2 Power Plant Group
23-13/5 1-11

110

To: Commanding General -3- January 27, 1947
Subject: Revision to Proposal and Quotation on 12 T35-1 Turbo Prop Engines and on Development Testing of T35-1 Engines

Exhibit Item Number 1 - Conduct not less than 500 hours of full scale and component development testing on the T35-1 turbo prop engine to continue the development of the engine past the 10-hour experimental flight test to the point where the engine will complete successfully the 50-hour Preliminary Flight Rating Test. For convenience in administration and in making payment the 500 hours of testing is divided into ten periods each of approximately 50 hours at an average price per 50-hour period of $225,924.00

Exhibit Item Number 1 Total Price $2,259,240.00

Exhibit Item Number 2 - Successfully complete a 50-hour Preliminary Flight Rating Test on a Government furnished T35-1 turbo prop engine.

Exhibit Item Number 2 Total Price 338,889.00

Total Proposed Additional Contract Price Exhibits Items Numbers 1 and 2 $2,598,129.00

6. For the convenience of the Air Materiel Command in evaluating this additional development test program an analysis of the total price is attached to this letter as Enclosure (A). If the Government desires, a portion or portions of the development testing may be placed on contract from time to time. These portions will be priced on the basis quoted as the average price per 50-hour period.

7. Delivery of the reports which will be submitted upon the completion of the development testing and the 50-hour Preliminary Flight Rating Test can be scheduled as follows:

Exhibit Item Number 1 - 10 reports by September 1948.

Exhibit Item Number 2 - Report of 50-hour Preliminary Flight Rating Test September 1948.

All the delivery dates quoted in this letter assume that contractual coverage for the 12 engines will be provided in the immediate future and that the development testing quoted on in this letter will be placed on contract by September 1, 1947.

8. This quotation is firm for thirty (30) days.

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8.2 Remarks & Comments
28-(4/5-47)

111

To: Comm. ding General -4- January 27, 1947
Subject: Revision to Proposal and Quotation on 12 T35-1 Turbo Prop Engines and on Development Testing of T35-1 Engines

9. This company's representatives will be pleased to visit Wright Field at the convenience of the Government to assist in the preparation of a contract based upon this quotation and Reference (a).

Respectfully,

WRIGHT AERONAUTICAL CORPORATION

Geo. E. Tubb

Geo. E. Tubb
Assistant Sales and Service Manager

GET:mg
cc: TSEPE3
TSEPP
AAFPR at WAC

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8.2 Powers Power Plant
28-(5/47P)

112

Enclosure A
W.A.C. Letter CET:mg dated
January 27, 1947

PRICE ANALYSIS - ADDITIONAL FULL SCALE AND COMPONENT DEVELOPMENT
TESTING OF T35-1 TURBO PROP ENGINE THROUGH 50 HOUR PRELIMINARY FLIGHT RATING TEST

Engineers	$126,896		
Draftsmen:			
Layout	23,408		
Detailers	19,360		
Checkers	9,680		
		$179,344	
Engrg. Dept. Supplies & Expense (153%)		274,396	
			$453,740
Fabrication:			
Materials		382,200	
Direct Labor		73,855	
Factory Overhead (245%)		180,945	
Materials Handling (10% of Matls.)		31,850	
			668,850
Exper. Assy. & Disassy. Direct Labor	91,135		
Exper. Test Direct Labor	98,475		
		189,610	
Exper. Assy. & Test Overhead (272%)		515,739	
			705,349
Sub Total			1,827,939
Facilities Rental (10.85%)			198,331
Sub Total			2,026,270
General & Admin. Overhead (15.4% of Above)			312,046
Total Estimated Cost			2,338,316
Profit			259,813
Total Price			$2,598,129

Basic Price	$2,343,824
Facilities Rental Amortization	254,305
Total Additional Contract Price	$2,598,129

W.A.C.
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TC-72 452.1 Rumanx
AF 707-33 (20 MAY 44)
12 (2/3 (28)

23

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

SECRET

TALLY NO	ERS
FILE NO.	2

SUBJECT: Internally Stowed Fighter

TO: DC/AS for [illegible]

DATE 21 JAN 1947

INFO: [illegible]

FROM: Requirements Division, A-[illegible]

COMMENT No _____

X337

X452.1 V (Rear)

1. The future development [illegible] obsolescence by recent developments [illegible]. At the conference in December 1946, [illegible] LeMay ruled that the special study [illegible] not provide for an internally stowed fighter. In subject in January 1947, it was decided that [illegible] desirability of building a general purpose [illegible] etc., however, that a study at the [illegible] tion should provide for internally stowed [illegible].

2. Some months ago, [illegible] the Requirements Division [illegible] having one or more internally stowed fighters. [illegible] would be obtained by having the same [illegible] design problem. This planning [illegible] all very long range bombers and at least one [illegible] larger to the B-36 type. It was felt that [illegible] actual trials of the XP-[illegible] not prove feasible, we will not [illegible] design limitations [illegible].

3. Doubt has been raised [illegible] stowed fighters for night and all-weather [illegible] ency's defenses were primarily [illegible] missiles. [illegible] too pessimistic attitude [illegible] operations will complicate the problem and may make the [illegible] unnecessary on the particular kinds of missiles. [illegible] defenses we may find that, [illegible] ternally stowed aircraft [illegible] measure devices; for instance, [illegible] or in other ways similar [illegible] many in close formation [illegible] of guided missiles, thus, causing the missile to [illegible] it also noted that the Navy [illegible] from mitting capital ships. With this idea [illegible] of baby aircraft, it would not [illegible] drones. We may, in any case, find that the [illegible] circumstances may make internally [illegible] them into drone carriers internally [illegible].

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PAGE 1

A-1120, AF (REV 20 MAY 44)

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TC-72 USAF Bureau 24
AF 180-33 (20 MAY 44)
12-(3/3 PC)

HEADQUARTERS ARMY AIR FORCES

DKD

ROUTING AND RECORD SHEET

TALLY NO	
FILE NO.	

SECRET

SUBJECT: Internally Stowed Fighters

TO: DC/AS for Research and Development

DATE 31 JAN 1947

COMMENT No. 1

FROM: Requirements Division, AC/AS-3

4. It is recommended that we continue with plans to [illegible] aircraft into future medium and heavy bombers and, in particular, in the [illegible]-52. In the case of the XB-52 let us consider that the minimum load [illegible] one A-bomb. It is also recommended that, if funds can be made available, [illegible] be given a contract to build an internally stowed fighter for the [illegible]-36.

Alfred R. Maxwell
ALFRED R. MAXWELL
Brigadier General, U.S.A.
Chief, Requirements Division

TO: DC/AS for Research and Development

DATE 5 February 1947

COMMENT NO. 2
Maj Brady/jm/3563

FROM: Research & Engineering Division, AC/AS-4

Noted and forwarded.

A. R. CRAWFORD
Brig. General, U. S. A.
Chief, Research & Eng'g Div.
AC/AS-4

AFDRE-4B Maj WDB
AFDRE-4F Maj RBA
AFDRE-4 [illegible]
AFDRE-1 _____

SECRET

PAGE 2

3-1180, AF (OCT 20 MAY 44)

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Contr. W33-038 ac-15065
Corres., Vol. 1
Contr. Files - B

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ROUTING AND RECORD SHEET

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SUBJECT Contract W33-038-AC-15065, XB-52 Airplane

TO Armament Laboratory, TSEPS

FROM Aircraft Projs. Sect., Engineering Division, TSEOA-2

DATE 4 Feb 47

COMMENT NO. 1

1. For your information, authorization has been given for Phase I development of the subject airplane. The model of the airplane decided upon for this development is the Boeing Model 464-17. The detail specification will be furnished your Laboratory in the near future for comments. The tentative characteristics of the airplane are as follows:

Gross Weight	Design——————360,000 lbs. Maximum Overload——480,000 lbs.
Power Plants	Four Wright T-35-3
Crew	Eleven
Turrets	2 upper 2/20 mm/400 rds per cannon 2 lower 2/20 mm/400 rds per cannon 1 tail 4/20 mm/400 rds per cannon
Bombs	Design——————10,000 lbs. Maximum——————88,000 lbs.
Wing Loading	Design——————120 lbs/sq. ft. Maximum Overload——160 lbs/sq.ft.
High Speed	445 mph at 35,000 ft.
Tactical Operating Radius at Design Gross Weight	3,380 miles at 220 mph average speed

GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

K. M. Scholes:rh
3-5392 Bldg 125

MX-839

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15.1 Contracts - Correspondence.
26 - T/TRP
Boeing Aircraft Company
Basic Contract Correspondence

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~~RESTRICTED~~

1002 Harries Building
Dayton 2, Ohio
February 14, 1947

Reference:
ORI-3438

For: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSEOA-2 Bombardment Branch,
Aircraft Project Section,
Engineering Division

Subject: CPFF Proposal for Heavy Bombardment Airplane, AAF Model XB-52 (Boeing Model 464-17), Phase II.

per ltr # OR2-1029 dtd 3/1/47

References: (a) Letter Contract W33-038 ac-15065, dated 7 June 1946.
(b) Boeing Letter ORI-528 dated 30 January 1947.

Pursuant to the request of the Air Materiel Command, there is submitted herewith a revised proposal to cover a Phase II development program on the subject model airplane. This proposal cancels and supersedes proposal contained in reference (b) and provides for additional work to be accomplished.

Phase II of this proposed program shall consist of an extension of the present Phase I program as set forth under the following Statement of Work:

Statement of Work

1. The work covered herein shall consist of an extension of that work at present called for under the terms of letter contract W33-038 ac-15065 except that the subject letter contract shall be amended to direct design of a long range heavy bombardment airplane in accordance with the contractor's Specification No. D-3091, dated 1 February 1947, revised 12 February 1947, in

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Boeing Airplane Company

To: Commanding General, AMC -2- February 14, 1947
Ref. ORI-3438

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lieu of contractor's Specification No. D-7603 dated 19 April 1946. The airplane design will be based on T-35-3 gas turbines with a minimum number of substitutions required to permit initial flying with T-35-1 gas turbines. In the work covered herein, the relevant portions of the current issues of the following specification, in effect on 18 April 1946, are incorporated herein by reference.

Army Air Forces - 40749 Data, Aircraft Performance

Army-Navy - AN-9103 Group Weight Statement

Item I.

A. Wind Tunnel Models, Tests and Reports.

1. Wind Tunnel Tests. The contractor shall conduct such additional wind tunnel tests as may be required to establish at least the following:

a. Rudder and elevator hinge moments.

b. Full-span flap, leading edge slats and/or other devices to insure satisfactory stalling and lateral control characteristics.

c. Cadome, pilot's canopy and other external protuberances found necessary during development of the airplane.

d. Satisfactory flutter characteristics of the airplane.

2. Wind Tunnel Models. The contractor shall design and construct and test the following wind tunnel models:

a. Complete flutter model (approximately .05 scale).

b. Such additional models as may be determined necessary to satisfactorily accomplish the items listed in paragraph A, 1. above.

3. Wind Tunnel Facilities. All wind tunnel tests required herein shall be conducted in the Boeing Aircraft Company high speed wind tunnel.

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15.7 Contracts Cancelled
26-(3/7 Rec)

Boeing Aircraft to Army

99

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4. Wind Tunnel Data and Reports. All data and analysis reports of wind tunnel tests shall be furnished in triplicate.

B. Mock-Up.

1. Revisions and/or Additions to Mock-Up. The contractor shall make such revisions and/or additions to the mock-up constructed under Phase I as may be required for the continued development of this project.

2. Mock-Up Photographs. Two (2) copies of photographs showing all installations and features which have been altered from the basic Phase I mock-up will be furnished.

C. Layouts and/or Drawings. The contractor shall prepare and make available to the Government such layouts and/or drawings and initiate such tests as may be required in the preparation of same to develop the design of the airplane components and systems for the purpose of determining jig fixtures, material requirements and accessory equipment procurement specifications for at least the following:

1. Fuselage Structure.

2. Wing Structure, including slats, flaps and ailerons or other devices required for satisfactory stall and lateral control characteristics.

3. Empennage Structure, including rudder, elevator and required tabs.

4. Landing gear, including main gear, nose gear, tail skid and required retraction mechanisms.

5. Flight Controls, including flap and slat acturting mechanisms and control surface boost systems.

6. Nacelle structure including engine dynamic suspension mounts.

7. Engine cooling including air intake provisions.

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15. 7 [illegible]
26 – 1947 (P)

Boeing Aircraft Company

To: Commanding General, AMC -4-

February 14, 1947
Ref. OPI-3438

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8. Ice removal system.

9. Power Plant installation including quick detach features.

10. Fuel system including tanks and supports.

11. Hydraulic system.

12. Turret installations including optical and radar fire control.

13. Bomb rack provisions.

14. Optical and radar bomb sighting installations.

15. Navigation equipment.

16. Crew furnishings including cabin soundproofing.

17. Flight and engine instruments.

18. Photographic equipment installations.

19. Electrical system.

20. Oxygen system.

21. Crew compartment supercharging and air conditioning system.

22. Hoisting and jacking provisions.

23. Emergency equipment provisions.

24. Fire prevention provisions and extinguishing system.

25. Tie-down provisions.

26. Radio equipment installations.

27. Radio and radar antenna installations.

28. Propeller installations.

29. Auxiliary and/or accessory power plants.

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15.7 Contract W-535-ac-[illegible]
26-(5/7 pp)

Boeing Aircraft Company

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30. New and novel features.

D. Development and Test

1. The contractor shall initiate the following developmental investigations and/or tests and make available to the Government in triplicate summary reports and studies resulting therefrom:

   a. Leakproof fuel tanks for body and wing fixed fuel.

   b. Control surface boost systems.

   c. High voltage electrical equipment.

   d. Hydraulic and pneumatic systems.

   e. Structural panels and fittings as necessary to substantiate stress analysis.

   f. Fuel system components.

   g. Typical sections of lateral control and stall improvement devices including actuating mechanisms.

   h. Refrigeration system.

2. Deletions and/or additions to the foregoing list of developmental studies and tests shall be made as indicated by the design progress and subject to the approval of the Chief, Engineering Division.

E. Development and Test of Horizontal Tail Surfaces.

1. The contractor shall:

   a. Prepare production design and master layout of horizontal tail surfaces incorporating thermal anti-icing, sealed leading edge elevator balance and mechanism for elevator extension.

   b. Fabricate one set of horizontal tail surfaces.

   c. Proof test typical structural panels of horizontal tail surfaces to substantiate strength.

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15 7 Contractual Corres
26 - (6/7 pp)

Boeing Aircraft Company

To: Commanding General, AMC

February 14, 1947
Ref. ORI-3438

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2. Prior to the contractor's initiating tests in connection with any of the items listed in paragraphs A, C, and D above of this supplement, and also tests covered in basic contract, the contractor shall notify the Air Materiel Command, Engineering Division, and furnish same with a brief outline of the test program.

3. Unless otherwise noted, three (3) black and white legible copies of layouts, drawings, reports and data as may be required shall be furnished.

4. Listed below are the requirements of the Engineering Division to be included under the place of delivery statement in the subject contract:

A. All drawings, layouts, data and reports as required shall be delivered in triplicate to the Air Materiel Command, Engineering Division, Wright Field, Dayton, Ohio, marked for the attention of TSIOA-2.

B. All mock-up photos shall be delivered to the Air Materiel Command, Engineering Division, Wright Field, Dayton, Ohio, marked for the attention of TSIOA-2.

C. The revised mock-up shall be available for inspection at the contractor's plant, Seattle, Washington.

5. Listed below are the requirements of Engineering Division to be included under the time of delivery statement in the subject contract:

A. Wind tunnel test reports, data and developmental test reports shall be delivered 30 days after completion of the particular tests insofar as practicable but not later than 31 December 1948.

B. Mock-up photographs shall be delivered within 30 days after the acceptance of the mock-up.

C. Design layouts and/or drawings shall be completed by 31 July 1948 and shall be delivered as specified by the Government as each is completed.

D. Proof test reports of horizontal tail surfaces shall be delivered within 30 days after completion of tests, but not later than 31 June 1949.

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15 7 Contracts & Corres.
26 - 19/1 PP)

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Boeing Aircraft Company

To: Commanding General, AMC -7- February 14, 1947
Ref. ORI-3438

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For the continuation and accomplishment of the work as outlined above, the Contractor quotes as follows:

	Hours	Rate	Amount
Engineering Labor	~~323,100~~	~~$2.56~~	$827,136.00
Engineering Overhead		85%	703,065.00
Developmental Labor	157,600	1.92	302,592.00
Tool Labor	13,200	1.90	25,080.00
Experimental Labor	56,100	1.84	103,224.00
Overhead		130%	560,164.00
Material and P.E.			135,150.00
Subcontracting			55,000.00
Direct Charges			13,500.00
Total Estimated Cost			$2,724,911.00
Fixed Fee			167,681.60
~~Total~~ Selling Price			~~$2,892,592.60~~

The foregoing proposal assumes that any contract resulting from this proposal will be on a CPFF basis and be issued as an amendment to the contract contemplated by Letter Contract W33-038 ac-15065, and that the terms and conditions applicable thereto will include those presently being negotiated under CPFF Contract W33-038 ac-15272.

This proposal assumes that arrangements can be made with the Government for the use of Government owned testing facilities in the event such facilities should be required by the Contractor in connection with the subject program; also that certain GFE, to be determined at a later date, will be furnished to the Contractor.

This proposal is subject to acceptance by 28 February 194~~8~~7

BOEING AIRCRAFT COMPANY

P. Gelsenlichter
Chief, Contract Administration

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BOEING AIRCRAFT COMPANY

SEATTLE 14, WASHINGTON

19 February 1947

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IN REPLY, REFER TO REFERENCE NO. OR2-1007

CONTRACT FILES
W33-038ac15065
2/26/47

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSGSA-2, Bombardment Branch
Aircraft Project Section
Engineering Division

Subject: Contract W33-038 ac-15065, AAF Model XB-52 Airplane (Boeing Model 464-17)

1. Pursuant to a request of the Air Materiel Command, we submit the following tentative schedules for the complete design, development and first flight date of one Model XB-52 airplane, which is based on the assumption that a definitive contract, covering the complete airplane and other developmental work, will be executed by 30 November 1947.

2. In the development of the subject airplane, the Contractor proposes to construct an experimental test engine nacelle which will be set up and ready for operation by April of 1949. This schedule is dependent upon receipt of the first gas turbine engine by September 1948 and the first propeller by 28 February 1949.

3. Provided an uninterrupted program of engineering design and developmental work can be accomplished, the airplane will be set up and ready for flight at the Contractor's plant in Seattle, Washington in January 1950.

4. The above program can be accomplished only if complete information on the Wright Aeronautical Corporation engine, Model T35-3, is received by the Contractor not later than 30 April 1947 and the definitive contract for the complete airplane as herein above set forth.

5. It is to be understood that the schedules herein set forth are tentative only and subject to change as further information in the development of the airplane becomes available.

BOEING AIRCRAFT COMPANY

William M. Allen

William M. Allen
President

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8.2 FT
-24- 1/31/47
Bomb 12... Eng Div -

113

8.2

Subject: XB-52 Power Plant-Propeller Conference 21 February 1947

Purpose of Report: A conference was held on 1 February 1947 at Wright Field to determine propeller reduction gear ratio, power cut-off and approximate propeller diameter for the XB-52 airplane.

Factual Data:

1. Personnel attending the subject conference are listed in Appendix A.

2. A general discussion was held with the representatives of propeller manufacturers as to the optimum propeller selection for the XB-52 based on eventual installation of T-35-3 gas turbines. This problem is complicated by the timing of the engine development which necessitates the initial flight of the XB-52 airplane with the T-35-1 gas turbines, each of which develops 5500 horsepower for take-off.

3. The highest activity factor that propeller representatives agreed could be utilized was 125. The airplane contractor expressed a desire to go to higher activity factors but the propeller manufacturers were reluctant at this time to agree to anything higher than 125 in view of structural considerations.

4. Some discussion was held regarding the tip speed associated with a propeller of 23' diameter turning at 650 rpm. It was believed that with the progress being made and thinner blade sectors, the 23' propeller should be satisfactory. Dual rotation appears to be extremely desirable for this particular installation, but it would result in delaying the engine program by at least a year. Therefore, dual rotation will not be installed. Five-bladed propellers were not considered, because of design complications and concern was felt on the severe blocking of the cowl entrance which will be used on the XB-52 airplane.

5. It was decided that propellers of 23' diameter would be suitable and an rpm of 650 was selected for cruising condition at a turbine speed of 7000 rpm. A four-bladed single rotation propeller with a propeller shaft size of 80 will be installed. It was agreed that Boeing will space the nacelles to accomodate 23' diameter propellers without any overlap and that the propeller manufacturer then will make every attempt to increase the activity factor.

6. It was agreed that the take-off rating for the T-35-3 turbine would be 89,000 shaft horsepower at 7200 rpm. The reduction gear would be designed for 10,000 shaft horsepower to permit obtaining some of the additional power available as a result of ram pressure and reduced ambient air temperature.

7. The Power Plant Laboratory currently requires that the engine be good for a 3 radian per second spin. This is considered excessive for heavy bombardment aircraft and it was concurred that Wright Aero. would be given a deviation from the above requirement.

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8.2 4-4 General
24-6 2/3 pp)

8. The Boeing Company pointed out that the landing condition appeared to be critical in that excessive load would be developed in the nacelle and engine as a result of wing wind-up. Wright Aero stated that the engine was designed for a 12 g load with no yield and that, therefore, they considered the condition pointed out by Boeing would not be critical for either the engine or propeller. It was agreed, however, that this condition would be investigated by the airplane contractor.

9. A discussion with regard to the cooling to be used with the T-35-1 and -3 was held. This decision should be made as soon as possible. Boeing will conduct wind tunnel tests to assist in this determination.

10. The propeller manufacturers agreed to give an estimate as to the general size of the propeller blades as soon as possible. The Propeller Laboratory agreed that propellers could be available in time to meet the XB-35 flight requirements of [illegible].

11. Both Hamilton Standard and Curtiss felt that they would have hubs and controls developed in time for the type test of T-35-1 engine (July 1947). It is desired that the propeller used for the type test will be the same as the propeller used for the initial flight testing of the XB-35. This hub will be the same as for the -3 engine except that it will be machined initially for the size 'C' shaft. Propeller blades, the development of which is now under contract, could be used in these hubs. This procedure will give the propeller manufacturers some additional time to develop the blades for the T-35-3 turbine installation.

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24-6 3/3 pp)

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INDIVIDUALS ATTENDING CONFERENCE

Air Materiel Command

M. A. Bennett, Power Plant Lab.
R. J. O'Keefe, " " "
Harold Brown, Aircraft Lab.
E. K. Grimes, Propeller Lab.
C. L. Word, " "
C. I. Valentine, " "
W. T. Grady, " "
J. A. Boykin, Bomb. Br., AFS

Boeing Aircraft Company

Vaughn Blumenthal
A. G. Carlson
R. H. Jewett
G. S. Schaires

Aeroproducts

D. D. Bowe
R. E. Gould

Wright Aeronautical Corporation

W. G. Lundquist
W. G. Ovens
E. L. Sulzman
Geo. E. Tubb

Curtiss-Wright Propeller Div.

J. W. Brady
Louis H. Enos
A. L. Ervin (Dayton)

Hamilton-Standard Propellers

J. F. Chappel (Dayton)
[illegible] E. Eaton
Charles [illegible] Kearns
J. Rosen

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May 1947

MEMORANDUM FOR THE RECORD:

SUBJECT: Defensive Armament in Bombardment Aircraft.

1. The following discussion is offered pursuant to your recent suggestion that the AAF position on defensive armament in future bombardment aircraft be reexamined in the light of the British decision to carry no defensive armament in their projected 2,500 mile radius, 10,000 payload, VHB aircraft designed to operate at a Mach. No. of .87.

2. Increased speed is recognized to be one of the most valuable assets a bomber can possess. Increased speed greatly enhances the concept of long range, single plane, unescorted missions by decreasing the time spent over enemy territory and restricting effective attacks by conventional fixed gun fighters to a narrowing tail cone which decreases proportionally with the increase in speed. In addition, combining the tactical maneuverability allowable in single plane missions with an increased speed will greatly reduce the bomber's susceptibility to flak and guided missiles.

3. Present Military Characteristics for our Heavy Bombardment aircraft require five thousand (5,000) miles tactical radius of action with a payload of 10,000 lbs. at an average speed of 300 m.p.h. However, we are insisting that the XB-52 cruise at over 400 m.p.h. At that range fighter escort is precluded and fighter attacks are entirely feasible at the required speed. A point worthy of consideration in this connection is that, according to Boeing estimates, the retractable, all-around defensive armament of the projected B-52 has a negligible effect upon the aircraft's speed and range.

4. Our Medium Bombardment Characteristics require a tactical operating radius of thirteen hundred (1,300) miles with a 10,000 lb. bomb load at an overall speed of 500 miles per hour. This speed is still not considered adequate protection against fighters, so all-around fire power has again been specified. However, it is desired to point out that the B-40 series bombers, which meet the above requirements in all respects other than in range, are being developed with only tail armament, as specified in the light Medium Bomber Characteristics. Service tests with these bombers will prove or disprove the soundness of the above decision.

5. The Long Range Military Characteristics for aircraft are considered to be somewhat lacking as tactical weapons when the capabilities of

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BOEING AIRCRAFT COMPANY

SEATTLE 14, WASHINGTON

MAR 7 '47

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IN REPLY REFER TO REFERENCE NO.
OR2-1029

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSESA-2, Bombardment Branch
Aircraft Project Section
Engineering Division

Subject: CPFF Proposal for Heavy Bombardment Airplane, AAF Model XB-52 (Boeing Model 464-17), Phase II

Reference: (a) Letter Contract W33-038 ac-15065 dated 7 June 1946
(b) Boeing Proposal Letter, OR1-3438 dated 14 February 1947

1. Pursuant to the request of the Air Materiel Command, there is submitted herewith a proposal covering additional work on the Phase II development of the subject model airplane.

2. The additional work herein proposed is the design and construction of an experimental nacelle and a suitable supporting structure on which to mount the complete power plant assembly for the purpose of accumulating, as quickly as possible, 200 hours of operational time on the Wright T35-1 engine installation for the Model XB-52 airplane. The work contemplated is set forth under the following statement of work:

(a) Design and prepare master layout of a complete experimental nacelle.

(b) Design and construct a special test rig adaptable to various large power plant installations for engine and accessory tests.

(c) Fabricate an experimental nacelle together with a supporting wing structure consisting only of simple beams with fairing attached to simulate wing structure for installation in the test rig.

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(d) Perform test runs on engine (not to exceed 200 hours of engine operation) and compile resulting data.

3. For the work, as outlined under paragraph 2 above, Contractor quotes as follows:

	Hours	Rate	Amount
Engineering Labor	67,000	$2.56	$171,520.00
Engineering Overhead		85%	145,792.00
Developmental Labor	13,500	$1.92	25,920.00
Tool Labor	14,500	1.90	27,550.00
Experimental Labor	89,500	1.84	164,680.00
Overhead		130%	283,595.00
Materials and Purchased Equipment			72,500.00
Subcontracting (ground test rig)			40,000.00
Total estimated cost			$931,557.00
Fixed fee @ 7%			65,208.00
Total estimated selling price			$996,765.00

4. It is estimated that the ground test rig and experimental nacelle can be completed and ready for operation by April 1949, the engine run testing completed by October 1949, and final reports of the developmental testing accomplished submitted by January 1950. The above schedule can be met only if complete information on the Wright Aeronautical Corporation engine, Model T35-1, is received by the Contractor not later than 30 April 1947, and the gas turbine engine, complete with accessories, and the propeller, which are to be Government furnished, are received by the Contractor not later than 30 September 1948 and 28 February 1949 respectively.

5. This proposal assumes that any contract resulting therefrom will be on a CPFF basis as an amendment to the contract contemplated by Letter Contract W33-038 ac-15065 and that an uninterrupted program of engineering design and developmental work can be accomplished.

BOEING AIRCRAFT COMPANY

William M. Allen

William M. Allen
President

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Internally Stowed Fighters for XB-52 — 21 MAY 1947

Research and Engineering Division, AO/AS-4 — 1

Performance Division, AO/AS-3 — Von Maxwell/bs/3020

1. It has been decided to proceed with the development of the internally stowed fighter type until sufficient experience is gained to properly weigh its military value. Since the present program is limited to the development of the XF-85, it is quite possible that sufficient information will be gained from this project. It is entirely possible that the limitations imposed on the XF-85, namely that it must fit into the bomb bay of the B-36, will be a primary reason for the failure of this particular design. The ideal solution would be to provide the manufacturer design latitude and thereby eliminate the size problem. The next best solution would be to have the different manufacturers work in parallel to produce an optimum combination.

2. The XB-52 is the only large new bomber presently in the program capable of accommodating internally stowed fighters. Although the primary purpose for which the XB-52 is being designed is the world type of mission which would undoubtedly be compromised by carrying an internally stowed fighter, it would be most desirable to have provisions in the XB-52 for carrying one or more internally stowed fighters for local area escort and defense missions. Without such protection and prior to the development of properly improved defensive armament system, it is not expected that the bomber performance of the B-52 will be high enough to allow it to penetrate highly defended areas.

3. This problem has been discussed with Lloyd Leday who concurs in the desirability of proceeding with the development of the internally stowed fighter and of providing provisions in the B-52 for normal missions, provided that the provisions for the fighter will not unduly compromise performance of the bomber on its special mission.

4. It is therefore recommended that the Boeing Aircraft Company be advised of this potential requirement and that they or AMC study this problem and comment in an early date so that decision can be made before the Boeing design is too far advanced. For this purpose the characteristics for "Fighter Airplane (Internally Stowed)" will be used. However, since these characteristics are largely based on the XF-85 project, they should be considered tentative and by no means limiting on a reprint design for a new internally stowed fighter project. It is expected that

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to be gain experience on the XP-35, these characteristics will be suitably modified.

5. Discussions [illegible] your office have brought out the desirability of producing an air-to-ground [illegible] able to increase the success of penetrations against [illegible]. This subject will be brought out in more detail [illegible], but due to similarity of the problem with the internally stowed bomb problem it is mentioned here.

[illegible]
Brigadier General, U. S. A.
Chief, Materiel Division

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HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET (2)

TALLY NO. 182
FILE NO. 9

[illegible] Members

[illegible] AF; Major General Maxwell
[illegible] A-4, Engr. Division

DATE 17 March 47

COMMENT No 3

[illegible] Deputy Chief of Air Staff for Research & Development

Col Sullivan/br/6144

1. [illegible] action stated in the first sentence of Par. 4, Comment No. 1, [illegible] plans to reclaim internally stowed aircraft into future medium [illegible], in particular, in the XB-52) is approved.

2. [illegible] action contained in the last sentence of Par. 4, Comment No. 1, [illegible] be made available, another source be given a contract to build [illegible] other for the B-36) is not favorable considered in light of [illegible] projected AAF research and development funds.

R. A. Wilson Colonel

for CURTIS E. LeMAY
Major General, USA
Deputy Chief of Air Staff for
Research and Development

[illegible] AC/AS-3

DATE 20 March 1947

COMMENT NO. 4

[illegible], AC/AS-4

[illegible] Grady/pfw/6235

[illegible] of letter, this Headquarters, subject is [illegible] study [illegible] provisions for in- [illegible] and heavy bombers, specifically the XB-52.

[illegible] report on this subject is received [illegible] forwarded to your office for further

J. J. Holtan Colonel

for ALLEN F. CRAWFORD
Brigadier General, U.S.A.
Chief, Research & Engineering Division
AC/AS-4

Maj. H. D. Grady
Col. Sullivan

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20 March 1947

SUBJECT: Internally Stowed Fighters for XB-52

TO: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

ATTENTION: Chief of Administration (TSMEX)

1. Recent discussion in this Headquarters indicated a desire to proceed with the development of the internally stowed fighter type aircraft until sufficient experience is gained to properly weigh its military value. Since the present program is limited to development of the XP-85 it is quite possible that insufficient information will be gained from this project. It is entirely possible that the limitations imposed by the XP-85, namely, that it must fit in the bomb bay of the B-36 will be a primary reason for the failure of this design.

2. The XB-52 is the only new heavy bomber presently in the program capable of accommodating internally stowed fighters. Although the primary purpose for which the XB-52 is being designed is a special type of mission which will undoubtedly be compromised by carrying an internally stowed fighter, it would be most desirable to have provisions in the XB-52 for carrying one or more internally stowed fighters on normal and shorter range bombardment missions. Without such protection and prior to the development of greater improved defensive armament systems it is expected that the general performance of the XB-52 will be high enough to allow it to penetrate highly defended areas.

3. In view of this potential requirement, it is directed that your Headquarters study the problem of including provisions for internally stowed fighters in future medium and heavy bombers, specifically the XB-52. It is requested that you forward your comments and recommendations to this Headquarters at an early date.

BY COMMAND OF MAJOR GENERAL SPAATZ:

[redacted]
Brigadier General, U. S. A.
Chief, Research and Engineering Division
AC/AS-4

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HEADQUARTERS
AIR MATERIEL COMMAND

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL AIR MATERIEL COMMAND ATTENTION FOLLOWING OFFICE SYMBOL

(MCREXD-5)

TSEMA-5/THW/rtc

WRIGHT FIELD, DAYTON, OHIO

1 April 1947

SUBJECT: Transmittal of Correspondence.

TO: Commanding General,
Army Air Forces,
Washington 25, D. C.

Attention: AC/AS-4, Research & Engineering Division -
Colonel Young.

1. In compliance with your verbal request, the attached correspondence is returned to your office. Copies have been made of this correspondence for further reference by this office.

2. Bell Aircraft Corporation and Goodyear Aircraft Corporation have each made several studies previously, relative to the problem of internal stowage of 100 mile range, subsonic and supersonic missiles, within jet bombers now under construction, as well as within B-29/50 and B-36 series bombardment aircraft.

3. Within a week, arrangements will be completed to have Boeing Aircraft Company and North American Aviation, Inc. undertake individual studies on the adaptibility of current new bombers, as well as the B-52, for carrying air-to-surface guided missiles of the type and size now conceived by Bell and Goodyear as being the eventual answer to the current requirements for air-to-surface missiles.

4. The Aircraft Laboratory of the Air Materiel Command completed a design study for the MASTIFF Project over a year ago, which design was based on being transported by a B-36 aircraft. However, the MASTIFF Project is still marking time pending security arrangements and the release of necessary information for a missile design, and whenever the project is reactivated, it is believed higher performance characteristics will be required over those which were originally set up, necessitating entirely new thinking in regard to what configuration and design the missile will assume.

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CG, AAF, Washington 25, D. C.
Transmittal of Correspondence.
1 April 1947.

5. The problem of integrating optimum air-to-surface guided missile designs with those of high performance bombardment aircraft to the best overall advantages presents major difficulties. In addition, it may be pointed out that the companies developing the missiles are separate from the ones developing and building the aircraft which will eventually carry the missiles. Because of the additional studies which will become necessary in reaching compromises between both fields of endeavor, definite comments can not be reasonably offered at this time. However, as the studies and work continue, reports, together with conclusions and recommendations will be forwarded to your office whenever they are received by this Command.

FOR THE COMMANDING GENERAL:

GEORGE A. PRICE,
Colonel, Air Corps,
Chief, Guided Missiles Section,
Engineering Division.

1 Incl:
R&R 3/14/47 to AC/AS-4
fm AC/AS-3 w/comment
No. 2 3/17/47 to AC/AS-4
fm. AC/AS-3.

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Basic ltr fr Hq AMC to CG, AAF, dtd. 15 Apr 47 subj: Transmittal of Correspondence.

AFDRE-3/T 1st Ind.

Headquarters, Army Air Forces, Washington 25, D.C.

TO: Commanding General, Air Materiel Command, Wright Field, Dayton, Ohio. Attention: TSCAD.

1. Reference is made to the integration of optimum air-to-surface guided missile designs with those of high performance bombardment aircraft as presented in paragraph 5 of basic letter. It has become necessary that this Headquarters be furnished specific information of the above type for the B-52 aircraft. It is desired that the following action be initiated by your Command:

a. Determine characteristics for the largest air-to-surface missile, which will meet present air-to-surface missile military requirements, which may be carried in the B-52 without modifying the bomb-bay.

b. If information presently available from Bell Aircraft Corporation is adequate, determine the feasibility of carrying the Bell air-to-surface missiles in the B-52.

2. The above listed studies should be preliminary in nature and it is requested that answer be forthcoming within one month.

BY COMMAND OF GENERAL SPAATZ:

1 Incl
n/c

[illegible] CCAC
[illegible] CAMCAL
[illegible], General, U.S.A.
Chief, Engineering [illegible]
Officer, Asst. Chief of Air Staff-4.

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12) XREF'D

Basic ltr fm Hq AAC to CG, AAF, 15 Apr 47, subj: "Transmittal of Corres."w/Ind

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TSECH-5/JHM/dr

2d Ind

Hq, AAC, Wright Field, Dayton, Ohio, 14 Aug 47.

TO: CG, AAF, Washington, 25, D. C., Attn: AFDRE-3/T

1. Information requested in the first indorsement to the basic communication is forwarded herewith, and is of purely preliminary nature.

2. The design of the B-52 is in a state of flux, pending further decisions by Headquarters, Army Air Forces, as to the specific mission of the airplane. Latest information furnished by the Bombardment Branch, Aircraft Projects Section, indicates that the currently envisaged bomb bay has dimensions of 35'10" length, 8'0" width, 6'4" maximum depth, with a cross-sectional curvature across the lower portion of 5'3" radius.

3. The present conception of the Bell MX-776 "Rascal" missile, presented in the Preliminary Design Study, dated 22 May 1947, will fit semi-internally in the B-52 envelope dimensions, with modification of the bomb bay doors. Portions of the forward and rear horizontal surfaces, and the lower rear vertical surface, would lie in the airstream.

However, while preliminary information indicates that the present conception of the B-52 might carry one "Rascal" missile in the bomb bay, as described above, with two missiles mounted on the wings, the B-52 project personnel point out that launching and separation problems with such a high-speed airplane would be so considerable that external stowage might be the only solution to the problems.

4. The Bell missile, which on paper closely meets the military characteristics of 16 July 1945, apparently possesses the optimum characteristics for a missile to be carried internally in a B-52. The main limiting factor of the bomb bay is the width (8'0") which means that any missile which would fit wholly internally would have very poor range and speed characteristics, and a warhead weight on the order of 1000 lbs. Past studies have indicated the use of folding wing and control surfaces for internally-stowed missiles, but such a procedure introduces problems that limit its application to subsonic missiles.

FOR THE COMMANDING GENERAL:

MARSHALL S. ROTH
Colonel, Air Corps
Chief, Guided Missiles Section
Engineering Division

Heavy Bombers

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Ltr of Instruction
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HEADQUARTERS
AIR MATERIEL COMMAND

MCREG (TSEOA-2) JAS/mm
WRIGHT FIELD, DAYTON, OHIO
17 April 1947

SUBJECT: Contract W 33-038 AC-15065
Continuation of the XB-52 Project

TO: Commanding General
Army Air Forces
Washington 25, D. C.
Attention: AC/AS-4

1. Reference is made to letters from AC/AS-4, dated 7 December 1946 and 21 January 1947, relative to continuation of the XB-52 project.

2. In accordance with referenced letter, dated 21 January 1947, work is proceeding with the development of the XB-52 conforming with Boeing's design proposal known as 464-17 with four Wright tentative T-35-3 gas turbines and approximately 5,000 miles tactical radius.

3. It is noted that in referenced letter, dated 7 December 1946, Paragraph 2 states as follows: "No action will be taken for initiation Phase II of the XB-52 without specific approval from this Headquarters". Although this letter was dated prior to the time agreement was reached as to the basic configuration of the airplane, it is recommended that this matter be clarified. Phase I of the XB-52 is covered contractually to date and it is the recommendation of this Command that there be no restriction which would prevent the initiation of Phase II, or a part thereof, consistent with the availability of funds. It is believed that this action is necessary to secure the continued and uninterrupted development of the XB-52 and such action is warranted inasmuch as there is no other heavy bomber design in the development program to meet the requirements of 5,000 mile tactical radius. Therefore, it is believed that this project should be conducted on a high priority basis.

FOR THE COMMANDING GENERAL:

S. R. BRENTNALL
Brigadier General, U.S.A.
Chief, Engineering Operations
Engineering Division

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Basic Comm: Ltr fr Hq AMC, Subj: "Contract W 33-038 AC-15065 Continuation of the XB-52 Project."

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AFDRE-4B

1st Ind.

Headquarters, Army Air Forces, Washington 25, D. C., 2 May 1947.

TO: Commanding General, Air Materiel Command, Wright Field, Dayton, Ohio.

1. Based on information contained in basic letter, this Headquarters cannot concur at this time with the recommendation contained in paragraph 3, for the following reasons:

a. This project is of such enormity it does not seem advisable to proceed with fabrication of any components before wind tunnel tests have been conducted.

b. At present, it is felt that Phase I of this contract has not been sufficiently evaluated to justify committing $2, 892,592.00 for initiation of Phase II.

2. In addition, this Headquarters desires information as to the source of the $2,892,592.00 that is said to be available in your Headquarters for this project.

3. It is realized that if this available money is not committed by 1 July 1947, it will be lost to this project. In view of this further justification for initiating Phase II, is desired should it still be deemed advisable by your Headquarters.

BY COMMAND OF GENERAL SPAATZ:

Allen R. Crawford

ALDEN P. CRAWFORD,
Brigadier General, U. S. A.
Chief, Research & Engineering Div.,
Office, Asst Chief of Air Staff-4.

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Routing ltr fr Hq AMC, Subj: "Cont. W33-038-ac-19065, Continuation of the XB-52 Project."

2nd Ind. TSEOG(TSEOA-2)/JAB/alk

Hq., Air Material Command, Wright Field, Dayton, Ohio. 2 June 1947.

TO: Commanding General, Army Air Forces, Washington 25, D.C., Attention: AC/AS-4.

1. Reference is made to telephone conversation between General Crawford, AC/AS-4, and General Putt, AMC, 14 May 1947, regarding the basic communication and 1st Indorsement thereto. The following information is submitted in confirmation:

a. The XB-52 was initiated in Fiscal Year 1946 as a result of a design competition. Sufficient funds were not available to award more than one Phase I contract and, inasmuch as the XB-52 design was declared winner of the competition, a Phase I contract was awarded to Boeing out of Fiscal Year 1946 funds. The Fiscal Year 1947 Program included funds for the continuation of this project to meet existing requirements for a new heavy bomber. After the 1947 budget reduction, there was approximately $2,892,500.00 remaining which could be applied to the XB-52 project. A review was made of those items which would be required in the normal development of the XB-52 and, based on trying to insure continuity of the project, certain additional items of work were selected. These items included additional wind tunnel testing, additional mock-up work, continuation of engineering and test work and the construction and proof testing of one set of horizontal tail surfaces. A letter contract in the amount of $2,892,592.60 has been initiated to cover the above items.

b. Fabrication of components will not be accomplished prior to a complete wind tunnel test program, inspection and approval of the mock-up and completion of adequate engineering.

FOR THE COMMANDING GENERAL:

S. R. BRENTNALL
Brigadier General, U. S. A.
Chief, Engineering Operations
Engineering Division

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Basic Comm: Ltr fr Hq AMC dtd 17 Apr 47, subj. "Contract W33-038-ac-15065, Continuation of the XB-52 Project"

3rd Ind. AFDRE-4B

Headquarters, Army Air Forces, Washington 25, D. C., 16 June 1947

To: Commanding General, Air Materiel Command, Wright Field, Dayton, Ohio
Attention: TSTEX (TSEOA-2)

1. This headquarters approves expenditure of $2,892,592.60 for initiation of Phase II of the XB-52, to include items indicated in paragraph 1 a of 2nd Ind. However, in view of the enormity of the XB-52 project, it is felt that any further commitment of funds for Phase II of the XB-52 contract should be referred to this headquarters for approval.

BY COMMAND OF GENERAL SPAATZ:

ALDEN R. CRAWFORD
Brigadier General, U. S. A.
Chief, Research & Eng'g. Div.
AC/AS-4

Follow up Sept 15, 1947

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HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	
FILE NO	

SUBJECT: [illegible]

TO: [illegible] Division, AC/AS-1

DATE: 21 APR 1947

FROM: [illegible] Division, AC/AS-2

COMMENT No 1
Gen Maxwell/bg/3020

1. Representatives of the Douglas Aircraft Company have showed me some figures [illegible] range-payload Navy Project studies, which consist of preliminary comparisons [illegible] performance with certain other theoretical designs. These figures cast [illegible] ability of the XB-42 to reach a 5000-mile tactical radius of action with [illegible] bombs, unless the design is cleaner than can be expected from present [illegible] specific fuel consumption betters present estimates. These figures estimate [illegible] over 300,000 lbs., and other figures estimate a weight of over [illegible] lbs. carrying a 22,000 lb. bomb. Other studies, which they are making in [illegible] with Navy projects, show tremendous gains in range if small fuselages without [illegible] are used and bomb and range extension fuel are carried in carefully [illegible] streamlined external pods. This theory definitely disagrees with the latest [illegible] tables which showed no significant range would be gained by designing a minimum [illegible], Special Purpose XB-42.

2. [illegible] the Douglas Company is now tied up with the Boeing Company through the [illegible], they are apparently well aware of these differences in estimated per- [illegible] their representatives expressed optimism that an agreement would be reached [illegible].

3. Everything will be O.K. if the Boeing estimates are met, but it is noted that [illegible] are far more optimistic than the Douglas Company and it is signifi- [illegible] figures are being put out by the Company who has the greatest [illegible] matter. If the XB-42 will not make the range or will do so only [illegible] overweight, we will be right back where we started [illegible] a huge bomber did not make very much sense. It looks as if [illegible] considering the ultimate cost of this project, when such serious [illegible] between the Boeing Company and a competent engineering staff (Douglas)

4. [illegible] that the Boeing Company presumably will stick to the conven- [illegible] design for the XB-42 in spite of the fact that all indications so far [illegible] the more efficient flying wing design, such as the B-35. Although not [illegible] warrant positive opinions on the subject, the Douglas experiments [illegible] indications of even greater efficiency than the present type [illegible].

5. [illegible] as requested.

ALFRED R. MAXWELL
Brigadier General, U.S.A.
Chief, Requirements Division

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AF HQ-33 (30 MAY 44)

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO.

SUBJECT

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Asst. A/C Chief

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Address Reply to
Commanding General, Army Air Forces
Washington, D. C.

WAR DEPARTMENT
HEADQUARTERS OF THE ARMY AIR FORCES
WASHINGTON, D. C.

29 April 1947

AFDRP-10

SUBJECT: Proposed Letter Contract with Boeing Aircraft Company, Seattle, Washington

TO: Chief, Current Procurement Branch
Procurement Group, WDGS

1. Pursuant to letter your office, dated 18 October 1946, authority is requested to issue a letter contract to Boeing Aircraft Company, Seattle, Washington, to cover work in connection with Phase II (initial) of the XB-52 program.

2. A definitive contract covering Phase I of this procurement, which is covered by Letter Contract W33-038 ac-15065, CPFF type, in the amount of $1,785,176.00, will be signed by the contractor within a few days, and even though Phase I is not completed, it is necessary that the contractor proceed with the initial portion of Phase II for the purpose of insuring continuity of the XB-52 program.

3. The approximate dollar value of this procurement is $2,791,053.23.

4. This will be Supplement No. 1 to Letter Contract W33-038 ac-15065.

FOR THE COMMANDING GENERAL, ARMY AIR FORCES:

APPROVED: APR 28 1947
By direction of the Under Secretary of War

PHILIPS W. SMITH
Colonel, GSC
Chief, Current Procurement Branch
Procurement Group, WDGS

WILLIAM D. ECKERT
Colonel, Air Corps
Chief, Readjustment and Procurement Division
Office, Assistant Chief of Air Staff-4

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

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AFDRE-1/Gen Crawford/ee/71500
Wtn 7 May 1947

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8 MAY 1947

SUBJECT: Medium Bombardment Aircraft

TO: Commanding General, Air Material Command
Wright Field, Dayton, Ohio

Att: Engineering Division

Reference: Ltr frm CG, AMC to CG,AAF, subject as above, dated 6 May 1947

1. The reference letter -

a. Concurs in a tentative decision arrived at in Headquarters, AAF, on 25 March 1947, that the AAF bombardment development program should be aimed several years hence with all available development funds being directed towards the optimum weapon at that time, without compromise to such funds by competitively modernizing existing bombers.

b. Emphasizes that the modernization of existing bombers, to obtain the potential increased performance capable of realization through such modification, can only be done at the expense of lesser emphasis on the initiation of a new medium bomber design.

c. Brings out the fact that development of the R-4360 VDT engine is only warranted if current bombers are to be modernized, and that the development of the VDT is competitive with the T-35-3 development.

d. Implies that all research and development funds required for the modernization of current bombers must come from the proposed F. Y. 1948 aircraft funds as currently visualized, and that funds for the development of the proposed 4360-VDT engine can only be undertaken at the expense of other engine developments.

4-5-2, 1 Reference

2. The recommendations of the reference letter (as briefly summarized above) were, together with the current tactical and strategic planning for the next 5 to 7 year period, given serious consideration by the Air Staff in a meeting held in the office of the Deputy Chief of Air Staff for Research and Development on 6 May 1947. As a result of this reconsideration of desirable bombardment developments, it was decided (subject to further consideration of additional data to be obtained from A.M.C. as outlined below) that the tentative decision reached in the conference of 25 March 1947 should be reversed. Specifically, it was considered essential that -

a. The continued development of the XB-52 proceed as a first priority project.

b. Initiation of the procurement of a new medium bomber should be instituted immediately upon the availability of F. Y. 1948 funds.

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Ltr to CG, AMC, subject: Medium Bombardment Aircraft

c. The R-4360-43(VD) engine be developed.

d. A prototype installation of this engine in a modified B-36 and B-50 (including new wings) should be undertaken.

3. During discussions of the availability of funds for the concurrent developments outlined above, it was brought out that the airframe contractors cost of the airplane modifications referred to in par. 2 d, was a proper charge against production funds. It also appeared probable that a similar financing of installation engines and possible propellers would be in order. This use of Production funds would reduce Research and Development funds from the $15,250,000 estimated as required for modification of a B-36 and a B-50 to approximately $8,000,000, with a resultant lesser prejudicial effect on other categories of AAF development projects.

4. While the plan for development of bombardment airplanes as outlined in par. 2 was considered as highly desirable, it was felt advisable that the issuance of a firm directive implementing such a development program should be held in abeyance pending receipt of the following information from A.M.C.

a. A listing of the specific projects currently scheduled for financing from F.Y. 1948 funds which would have to be cancelled, were the decision outlined above placed into effect.

b. AMC's comments, in such detail as to warrant an intelligent appraisal by this Headquarters, on the prejudicial effect resulting from cancellation or postponement of the projects recommended for exclusion from the scheduled 1948 R&D Program.

5. It is realized that a re-analysis of the R&D Program for 1948, at a time when all Laboratories are engaged in preparation of their F.Y. 1949 budget estimates, is imposing an additional work-load at a time of unusual planning stress. In view of the importance and far-reaching nature of the decision which will hinge upon a consideration of the desirability of fostering improved versions of the B-36 and B-50 as compared with the undesirability of delaying the development of items of other categories, the additional reviewing functions occasioned by preparation of the above data was considered warranted. It is, therefore, directed that the information as outlined in the preceding paragraph be submitted to this Headquarters at the earliest possible date and not later than 23 May.

By command of General SPAATZ:

HQ. AAF

SIGNED
W. M. POWERS
Colonel, U. S. A.
Asst. to Dep. Chief of Air Staff-4

AAG - MAIL BRANCH

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Telephone Conversation between General Crawford and Col. Smith, General Putt, 14 May 1947

SUBJECT: XB-52

S. We have your letter of May 2, telling us in effect to stop on the 2nd phase of the XB-52. We wanted to explain - (1) that the contract is all signed and sealed, which occurred just about the time we received the letter, so we had no time to take action on it, but we have in the legal document the phrase that covers the $2 million bucks that covers the second phase of it; however, we're not getting the cart before the horse as we have intercepted one of the things in the letter that came out - everything is proceeding logically that we're not building anything before we have the wind tunnel test; however, the thing that's really got us in - is that we've got some other letters in here signed by Powers that just arrived yesterday, dated the 5th, that directs that we continue the B2 on a 1st priority basis, so now we need an interpretation.

C While they appear to be conflicting, they're actually not. The first letter you spoke of is in reply to a letter we got in here which is not very explanatory, talking about some $7,000,000 - some $2,500,000 for actual fabrication and construction of some sort for the B-52, without any summary or explanations which would justify the actual expenditure of money for hammering out a piece of tin prior to completion of design studies and tests in the wind tunnel. We didn't know why you actually wanted to spend that amount of money which is very appreciable for any fabrication prior to a more complete running of wind tunnel tests. I was skeptical about it myself and I mentioned it to Powers and he was also skeptical of the wisdom based on such limited information we had which was none of going ahead on any fabrication. We are also concerned that we obligate as much money to the B-52 as we can but we didn't actually want to get caught, since it was only a Phase I in the budget. We didn't want to get caught by authorizing $2 million worth of construction without knowing how the wind tunnel evaluations are turning out. As to the 2nd letter was merely about the only thing that came out of that meeting, concretely, was that they wanted the B-52 continued on first priority Government development, but that did not mean start construction and building prior to a normal process whereby there's wind tunnel evaluation prior to fabrication.

S Actually, the $7,000,000 was for the part of Phase 2 - -just as in Phase I we do preliminary and interim - so that part of that $1 million there was actually only $500,000 I believe that would be used sometime in early 1948 to construct these tail services after all of the wind tunnel testing, the interim work and without not have proceeded logically.

Col. P

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KC-135 (cont'd)

C Well, if some explanation has been in the letter I think we could have no doubt given you approval on it. I'm in favor of giving you an approval anyway for I assume that any money it could get obligated that year - that much less we put on it next year.

S Actually our objective there was to try to short some of the paper work - letters out there that could be interpreted two ways, so I could see -

C Well, this 2 million plus dollars you have - that's for start of the phase 2 ... start fully for the preliminary detailed studies on certain components of the airframe?

S Yes. Detailed engineering design that you go through before you start any construction. Actually it involves $400,000 of that $2 million stemmed down simply as an article for construction, so that all the rest of it - 1.1 million dollars or so for just entering into Phase 2.

P Al, the reason the figure came out that way was that we had more money that was available in the fiscal [illegible] to $5 million. Well, after all the cuts, we were not going to this year, just $3 million 300 thousand, so we had just as much as we could with the $3,400,000 which is for the engineering of the airplane ... phase 2 and the $1 million 100,000 which is for later delivery of the first airplane.

C You think that there's no doubt from the preliminary design studies able to make the airline justification?

S Well, we're going to [illegible] hope to have it done maybe next week. We have the boeing people here now. We're still to the laboratories, getting the latest estimates we can on all of these uniform and we're going to present it as solid to you in the form of what for the contract we can agree with and that is the best we can come up with and then you'll see the picture just as we see it.

C Is it your intention to have us include that contract until your study is ready?

S The contract can already been signed. Now, we can go and do three things. We can tell them not to go ahead or we can tell them to continue, or we can tell them to go ahead. We will lose the funds, or we can probably actually go ahead and [illegible] the contract from Boeing for four years.

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XE-52 (cont'd)

C Has that been approved over here by the Secretary's office?

S I presume it has. The Procurement people have that kind of it.

C I'm just wondering when they sign - whether it has been signed by Boeing or not.

P Yes. It's been signed by Boeing. It's a contract.

C I don't believe it's been approved by the Secretary's office.

P It's a letter contract, Al, and I'm pretty sure it's been approved there because they have to approve all now.

C If the contract has been approved, don't stop typing at all. That is where in the contract like there was no question at all that we after we get your send (I would stipulate there to be no reason for typing to over-ride [illegible] we have done to assume that will be no over-riding), I'll take it up with Powers at that time.

P [illegible] we would like to stipulate that it is [illegible], Al, [illegible] we couldn't leave the contract in effect until we can get

C Yes. Just [illegible] question [illegible] on [illegible] contract, or I [illegible]. I don't visualize there won't be any need - I wonder, [illegible] to the matter [illegible] the contract, and if not, we'll [illegible] at that time.

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AMC Form No. 10-3 (Ex 19 Mar 45)

1.1 Aircraft Corr. 35
6-(1/3 pp)

ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND (1.1)

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e entire width of sheet, both sides. Number all comments consecutively. Separate comments by horizontal lines across page.

SUBJECT XB-52 Conferences

TO TSEOA-4
Attn: Lt. Savage

FROM TSEOC-2A

CONFIDENTIAL

DATE 15 May 1947 COMMENT NO. 1

1. The purpose of this MR is to provide a record of a series of conferences held 4 February 1947, 6 February 1947, 9 February 1947, and 12 February 1947, in the Aircraft Laboratory relative to the design of the subject airplane. This MR will also serve to supplement various notes of the conferences which were independently made and retained by the Projects Office, the MAC representatives and the Aircraft Laboratory.

2. Present, at various times, were Messrs. Schairrer, Jewett, Carlson and Blumenthal of the Boeing Aircraft Company and personnel of the Project Office and the Aircraft Laboratory.

3. The conferences were held for purposes of preliminary examination, discussion and comment on the then current XB-52 design as shown in the following listed data:

a. Preliminary Detail Specification - MAC Report B-00.1, dated 1-31-47.
b. Deviations from Structures Specifications, MAC Report B-0129, dated 1-31-47.
c. Aerodynamic Progress Report, MAC Report B-0130, dated 1-31-47.
d. Teletype SE-229, TWX-5, dated 2-6-47, from Boeing, Seattle, to the Dayton Office of the Company.

4. The initial conference on 4 February 1947 was primarily one of becoming acquainted with the design since it had been altered from the configuration evaluated approximately one year ago. Aerodynamic matters, including wing loading, were discussed; also, the basis for Boeing's selection of this particular size, span, gross weight, etc. Certain studies by Design Branch were discussed for comparison and preliminary data which later resulted in Memorandum Report TSEAC-4-42013-1-1, dated 4 April 1947, were shown the Contractor's representatives.

5. Subsequent conferences on 6 February, 9 February and 12 February 1947, were concerned more with details of wheel size, brake capacity, structural load factors and the assumptions connected therewith, and shock absorber design and testing. The results of these conferences are set forth below. The Contractor's representatives and the Project Office were fully represented at the last conference. Independent and complete notes of the conferences were kept by all concerned.

a. The Aircraft Laboratory recommended the use of C-1303 design requirements, i.e., +2.0 limit load factors at the 480,000 pounds gross weight condition (designated at the time as "Maximum Overload" by the AAF; this is actually "Design Gross Weight" by the terms of Specification R-1303-1E, Paragraph E-2c(4)). This condition was to control the design inasmuch as load factors at lesser gross weights were to be permitted to fall where they might, based on +2.0 at 480,000 pounds. The MAC teletype quoted 950 pounds as the probable structural weight increase over their current estimate to make good the factor of +2.0. The recommendation was based on the following considerations:

1. No static test article was to be procured (a large number of static test articles fail at approximately 85% of design loadings).

2. The AAF has had no experience with operational aircraft at load factors below +2.15 or +2.10 approximately.

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1.1 Aircraft Lab. Comments 6-(4 3 pp) 34

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SUBJECT XB-52 Conferences

CONFIDENTIAL

TO TSEOA-4
Attn: Lt. Savage

FROM TSEAC-2A

DATE 15 May 1947

COMMENT NO. 1
Page 2

3. V-G records collected in actual service indicate that accelerations over 2.0 are consistently obtained.

4. A weight build-up will tend to occur as the airplane is designed and constructed but the 480,000 pounds gross weight condition cannot be exceeded. In addition this is the first case where an airplane of the heavy bombardment type has been designed to the revised requirements of Specification C-1803-E, i.e., where the load factor of +2.0 limit is used for design at the heaviest gross weight possible, which gross weight, in the case of the XB-52, also corresponds to the upper limit of performance capabilities of the design.

5. Fatigue life.

In view of the foregoing discussion, the second deviation on Page 5, BAC Report D-8129 was not granted.

b. With reference to BAC Report D-8129, the proposal for the use of the 50 ft./sec. gust for V_H at all weights up to 400,000 pounds, but 0.85 V_H at all weights over 400,000 pounds, was turned down. BAC representatives agreed to submit new V-G data showing the effect of the full 50 ft./sec. gust up to V_H at 480,000 pounds gross weight provided that +2.0 load factors are not reduced, in other words, the design will meet C-1803 requirements.

c. The deviation in Report D-8129, Page 4, regarding limit dive speed was agreed to, i.e., with reference to Specification C-1803-E, Table I, Note g, the value of the percentage factor shall be 110 percent instead of 115 percent.

d. The Aircraft Laboratory accepted 1.67 as the limit load factor for the take-off condition at 480,000 pounds provided that due consideration is given to careful detail design to take into account the fatigue problem. BAC agreed to submit a discussion of this point in a report. The report will discuss taxiing, fore and aft loads, assumptions on unsymmetrical vertical loads, side loads (i.e., which gear absorbs them, or to what extent), symmetrical vertical loads, etc.

e. The landing weight of 310,000 pounds and 4.0 factors ultimate met C-1803 requirements and was accepted. The Aircraft Laboratory requested drop tests at 200,000 pounds and 400,000 pounds gross weights in order to demonstrate shock absorber orifice action and to show what vertical velocity can be tolerated while not exceeding design loads on the gear and structure. The Aircraft Laboratory offered to conduct drop tests with pre-rotation to gather a time history of drag and vertical loads as a substitute for the inclined platform drop tests.

f. With reference to BAC Report D-8129, Page 10, and the question of demonstrating limit loads in flight, the Aircraft Laboratory stated that if limit loads were not demonstrated, it would result in an airplane placarded with a restriction. Since, it was agreed, that at some time or other during its life, the airplane would probably be operated at limit loads, the Aircraft Laboratory recommended that the

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1.1 Aircraft Lab. Com.
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SUBJECT XB-52 Conferences

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TO TSEOA-4
Attn: Lt. Savage

FROM TSEAC-2A

DATE 15 May 1947

COMMENT NO. 1

airplane be demonstrated to limit loads; also, that no deviation be granted from standard flight test requirements as regards preliminary demonstration, i.e. follow Specification R-1803-11.

g. With reference to BAC Report D-8129, Page 8, the deviation regarding ditching design was granted provided that the Contractor gives due and careful consideration to the detail design of doors, hatches and all similar portions of the airplane subjected to water loads.

h. With reference to BAC Report D-8129, Page 9, the deviation regarding criteria to be used for vertical and horizontal tail loads was disposed of by requiring the Contractor to submit for AMC approval all of such criteria.

i. There were several other deviations mentioned in BAC Report D-8129 which were either deferred for later and more detailed consideration, or which were related to specific points covered in the discussion above in this R&R. Two examples of the latter are the deviations on Page 6, BAC Report D-8129 relating to Specification R-1803-2B, Paragraph E-4c(2) which was automatically covered by comments above in Paragraphs 5.a. and 5.d., and the deviation on Page 6, BAC Report D-8129 relative to R-1803-2B, Paragraph E-4c(3) which was covered by comments in Paragraph 5.b. of this R&R.

j. With reference to the single rudder control system mentioned in Paragraph E-10a(3) of Preliminary Specification, BAC Report D-8091, in which the Contractor desired to consider the trim tab as the duplicate control, it was agreed that BAC will further investigate this matter and provide the AMC with pertinent information, including flight test data on the B-29 airplane, before final decision by the AMC on this deviation.

k. The tire equipment proposed was found not satisfactory.

1. This Laboratory recommended a 56 x 16 EHP tire requiring special development to increase its capacity to a rating of 50,000 pounds. This means that, at 480,000 pounds gross weight, the tires (loaded to 60,000 pounds each) would be good for one mission only.

2. The brakes will probably be adequate provided the airplane is equipped with reversible pitch propellers and the latter are used concurrently with the brakes. If no reversible pitch propellers are provided, the brakes will require special development steps.

3. The nose wheel equipment recommended by this Laboratory was dual 18.00 - 20 size.

for C. K. MOORE,
Colonel, Air Corps,
Chief, Aircraft Laboratory,
Engineering Division.

H. S. Lippman
HSL/mmn
26832
Bldg. 50

cc:
TSEAC-9
TSEAC-12

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AFDRD/Col Emrick/br/6144

15 May 1947

Lt. General N. F. Twining
Commanding General, Air Materiel Command
Wright Field, Dayton, Ohio

Dear Nate:

For some time now the Air Staff has been attempting to get together on some sort of a program for our future medium and heavy bombardment. As you know, we have had several go-arounds here in Washington, where the pros and cons were discussed at great length, but so far we have not been able to agree on a proposed program covering the next five to ten years which is worthy of being presented to General Spaatz for decision.

As you are well aware, the complete lack of an experimental program in heavy and medium bombardment during the war years necessitates our having to wait seven to ten years before we can expect any new and improved medium and heavy bombers. We are advised that, not until 1952 - 1954, could procurement be in sufficient quantities to offer anything new to our combat units as replacements for the B-50 and the B-36. Due to this long period, between now and the time we can expect these new bombers to emerge in production quantities, it is absolutely essential that a program covering these years be carefully considered and formulated now. In this connection, it is my opinion that the heavy and medium bomber picture presented to Congress in the form of future budget requests, must adequately show the integration of each years program into the entire program for the period between now and the time our new medium and heavy bombers will emerge from production. Without such an integrated picture, it is difficult for Congress to understand why we continue to buy B-50's and B-36's, say until 1952.

Now for a word about tactical employment of future medium and heavy bombardment. I feel that the B-52, or any other airplane capable of doing the job for which the B-52 is intended, will of necessity be of such size and of such cost that neither the aircraft industry nor our future budget will permit its production and procurement on other than a very limited scale. What this exact figure may be, I do not profess to know, however, I guess it at about one-hundred (100) articles. These airplanes, utilizing atomic bombs, would be used to initiate retaliatory combat

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operations from North American bases, as soon as hostilities start. Such operations would obviously be on a small scale, due principally to the limitations of the atomic bomb stock pile, limited number of carriers available and the complications of operating at such long ranges from the U. S. As for the medium bombers, they would necessarily be used in a manner similar to the B-29's in the last war, namely as a work horse, operating, subsequent to the initial retaliatory phase, from over-seas bases within 2,500 mile range of strategic targets within the enemies homeland.

Aircraft of the heavy class should have a radius of at least 5,000 miles, carry a bomb load of at least 10,000 pounds and be able to cruise at a moderately high speed. On paper the B-52 is such an airplane. However, I am somewhat concerned over the B-52 as presently conceived, since attainment of its designed speed and range characteristics appear absolutely dependent upon the successful development of the T35-3 engine. I believe that we have at least six months to go before a committing final decision as to the B-52 will have to be made, in order to be assured that only limited funds will have been spent before cancellation. In this connection I have learned that Douglas, Northrop and Consolidated have suddenly awakened to the fact that though they were uninterested in bidding on an airplane of the B-52 type when this project was started, they realize now that a large part of our production funds will go into such an airplane, and they are now out in the cold. It appears, therefore, that we must take a good look at any proposals that may now exist in the minds of the late starters in order to make sure that if the B-52 is the horse we intend to back, such action is firmed after all other possibilities have been considered and eliminated. With this in mind, I for one, certainly advocate continuance of the present B-52 contract with the final decision to be made after considering any other proposals which would fit into the B-52 concept but in no case after a period of six months.

As for the medium bomber class, neither the B-50 nor the B-36 appears to be the answer. By definition, such a medium bomber may be considered analagous to the World War II work horse, namely the B-29, in that it must possess operational characteristics far superior to present day concepts but still be capable of being produced in large quantities. Its characteristics can be summed up briefly: Combat radius of 2,000 miles, cruising speed in excess of 500 miles per hour and gross weight somewhere in the vicinity of 170,000 lbs. No amount of modification to the B-50 or B-36 would appear to bring these airplanes within the desired characteristics. My reaction is that we are talking about a completely new medium bomber to be used as a work horse airplane. I believe also that the development and procurement

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of such an airplane could well follow the development of the B-52 type, since time would be required to expand industry, train units, and secure operational bases for the initiation of a sustained conventional bombing campaign.

This pretty well sums up my views, and I believe the views of the majority here in the Air Staff, concerning future medium and heavy bombers. The foregoing portion of the program, I prefer to refer to as Phase 2 - such phasing being based entirely upon time. As for Phase 1, the period between now and the time our new medium and heavy bombers become available, action required appears to be somewhat more clear, but perhaps more difficult of attainment in light of budgetary considerations. Of the many changes we can expect in the B-50 and the B-36, between now and the time they are superceded, the most important would appear to be the installation of the new 4360 VDT engine. Assuming that the required modification of both the B-50 and the B-36 for the installation of this new engine could come from production funds, at the cost of fewer aircraft, by the initiation of appropriate change orders, we are advised that the initial cost of a program to develop the 4360 VDT and associated equipment, would be five and one-half million dollars of research and development funds. If this five and one-half million dollars can be made available by rearranging the research and development program for fiscal 1947 or 1948, we could wait at least until June 1948 to decide whether or not this new engine should go into both the B-50 and the B-36, during fiscal 1950, provided funds are being included in fiscal 1949 budget for procurement of these types of aircraft. Just what effect this program as outlined above would have on the entire AAF research and development program is why, on 23 May, I have asked Generals Partridge, Powers, Power, Doyland, Rawlings and myself to be on deck at Wright Field. I know this comes at a bad time for you, since your laboratories are in the process of compiling budget estimates for fiscal 1949, but I cannot overestimate the importance of our being able to launch as soon as practicable on a firm medium and heavy bomber program for Phase 1 and Phase 2, such as discussed above.

Sincerely, R-91341

CURTIS E. LeMAY
Major General, USA
Deputy Chief of Air Staff for
Research and Development

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TSTEX (TSEOA-2)

17 June 1947

Landing Gear Requirements for
XB-52 Airplane

Commanding General,
Army Air Forces,
Washington 25, D.C.

Attention: AC/AS-4

1. Reference is made to letter from Headquarters, AAF, AC/AS-4, dated 2 January 1947, regarding the feasibility of dropping part of the main landing gear on the XB-52 airplane.

2. The AMC has been considering the possibility of such an arrangement for the XB-52 for some time, and it appears that a practical arrangement can be made to accomplish this. If the airplane gross weight is approximately 480,000 pounds, four (4) main landing gear struts and wheel assemblies will probably be required with an estimated weight of 18,000 pounds. If the inboard landing gear components are designed for a landing gross weight of 240,000 pounds, the outboard components can be dropped after take-off for an estimated saving of 7,000 pounds. A more accurate determination of the weight saving must await a more detailed study as to dropping methods and specific application to the XB-52 airplane.

3. From an operational standpoint, several factors must be considered. It appears that, if the outboard gears are to be made droppable, they should also be made fully retractable and would operate in a normal manner for routine flying of the airplane and would only be dropped for the special long range mission. This would also permit having the outboard gears available in case an emergency landing were required immediately after take-off.

4. Studies are being made as to means of rapidly decreasing the gross weight of the airplane, assuming a normal take-off had been executed, the outboard gears dropped and then an emergency landing required. It is believed that if the bomb load, bomb-bay fuel tanks and external fuel tanks were dropped and a portion of the remaining fuel were jettisoned, the gross weight could be reduced sufficiently to permit a safe landing on the two inboard gears.

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AMC ltr to CC, AAF, Att AC/AS-4, 9 June '47, "Landing Gear Requirements for [illegible] Airplane."

1. It appears that a satisfactory arrangement can be made to provide part of the main landing gear on the [illegible] airplane. This should be permitted as a means of reducing the weight of the airplane for the long range basis subject to arriving at a satisfactory detail design for releasing the required amount of fuel.

FOR THE COMMANDING GENERAL:

J. S. [illegible]
Brigadier General, U.S.A.
Chief of Administration

cc: [illegible]
[illegible]

[illegible]

[illegible]

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8.1

Model T35 Engine Power Control Principle.

17 JUN 1947

TSEPR TSEPP-15B

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1. In conference with representatives of Wright Aeronautical Corporation, Boeing Aircraft Company, propeller manufacturers, and representatives of the Air Materiel Command 12 June 1947 on XB-52 airplae, it was decided that thorough surveys on the part of Wright Aeronautical Corporation, Hamilton Standard, Aeroproducts, and Curtiss-Wright regarding the merits of Beta versus rate-of-change type propeller controls for the Model T35 engine be submitted to the Air Materiel Command for a decision on the type of control to be used. Further consideration of this matter by this Laboratory indicates another course of action should be taken. It is desired that no propeller manufacturers be excluded from supplying equipment for the XB-52 airplane because it is apparent that many propeller considerations are necessary in achieving the airplane's function. However, it is imperative that a power control configuration be established immediately in order that the schedule of engine and propellers be met for the XB-52 airplane.

2. In view of the above, it is proposed to release the type of control specified by Wright Aeronautical Corporation requiring a rate-of-change type propeller. This is in accordance with the engine model specifications based on Specification AN-E-20, where Wright Aeronautical Corporation is responsible for the engine power control and is required to specify the type of propeller necessary for the engine. The Propeller Laboratory would, accordingly, arrange with the propeller manufacturers to furnish rate-of-change type propellers in accordance with the Wright Aeronautical Corporation propeller specifications as finally coordinated by the Procuring Agency.

3. In the matter of future action, which is not subject to the immediate pressure of the initial part of the overall airplane program, the following is desired:

a. The Propeller Laboratory will survey the industry to determine the merits of rate-of-change and any other types of propeller controls regarding manufacture, power ntrol suitability, weight, size, etc., insofar as the propeller manufacturer is concerned.

b. The Propeller Laboratory will, on basis of a. above, supply recommendations to this Laboratory on the characteristics from which a possibly more desirable power control from the airplane control standpoint might be made.

c. The Power Plant Laboratory will obtain from Wright Aeronautical Corporation an analysis of engine power control with a propeller pitch change signal of Beta, rate-of-change, and any other which may be feasible.

d. On the results of study of b. and c. above, the Power Plant Laboratory will initiate another control program with Wright Aeronautical Corporation to provide an engine power control of the type desired. This action is, of course, contingent on the availability of funds and will necessarily follow the control development already contracted for.

R. J. O'KEEFE,
Colonel, Air Corps,
Acting Chief, Power Plant Laboratory,
Engineering Division.

JB:mb Bldg. 18D
Extension 2-2208

cc: TSEOA, Mr. Boykin
TSEPP-SI, Mr. Bennett

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[illegible] letter from Headquarters, Army Air [illegible], subject" as above.

[illegible] of this Command that the interceptor has first priority in the development of fighter [illegible] was stated in a letter entitled "Presentation of 1948 [illegible] Development Budget" from Assistant Chief of Air Staff-3 [illegible] of Air Staff-4, prepared by Brig. General Maxwell [illegible] by Major General Partridge, dated 30 August 1946. An item [illegible] in the 1948 Research and Development Program to cover a [illegible] escort fighter, but was withdrawn because of the uncertainty of funds. In keeping with the desire expressed in the 30 August [illegible] letter referred to above, an item in the 1949 Research and Development Program has been included to cover a Phase 1 development of a new parasite fighter that might conceivably involve only a modification and lengthening of the present XP-85 to improve spin recovery characteristics by taking advantage of the double bomb bay available in the B-36 series from No. 23 airplane upward. Accordingly, the following remarks are not intended to detract from the necessity for continued development of a parasite fighter for the B-36 series airplanes.

3. The problem of internally stowed fighters for the XB-52 airplane has been considered by this Command, and it does not appear feasible to design this particular airplane to accommodate an internally stowed fighter without seriously compromising the primary long range mission which is the basic objective of the XB-52. The most efficient design to accomplish a 5,000 mile tactical radius mission will be one in which the bomb bay capacity will be largely determined by the design bomb load expected to be carried on the long range mission. Although the XB-52 design is in the very preliminary stage, sufficient study of aerodynamic arrangement has been completed to indicate that there

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will be a severe weight penalty involved, if the bomb bay height is determined by a folded wing internally stowed fighter. In conference in Office of Chief, Engineering Division, AMC, 23 May 1947, subject "Bombardment Aircraft", it was emphasized by AC/AS-3 and AC/AS-4 and General LeMay that the extreme range requirement for the B-52 is a realistic requirement, and that other requirements must be subordinate to the fulfillment of the extreme range mission. Further, it is understood from recent discussions with personnel of A-3 that an internally stowed fighter will not be a requirement in the XB-52. The absolute necessity for keeping the weight of the XB-52 at a minimum appears to justify the conclusion that no special provisions nor structural re-arrangement, other than the optimum for the long range mission, be incorporated in the design.

4. In regard to provisions in the medium bomber for internally stowed fighters, sufficient preliminary design has not been accomplished to date to either justify or eliminate provisions for internally stowed fighters. However, it is believed that weight and size of the medium bomber must likewise be held to an absolute minimum, if the desired 500 mile per hour cruising speed is to be obtained.

5. The extreme range and speed requirements of both the XB-52 and the proposed medium bomber preclude the carrying of internally stowed fighters without compromising the performance requirements or, alternatively, causing a tremendous increase in gross weight. It is, therefore, recommended that requirements for internally stowed fighters not be a requirement in either of these airplanes, unless the tactical advantages can be demonstrated to be sufficient to warrant a reduction of the performance requirements.

FOR THE COMMANDING GENERAL:

S. R. Brentnall

S. R. BRENTNALL
Brigadier General, U. S. A.
Chief, Engineering Operations
Engineering Division

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AAF Form No. 71-228
(Rev 4 Apr 47)

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Supplemental Agreement No. 1 (S-18131)
to Contract No. W 33-038 ac- 15065

ANMB Preference

Classification 01

AFP 445720

Initiator: T.P. Savage, TSEOA2
E. O. No. 426-253
Project No. MX-839

Classification cancelled Confidential
changed to
AUTH: LD-356, 15 Apr. 48
by C. Bouchard
Signature and Grade USCO
Date 6-3-48

SUPPLEMENTAL AGREEMENT
TO
COST-PLUS-A-FIXED-FEE CONTRACT
for
SUPPLIES
(ARMY AIR FORCES)

WAR DEPARTMENT
HHGsmlh

CONTRACTOR: BOEING AIRCRAFT COMPANY

SUPPLEMENTAL AGREEMENT FOR: Additional Design Studies of a Long Range Bombardment Airplane

CHANGE IN ESTIMATED COST: Increase - $2,724,165.68

CHANGE IN FIXED FEE: Increase - $ 168,421.65

CONTRACT FILES

CANCELLED
EXPENDITURE CONTROL BR.
BUDGET & FISCAL OFFICE
MATERIEL COMMAND
13 JUL 1948

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Payments to be made by the Finance Officer, U. S. Army, Building 287, Wright Field, Dayton, Ohio.

The supplies and services, if any, to be obtained by this instrument are authorized by, are for the purpose set forth in, and are chargeable to the allotments below enumerated under the heading "Debit", the available balances of which are sufficient to cover the cost thereof. The reduction, if any, in estimated cost and fixed fee under this instrument will result in credits to the allotments below enumerated under the heading "Credit".

Debit

2170705, 702-7004 P 611-09 S 33-038

This Supplemental Agreement supersedes Supplement Letter Contract, dated 24 April 1947, as amended;

The AAF Plant Representative at Boeing Aircraft Company, Seattle, Washington, is hereby designated as the officer having overall administrative responsibility for this Supplemental Agreement.

This Supplemental Agreement has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

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SUPPLEMENTAL AGREEMENT TO
COST-PLUS-A-FIXED-FEE CONTRACT FOR SUPPLIES

THIS SUPPLEMENTAL AGREEMENT No. 1 (S-18131) to Contract W 33-038 ac-15065 (16h12), entered into this 13th day of June, 1947, by and between THE UNITED STATES OF AMERICA, hereinafter called the "Government", represented by the Contracting Officer executing this Supplemental Agreement, and BOEING AIRCRAFT COMPANY, a corporation organized and existing under the laws of the State of Washington, of the City of Seattle, in the State of Washington, hereinafter called the "Contractor",

W I T N E S S E T H:

WHEREAS, the parties hereto have heretofore entered into Contract W 33-038 ac-15065 (16h12), which contract is hereinafter referred to as the "Supply Contract", which calls for preliminary design studies of a long range bombardment airplane; and

WHEREAS, the Government desires the Contractor to perform certain additional work in connection with an additional phase of this project and the Contractor has agreed to furnish same as more particularly hereinafter set forth;

NOW, THEREFORE, in consideration of the premises and of the mutual covenants and agreements herein contained and for other good and valuable considerations, the parties hereto agree that the Supply Contract is hereby amended and supplemented as follows:

First: Article 1 is amended and supplemented as follows:

(a) By deleting Item 1, appearing in paragraph (a) thereof, and by substituting therefor the following:

"Item 1 - Conduct preliminary design studies of a long range heavy bombardment airplane substantially as described in Contractor's Specification No. D-8091, dated 1 February 1947, revised 1 April 1947, by reference hereby made a part hereof. The airplane design will be based on T-35-3 gas turbines with a minimum number of substitutions required to permit initial flying with T-35-1 gas turbines. In connection with these studies the Contractor shall also perform the work called for in Items 2 to 10, inclusive, below."

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(b) By adding after Item 5 of paragraph (a) thereof, the following new Items:

"Item 6 - Design, construct and test wind tunnel models and furnish reports as follows:

(1) Conduct wind tunnel tests in the Contractor's high speed wind tunnel establishing at least the following:

a. Rudder and elevator hinge moments.

b. Full-span flap, leading edge slats and/or other devices to insure satisfactory stalling and lateral control characteristics.

c. Radome, pilot's canopy and other external protuberances found necessary during development of the airplane.

d. Satisfactory flutter characteristics of the airplane.

(2) Design and construct the following wind tunnel models:

a. Complete flutter model (approximately .05 scale).

b. Such additional models as may be determined necessary to satisfactorily accomplish the items set forth in paragraph (1) of this Item.

(3) Furnish triplicate copies of all data and analysis reports of wind tunnel tests.

"Item 7 - Alter the mock-up called for under Item 5 above as may be required for the continued development of this project. In addition, two (2) copies of photographs showing all altered installations shall be furnished.

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"Item 8(a) Prepare and make available to the Government such layouts and/or drawings and conduct such tests as may be required in the preparation of same to develop the design of the airplane components and systems for the purpose of determining jig, fixtures, material requirements and accessory equipment procurement specifications for at least the following:

(1) Fuselage Structure.
(2) Wing Structure, including slats, flaps and ailerons or other devices required for satisfactory stall and lateral control characteristics.
(3) Empennage Structure, including rudder, elevator and required tabs.
(4) Landing gear, including main gear, nose gear, tail skid and required retraction mechanisms.
(5) Flight Controls, including flap and slat actuating mechanisms and control surface boost systems.
(6) Nacelle structure including engine dynamic suspension mounts.
(7) Engine cowling including air intake provisions.
(8) Ice removal system.
(9) Power Plant installation including quick detach features.
(10) Fuel system including tanks and supports.
(11) Hydraulic system.
(12) Turret installations including optical and radar fire control.
(13) Bomb rack provisions.
(14) Optical and radar bomb sighting installations.
(15) Navigation equipment.
(16) Crew furnishings including cabin soundproofing.
(17) Flight and engine instruments.
(18) Photographic equipment installations.
(19) Electrical system.
(20) Oxygen system.
(21) Crew compartment supercharging and air conditioning system.
(22) Hoisting and jacking provisions.
(23) Emergency equipment provisions.
(24) Fire prevention provisions and extinguishing system.
(25) Tie-down provisions.
(26) Radio equipment installations.
(27) Radio and radar antenna installations.
(28) Propeller installations.

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(29) Auxiliary and/or accessory power plants.
(30) New and novel features.

"Item 8(b)-Prepare and furnish in triplicate reports in accordance with AAF Specification No. 40749 dated 29 December 1944.

"Item 9 - Conduct the following developmental investigations and/or tests and make available to the Government in triplicate summary reports and studies resulting therefrom:

(1) Leakproof fuel tanks for body and wing fixed fuel.
(2) Control surface boost systems.
(3) High voltage electrical equipment.
(4) Hydraulic and pneumatic systems.
(5) Structural panels and fittings as necessary to substantiate stress analysis.
(6) Fuel system components.
(7) Typical sections of lateral control and stall improvement devices including actuating mechanisms.
(8) Refrigeration system.

Deletions and/or additions to the foregoing list of developmental studies and tests shall be made as indicated by the design progress and subject to the approval of the Chief, Engineering Division.

"Item 10 - Develop and Test Horizontal Tail Surfaces as follows:

(1) Prepare production design and master layout of horizontal tail surfaces incorporating thermal anti-icing, sealed leading edge, elevator balance and mechanism for elevator extension.

(2) Fabricate one set of horizontal tail surfaces.

(3) Proof test typical structural panels of horizontal tail surfaces to substantiate strength."

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(c) By adding after paragraph (f) thereof the following new paragraphs:

"(g) Prior to performing any of the tests called for in paragraph (a) above, the Contractor shall furnish a brief outline of the test program to the Engineering Division, Air Materiel Command, Wright Field, Dayton, Ohio.

"(h) The Government shall furnish, without cost therefor, to the Contractor for use in the performance of this contract all articles of equipment listed as Government-furnished in the Contractor's Specification referred to in Item 1 of paragraph (a) above."

Second: Article 2 is amended and supplemented by adding under the headings "Item" and "Estimated Cost", respectively, the following:

"6 to 10, inclusive	$2,724,165.68"

and by increasing the total estimated cost set forth in said Article by $2,724,165.68.

Third: Article 3 is amended and supplemented by deleting the first sentence of paragraph (a) thereof and by substituting therefor the following:

"The Government will pay the Contractor upon satisfactory delivery of all items specified in this contract, subject to reimbursements for cost, as outlined in Article 6 hereof, the cost, plus a fixed fee of Two Hundred Fifty-three Thousand Four Hundred Twenty-nine Dollars and Sixty-five Cents ($253,429.65). The total estimated cost of this contract is Four Million Four Hundred Twenty-four Thousand Three Hundred Thirty-three Dollars and Sixty-eight Cents ($4,424,333.68)."

Fourth: Article 4 is amended and supplemented as follows:

(a) By adding in paragraph (a) under the headings "Item No." and "Time of Delivery", respectively, the following:

"6	Analysis, data and reports shall be delivered within thirty (30) days after completion of particular tests insofar as practicable, but not later than 31 December 1948.
7	The altered mock-up will be ready for inspection and acceptance at Contractor's plant not later than 30 April 1948. Photographs shall be prepared and furnished to the Air Materiel Command not later than thirty (30) days after inspection and acceptance of the altered mock-up.

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3 Layouts and drawings shall be delivered on or before 31 July 1943.

9 Reports shall be delivered within thirty (30) days after completion of the particular tests (each of the 24 positions), but not later than 31 December 1943.

10 Proof that reports shall be delivered within thirty (30) days after completion of tests, but not later than 30 June 1949."

(b) By adding in the first line of paragraph (b) after the word "and" the words "photographs, layouts,".

(c) By deleting paragraph (f) thereof and by substituting therefor the following:

"(f) One mock-up ordered for under Item 5 and altered under Item 7 of Article 1 (f) hereof shall be available for inspection by the Government at Contractor's plant, Seattle, Washington."

Fifth: Article 6 is amended by increasing the total sum allotted for this contract referred to in paragraph (c) of said Article, by $2,892,567.00.

Sixth: Article 36 is amended and supplemented by adding in the third line of paragraph (b), after the word "all", the words "photographs, layouts,".

Seventh: The procurement made under the terms of this Supplemental Agreement not being for the construction or manufacture of any complete aircraft or portion thereof, the provisions of the Vinson-Trammell Act are not applicable.

Eighth: The Contractor will require no additional facilities for the performance of this Supplemental Agreement except as provided in Article 1 (d) of the Supply Contract.

Ninth: Nothing in this Supplemental Agreement shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies or to perform any work as to which a Notice of Termination is in effect at the effective date of this Supplemental Agreement, nor

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to require the Government to accept any such articles or supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for by this Supplemental Agreement or otherwise referred to in this Supplemental Agreement.

Tenth: This is the Supplemental Agreement contemplated by Supplement Letter Contract addressed by the War Department to the Contractor under date of 24 April 1947, and this Supplemental Agreement supersedes said Supplement Letter Contract. In the event of conflict between said Supplement Letter Contract and this Supplemental Agreement, this Supplemental Agreement shall govern.

Eleventh: Except as hereby modified, either expressly or by necessary implication, all the terms, covenants and conditions of the Supply Contract shall continue in full force and effect.

Twelfth: This Supplemental Agreement shall be subject to the written approval of the Secretary of War or such individual as said Secretary may designate and shall not be binding until so approved.

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HqAMC Form No. 80-507
(Rev 20 Aug 46)

TITLE SHEET

HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT FIELD, DAYTON, OHIO

JAB:slk

MEMORANDUM REPORT ON

SUBJECT: Analysis of the XB-52 Project

Date 23 June 1947

OFFICE Aircraft Projects Section Contract or Order No. W33-038-ac-15065

SERIAL No. TSEOA-2-1360 Expenditure Order No. 426-253

A. PURPOSE:

1. To review the background and assumptions upon which the XB-52 is based and to make a preliminary evaluation of:

a. The problems involved,

b. The probability of the XB-52 meeting the Military Characteristics currently established for this airplane.

B. FACTUAL DATA:

2. Background:

a. Existing Military Characteristics for heavy bombardment airplanes, dated 23 November 1945, revised 8 October 1946, specified the following essential performance items:

(1)	High speed at tactical operating altitude for 15 minutes	450 MPH
(2)	Tactical operating radius with 10,000 pounds of bombs	5000 miles
(3)	Average speed for above radius	300 MPH
(4)	Take-off over 50 foot obstacle at design gross weight	7500 feet

b. At the time these Military Characteristics were initially discussed in June 1945, it was expressed by AC/AS-3 personnel that it was the desire of Headquarters, Army Air Forces to emphasize the development of jet and turbine propeller engines. This has been reiterated on many occasions.

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c. It was pointed out, at the time these Military Characteristics were circulated to the industry, that an airplane between 400,000 and 500,000 pounds gross weight would be required, depending upon the average cruising speed finally selected. Based upon this contention relative to the size of the airplane, the design competition which was initiated in February 1946 was based on a reduced range in an effort to reduce the overall size and weight. The winner of this competition was the Boeing Aircraft Company and the design selected was powered with six T-35-1 Wright Aeronautical gas turbines, and had a gross weight of 360,000 pounds and a maximum alternate weight of 400,000 pounds. At these weights, it was estimated that the airplane would be capable of a tactical radius of 3110 miles and 3560 miles, respectively, at an average cruising speed of 410 miles per hour.

d. This configuration was approved by Headquarters, Army Air Forces 29 May 1946, and a letter contract was approved 3rd June 1946 covering Phase I development of this airplane. Subsequently, much dissatisfaction with the size and weight of the XB-52 was expressed, and shortly thereafter the objection was that the range was too short. Consequently, a meeting was held at Wright Field 17 and 18 October 1946 with AC/AS-4 personnel, at which time statistical data were presented showing the reasons for the size of bombardment aircraft. It was shown that, based on current designs and estimates of future designs of light, medium and heavy bombers, the airframe weight would be approximately 29% of the maximum gross weight. This indicated that the remaining 71% of the weight which covered power plants, armament, equipment, bombs and fuel, etc., is principally controlled by the AAF and is dictated by the Military Characteristics. Therefore, any criticism of the overall weight of a bombardment airplane should always be subjected to an analysis of the requirements which directly dictated this weight. As a result of this conference, it appeared that little could be accomplished to drastically limit equipment or reduce requirements. Therefore, the conclusion necessarily followed that, within limitations of present or immediately available power plants, a 5,000 mile radius bomber was at best, with acceptable cruising speeds, approximately a 500,000 pound bomber. Therefore, it was suggested that the question of the medium bomber, on which the AMC had been specifically directed to refrain from development (by letter dated 3 October 1945) should be reopened and that consideration be given to an airplane of approximately 200,000 pounds gross weight, having a tactical radius of 2500 miles, at an average cruising speed of around 400 miles per hour, and that studies be continued to arrive at acceptable compromises in requirements and equipment and design improvements which would permit appreciable weight reductions which would be necessary before an airplane of 5,000 miles radius could be built. Subsequent to this conference, studies and discussions with the Wright Aeronautical Corporation indicated that some improvement could be made in the T-35-1 gas turbine. This resulted in drawing up preliminary plans of a T-35-3 turbine having lower specific fuel consumption and 8000 horsepower for take-off.

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e. Studies of the T-35-3 in the XB-52 were made and a conference was held 27 November 1946 in Headquarters, Army Air Forces, to discuss this design and the medium bomber. The importance of weight reduction and reduction of requirements was emphasized, and out of this conference came the decision to have Boeing study a "special mission" airplane having a minimum crew and a minimum of GFE, which would be designed specifically for 10,000 pounds of bombs and a range of 12,000 miles at an average cruising speed of 400 miles per hour. Upon completion of these studies, a comparison between a "special mission" airplane designated as Model 464-16 and a "general purpose" airplane designated as Model 464-17 was presented to Headquarters, Army Air Forces, 7 January 1947. A comparison of range versus bomb loads for these two airplanes is included in Exhibit A and indicates the tremendous effect of elimination of tactical equipment which resulted in 1600 miles range difference between the two airplanes at the same gross weight. It should be pointed out that when the "special mission" airplane versus the "general purpose" airplane was presented, no comparison was made of the gross weight difference, had the range been held constant. Keeping the basic airplane configuration the same, the "special mission" airplane would have had a gross weight of 420,000 pounds to give the same range as the 480,000 pound "general purpose" airplane. The gross weight of the "special mission" airplane could have been further reduced had the complete design been tailored to the 10,000 pound bomb, 5,000 mile radius requirement. Because the "general purpose" airplane had an estimated all-out range of approximately 12,000 miles, it was considered the more desirable because of its greater utility. Consequently, by directive dated 21 January 1947, the Air Materiel Command has proceeded with Phase I development of the "general purpose" airplane which, when loaded to a gross weight of 480,000 pounds, was estimated to have a range of approximately 12,000 miles.

f. The XB-52 range of 12,000 miles, as presented in the 7 January conference was arrived at using an assumed ratio of propeller efficiency to specific fuel consumption η/c equal to 2.02. There were no specific fuel consumption data available on the T-35-3 at that time, other than a general estimated percentage reduction from the T-35-1 data. Subsequently, Boeing has reduced the value of η/c to 1.86 because they considered the propeller efficiency, η, of .85, as quoted by propeller manufacturers, as being optimistic. In addition, some assumptions, made by Boeing as to the possible reductions in load factors, have not been concurred in by the Air Materiel Command. Consequently, Boeing's current estimate of the range of the XB-52 with 10,000 pounds of bombs, and assumed propeller efficiency of .81 and a specific fuel consumption of .433, as quoted by the Wright Aeronautical Corporation for the T-35-3 turbine, is 11,700 miles. This range is based on an estimated weight empty of 177,969 pounds and a take-off gross weight of 480,000 pounds.

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3. "RAND" Project Study and Its Relation to the XB-52:

a. As a part of the "RAND" project, a study was conducted to determine the "absolute performance to be expected with present and interim aircraft." The results of this study are presented in Douglas Report No. RA-15005 dated 1 September 1946. Inasmuch as this report has created some concern as to the probability of the XB-52 meeting its range, the following is a brief summary of the study, assumptions and conclusions.

b. The study consists of taking Breguet's range formula, which gives an estimate of range for use in generalized studies, developing certain fundamental relationships and then plotting existing airplane data for comparison. The basic formula to determine absolute range when payload is replaced by fuel is:

$$\text{Range} = 863.5 \frac{\eta}{c} \frac{L}{D} \text{Log}_{10} 1/(W_B/W)$$

η = Propulsive efficiency

c = Specific fuel consumption, lbs/BHP/hr

$\frac{L}{D}$ = Operating lift/drag ratio

W_B = Airplane basic weight

W = Initial gross weight

The third quarterly report dated 1 December 1946 presents the items which can have the greatest effect on the range of airplanes. An analysis was made of the best long range airplanes, which, incidentally, are all powered with reciprocating engines, and have very low average cruising speeds, to "establish the best probable attainment in the immediate future."

c. An examination of Breguet's range formula indicates that the range of an airplane can be analyzed in terms of three basic efficiencies. These are :

(1) Structural Efficiency: $\frac{\text{Basic Weight}}{\text{Take-off Gross Weight}} = \frac{W_B}{W}$

(2) Propulsive Efficiency*: $\frac{\text{Propeller Efficiency}}{\text{Specific Fuel Consumption}} = \frac{\eta}{c}$

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(3) Aerodynamic Efficiency*: $\frac{\text{Lift}}{\text{Drag}} = \frac{L}{D}$

* In the supplement to the "RAND" study, to simplify the analysis, the two factors marked * were assumed constant for any range problem.

In the "RAND" studies, the aerodynamic and propulsive efficiencies were combined into a single factor, which was $\eta_c \frac{L}{D}$

d. From the "RAND" third quarterly report and current estimates for the XB-52 Airplane, the following efficiencies are tabulated:

Airplane	$\frac{L}{D}$ Max.	Limit Load Factor	W	W_B	$\eta_c \frac{L}{D}$ Max.	$\frac{W_B}{W}$
B-35	19.8	2.00	220,000	98,127	23.1 to 35.4	.446
B-36	21.2	2.00	328,000	141,720	26.2 to 39.0	.432
P2V "Turtle"	20.0	2.00	85,750	33,880	38.1	.396
B-29 "Dreamboat"	18.8	2.00	147,500	64,140	36.0	.435
XB-52	20.4	2.00	480,000	197,800	37.8	.405

e. From a study of the basic efficiencies defined above, it is obvious that, to obtain the maximum range, the design must result in the largest value possible of the ratio of $\eta_c \frac{L}{D}$ and the smallest value of the ratio of $\frac{W_B}{W}$. From the table above, it can be seen that the best values obtained to date for the term $\eta_c \frac{L}{D}$ is 39 (for the B-36) and the best weight ratio obtained for $\frac{W_B}{W}$ is .396 (for the P2V "Turtle").

f. A supplement to the "RAND" study went one step further and made an analysis of airplanes having the same aerodynamic and structural efficiency as that of the XB-52 and assumed that the range of the B-52 was 13,300 miles with 10,000 pounds of bombs. This assumption was in error inasmuch as the maximum range ever quoted for the B-52 with this bomb load is 12,200 miles (the "RAND" project having assumed that the all-out range for the B-52 was 8/3 of the 5,000 mile tactical radius requirement). Listed below is a table of airplanes having the same structural and aerodynamic efficiency as the XB-52, as assumed by "RAND":

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M.R. #TSEOA-2-1360,
23 June 1947

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	Assumed XB-52	Airplane "A"	Airplane "B"	Airplane "C"
Bomb Load	10,000	10,000	22,000	22,000
Tactical Radius (3/8 range)	5,000	3,455	5,000	3,455
Take-off Weight	480,000	51,300	1,056,000	113,000

g. Airplane "A" indicates the tremendous reduction in take-off weight for a small decrease in tactical operating radius required of 1,545 miles. This is one of the errors of oversimplification in such a study because obviously it is known from existing airplanes that it is impossible to build an airplane having a take-off gross weight of 51,300 pounds to meet a 3,500 mile range and include armament and equipment currently required in bombardment aircraft.

h. Airplane "B" shows the tremendous increase in gross weight if the bomb load is approximately doubled and the same radius requirement of 5,000 miles is absolutely necessary.

i. Airplane "C" indicates a theoretical design of approximately twice the bomb load of the XB-52 and presents the weight reduction for the 1,545 mile decrease in tactical radius requirement.

j. Exhibit "B" presents data taken from the "RAND" report and shows a plot of tactical operating radius versus the ratio of initial weight to bomb load for airplanes of various structural efficiencies. These curves are based on an assumed aerodynamic and propulsive efficiency $\frac{\eta}{c}\frac{L}{D} = 40.0$, which appears reasonable to attain. By decreasing the tactical radius requirement, it can be seen how the gross weight is drastically reduced for a given payload; or if 5,000 radius is a requirement, with present tactical equipment, a tremendous airplane must necessarily result. It also shows that if the gross weight is fixed, as in the case of the XB-52 at 480,000, a small overweight of the basic airplane will result in practically eliminating the payload, if the range required is maintained. It also shows the penalty of carrying any unnecessary weight items in an airplane designed to these large range values.

k. It is believed that the above general conclusions can be drawn from the "RAND" study. These same conclusions were presented by the Air Materiel Command during the period 1939 to 1942 when a 12,000 mile range requirement was being discussed. It was shown at that time that with the "state of the art" of airplane design and with the power plants available, a maximum range limit with all the tactical equipment required for a bombardment airplane was approximately 10,600 miles. Consequently, the directive to which the XB-36 was designed was reduced to a 10,000 mile range requirement. The XB-52 by comparison must attain 2,000 miles greater range and its cruising speed will be 420 mph instead of 240 mph required of the XB-36.

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Therefore, the penalty of every pound weight empty required has been magnified with the increased severity of the requirements. It is believed that the general conclusions stated above are all that should be drawn from that part of the "RAND" study currently conducted on airplane range capabilities. This statement is made for the following reasons:

(1) A general study must result in general conclusions which can be no more accurate than the assumptions used.

(2) The absolute values used by "RAND" for the very large or very small size airplanes are unrealistic because of the assumptions made. As an example, refer to Exhibit "B" and use curve for a structural efficiency of .40; this would imply that an airplane carrying 10,000 pounds of bombs for 2,667 miles could be built for a take-off gross weight of 20,000 pounds.

(3) The effect of requiring cruising speeds higher than those required to give maximum range has not been considered in the analysis.

(4) It assumes that aerodynamic efficiency is independent of size. Larger airplanes are actually more efficient.

(5) It assumes that the ratio of take-off weight to landing weight is independent of size. This is very unrealistic, because even if the airplane structural weight were assumed to be a constant proportion of take-off weight, it is obvious that the equipment weight and crew weight for a bombardment airplane are nearly independent of size and therefore the ratio of take-off weight to landing weight is materially improved by increasing the size of the airplane. As an example, the same radio and radar equipment will be used in a heavy bomber whether it weighs 200,000 pounds or 400,000 pounds.

(6) The very basis of the study is Breguet's range formula which is only an approximation for range because it assumes:

a. The lift drag ratio remains constant.

b. The flight path of the airplane is such that $\frac{L}{D}$ max. is always obtained.

c. The propeller efficiency is constant.

d. The specific fuel consumption is constant.

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Any of the above factors is dependent on the other. While the flight path can be adjusted to fly the airplane at $\frac{L}{D}$ max, the propeller operates at different efficiencies all along the flight path and also the engine power and rpm must be changed to accommodate the flight path and $\frac{L}{D}$ max. conditions.

The procedure of applying constant efficiencies in this manner must be viewed with caution, since without a real analysis of a specific airplane design, any factors assigned to be used in Breguet's formula must be approximate. Scaling airplanes up or down by Breguet's formula is a practice to be discouraged. The results of any such study should be used with caution and only after a full realization of the assumptions made.

1. In summary, the "RAND" study indicates the penalties and problems of designing to extreme range requirements; however, if 5,000 miles radius is a realistic requirement, it has contributed little to the attainment of this objective.

4. Discussion of 5000 Miles Radius as a Requirement:

a. Past experience has resulted in determining tactical operating radius as 3/8 of the theoretical range. Until the 40-series jet bombers, the theoretical range did not include climb; however, in the case of the XB-52, climb has been included.

b. Exhibit I presents an analysis made to determine the minimum range required to give a 5000 mile radius. This range estimate includes take-off, climb, fly to target, spend one hour over target, return to base, descend, hold 1 hour at 5,000 feet over base and land having used all fuel. In addition, 300 miles out and 300 miles return was added to cover difference between course flown and minimum possible course; also, 5% was added to take care of contingencies such as difference between engine operation and an assumed 3 engine return. The resulting range required is 12,180 miles. Therefore, it is believed that an airplane having an actual range according to the above schedule of approximately 12,200 miles will be capable of performing missions of 5,000 miles tactical radius.

5. XB-52 Performance and Possibilities of Meeting 5,000 Mile Radius Requirement:

a. The three major items which should be reviewed at this time, when discussing the range of the XB-52, are (1) propeller efficiency, (2) specific fuel consumption, and (3) operating weight empty. Exhibit "C" has been prepared to show the general relationship between these three variables for the XB-52 at a gross weight of 480,000 pounds for both ranges of 12,180 miles and 13,333 miles. The current estimated range of

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the XB-52 "general purpose" airplane is 11,600 miles with 10,000 pounds of bombs. This is based on an assumed propeller efficiency of .81, an average specific fuel consumption of .433 and an operating weight empty of 197,800 pounds. Following is a discussion of these three variables:

(1) Propeller Efficiency: The propeller industry, in general, has indicated that efficiencies in the order of .85 are possible for the XB-52. Boeing has considered this as being optimistic and has used .81 in their calculations. Two of the major problems involved are, (1) operating the propeller at high tip Mach numbers and the proper correction to apply in the propeller efficiency calculations and (2) proper detail design of propeller and cowl entrance such as to minimize losses to the turbine. Estimation is handicapped in that basic research data on propellers and conditions comparable to the XB-52 are not available. It should be realized that the propellers in question must be capable of absorbing approximately three times the power of any propeller flying today. Results of studies conducted indicate that it will be possible to design a propeller for the XB-52 having efficiencies between .83 and .85. However, furnishing such a propeller is contingent upon additional research and testing by the NACA, Air Materiel Command and the propeller industry.

(2) Specific Fuel Consumption: The specific fuel consumption data used in the XB-52 performance is that currently quoted by Wright Aeronautical for the T-35-3. This is approximately .433 for the conditions under which the XB-52 is expected to operate. The detail thermodynamic calculations are not available for check at this time; however, the component efficiencies assumed by Wright Aeronautical appear to be reasonable. It is believ ed that the attainment of the specific fuel consumptions quoted by Wright Aeronautical is primarily dependent upon the availability of funds to assure adequate research and development.

(3) Operating Weight Empty: The operating weight empty is 197,800 pounds. This is the assumed weight at the completion of the mission and is approximately 20,000 pounds greater than the weight empty of the airplane. Exhibit "H" gives the current weight breakdown of the XB-52 for the 480,000 pound condition. Also included is a list of the weight saving items assumed by Boeing which have not yet been specifically approved by the Air Materiel Command, but appear reasonable. In addition, a list of major weight saving items which could be used with some compromise in the utility of the airplane is presented. Examples

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of this nature would be dropping a part of the main landing gear, leakproofing only a part of the total fuel load, deletion of the auxiliary power plant, etc.

b. Exhibit "B" shows a plot of operating weight empty versus propeller efficiency for different specific fuel consumption values. These data are for the XB-52 at 400,000 pounds gross weight and show the necessary combination of these three variables to attain both 12,140 miles range and 13,333 miles range. These curves show how losses in one or two of the variables must be compensated for by a gain in the remaining variables, if the respective range is to be met. It can be seen that a weight reduction of at least 7,000 pounds must be achieved to show a theoretical range of 12,180 miles in the present XB-52 design based on assumed propeller efficiency of .81 and a specific fuel consumption of .433.

c. It is apparent from the curves of Exhibit "B" that extensive weight reductions must be achieved. The effects of incremental weight changes on the 450,000 pound airplane are shown by the following approximate relationships:

1000# reduction wt. empty = 2400# less takeoff wt. for same range.

1000# reduction wt. empty = 1400# saving in fuel for the same range.

1000# reduction wt. empty = 40 miles increased range with the same fuel capacity.

1000# reduction wt. empty = 71 miles increased range at same take-off weight.

1% reduction weight empty = approximately 1% increased range at the same take-off weight.

The above effects are further magnified if the acceptable compromises can be determined at a time early enough to take advantage of their combined effect in the airplane design and configuration.

d. Regardless of which configuration is selected, "general purpose" or "special mission" airplane, the weight will be extremely critical. Based on past experience, every pound must be eliminated if it does not contribute in an essential way to the attainment of the design range objective. There are tremendous weight savings which can and should be made even in certain compromises today. However, the weight reduction program associated with such a project must be on a day by day and a pound by pound basis because it is the accumulation of many small adverse changes which can mean the failure of the airplane. Only by such a weight program for airplane structure, Government furnished equipment and tactical equipment requirements can the success of the project be assured, because some reserve must be accumulated in terms of range to take care of unforeseen contingencies.

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e. Exhibit "D" gives a plot of range versus bomb load for the "general purpose" airplane at 480,000 pounds without the major weight compromises included in Exhibit "H". Curve B shows present airplane with 11,600 miles range and 10,000 pounds of bombs. Curve A depicts the same airplane if current weight estimate is exceeded by 2%, propeller efficiency is decreased to .75 and specific fuel consumption is increased to .45. Curve C depicts the same airplane with the best probable propeller efficiency of .85, improved specific fuel consumption to .40 and a 2% reduction in current weight estimates. These curves, it is believed, will bracket what can be reasonably expected from the XB-52 in its present configuration without major weight compromises.

f. Exhibit "E" shows range versus gross weight for the XB-52 in its present configuration without bomb dropping. This is presented because of the significance of the slope of the curve indicating how small weight changes have tremendous effect on range.

g. Exhibit "F" gives speed and climb performance of the XB-52 airplane in its present configuration.

h. Exhibit "G" gives a plot of gross weight versus take-off distance for the XB-52 airplane in its present configuration.

C. CONCLUSIONS:

6. It is concluded that:

a. To date the XB-52 project has been delayed by the lack of:

(1) A stated requirement for a 5,000 mile radius airplane which would represent the united thinking of all branches of the AAF.

(2) A full realization as to how such a requirement will automatically dictate an airplane of tremendous size and weight.

(3) A willingness on the part of all branches of the AAF to accept the compromises which are absolutely necessary if a successful design is to be evolved to meet the primary range objective of the project.

b. Studies conducted by Air Materiel Command, Boeing and the "RAND" project indicate that the XB-52 requirements, along with the present power plants and "state of the art", places the XB-52 on a curve of rapidly diminishing returns which will make the desired range difficult of attainment.

c. The basic XB-52 design is one which combines extremely long range with a high average cruising speed (approximately 420 mph) and is considered well balanced from this standpoint. Based on reasonable performance

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estimates, it can be shown today as meeting the range requirements provided appreciable weight reductions, which are considered entirely feasible, are allowed.

d. It is only logical to assume that during the development of the XB-52 certain engineering compromises will arise which will result in some reduction in range; however, with proper planning, development, weight control and equipment requirement control, these can be offset and the ultimate range objective can be realized.

e. The success of the XB-52 project will depend upon the following:

(1) An immediate agreement with AC/AS-3 and AC/AS-4 as to the compromises, involving major weight changes, which will be acceptable for the XB-52.

(2) The elimination of all items of equipment which are not vital to the accomplishment of the primary mission.

(3) The establishment of both present and future equipment requirements on a realistic basis consistent with the primary mission.

(4) A complete and comprehensive weight reduction and weight control program on the part of the airplane contractor for the airplane and on the part of the Air Materiel Command for all Government furnished equipment.

(5) Establishment of a priority high enough to assure uninterrupted progress and prompt attention to engineering matters by the Air Materiel Command.

(6) Adequate funds to assure the development of the T-35-3 turbine and the attainment of estimated specific fuel consumption.

(7) Adequate propeller research by the NACA, the Air Materiel Command and the propeller industry on a high priority basis to permit propeller design and development which will minimize efficiency losses.

f. Insofar as the "RAND" project studies conducted to date on airplane capabilities are concerned, the Air Materiel Command and those aircraft manufacturers associated with development of long range aircraft are and have been fully cognizant of the effect of range and speed requirements on the size and weight of airplanes. This in no way alters the fact that the Air Materiel Command is now presented with a requirement for an airplane of 5,000 miles tactical radius. If this is acknowledged, then it only remains to determine the compromises which are necessary to assure the development of a satisfactory airplane to meet the requirement.

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13.2 Graphs + 3 Pics;
25-(13/14 pp.

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M.R. #TSEOA-2-1360
23 June 1947

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D. RECOMMENDATIONS:

7. Based on the assumption that 5,000 miles tactical operating radius is a realistic requirement, which must be met, it is recommended that:

a. An evaluation of the compromises involving major weight items as presented in Exhibit "H" be made by Air Materiel Command, AC/AS-3 and AC/AS-4 and an immediate agreement be reached as to which can be considered for the XB-52.

b. Consideration be given to selecting the minimum weight "special mission" configuration for the XB-52 and continue the project on this basis.

c. A written directive be issued by Headquarters, AAF outlining the basic design objective of the XB-52, establishing the priority of the project from an overall AAF development standpoint, and relieving the XB-52 from automatic compliance with blanket directives which are written for aircraft in general and/or bombardment aircraft specifically. This would make each equipment requirement subject to review and compliance would depend upon what the specific item of equipment contributed to the accomplishment of the design mission.

d. An adequate weight control program be instituted and enforced with respect to the airplane contractor, all Government furnished equipment and equipment installation requirements.

e. Funds be allocated in the amount necessary to assure the development and refinement of the T-35-3 turbine to obtain the desired specific fuel consumption.

f. Power plant development programs be planned to provide, if at all possible, an alternate turbine which would back up the T-35-3 program.

g. Research and development programs be initiated by NACA, Air Materiel Command and the industry to assure a thorough investigation of propellers operating under conditions expected for the XB-52.

h. If B-52 airplanes are to be available during the period required, as indicated in conferences with AC/AS-3 and AC/AS-4 personnel, then the prototype airplane must be available for flight in 1950. To accomplish this, turbine and propeller development programs have been initiated and must continue uninterrupted. The XB-52 configuration must be selected and additional funds obligated on this project to assure continuity of development.

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HqATSC Form No. 80-507 (20 Jan 45)
(Old AAFMC-266)

M.R. #TSEOA-2-1360
23 June 1947

1. The design of the XB-52 not be penalized weightwise at this time for either the 80,000 pound bomb or the internally stowed fighter installation.

Distribution:
AC/AS-4
AC/AS-3
Aircraft Lab.
Propeller Lab.
Power Plant Lab.

Prepared by J. A. BOYKIN, Jr.
(Name)

Approved by H. E. WARDEN, Lt. Col., A.C.
Chief, Bombardment Branch

Approved by L. C. CRAIGIE, Major General, USA,
Chief, Engineering Division

Concurrence:

WF-1-29 DEC 45 1500

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HEADQUARTERS, ARMY AIR FORCES
WASHINGTON 25, D.C.

Classification Cancelled (or changed to) SECRET
By authority of CHANGED TO 1 APR 1948
By ALUSAF

SUBJECT: Military Characteristics of Aircraft

TO : Assistant Chief of Air Staff - 4

1. The following principal characteristics for military aircraft are approved:

a. Type - Heavy Bombardment.

b. Class - High Speed, High Altitude, Long Range, Land Airplane.

c. Mission - The destruction by Atomic Bombs of surface objectives.

d. Requirements -

(1) Performance (At design gross weight condition less one-half fuel unless otherwise specified)	Minimum Acceptable
(a) High speed at tactical operating altitude for 15 minutes.	420 mph
(b) Tactical operating altitude.	35,000 ft.
(c) Service ceiling.	40,000 ft.
(d) Service ceiling - 1/2 engine.	15,000 ft.
(e) Tactical operating radius with 10,000 lb. bomb load with full fuel load.	5,000 statute miles
(f) Average speed for above radius.	420 mph
(g) Take-off over 50' obstacle at design gross weight (without assisted take-off devices).	7,500 ft.
(h) Landing over 50' obstacle at design gross weight condition less droppable fuel and bombs.	7,500 ft.

(2) If after the above requirements have been met, additional performance may be realized, consideration in the design of this aircraft for utilizing this performance should be given to (1) high speed, (2) armament and (3) passive protection which will reduce its vulnerability in penetrating heavily defended zones.

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e. Armament -

*(1) Bombs - The airplane will be designed primarily to carry an Atomic Bomb internally. Provisions for standard bombs from the 500 lb. type up to the 22,000 pound type bomb and aerial mines are desirable; provisions for the 44,000 pound type will be desirable if the bomb is standardized at a later date. If practical, provisions should be made for ready inclusion, at a later date, of an internally stowed fighter and an air-to-surface guided missile with 100 to 300 mile range.

(2) Fire Control System - In accordance with current Military Characteristics, dated 27 May 1947, subject: "Heavy Bomber Fire Control System". Provisions for razon type of guided bomb are definitely required. Consideration should be given to design which will facilitate modification, within the useful life of this airplane, to substitute air-to-air guided missiles now under development.

(3) Armor - Armor protection (flak curtains or deflector plate) shall be provided for engines, vital airplane components against fighter, AAA fire, and guided missiles. The maximum protection consistent with airplane weight and performance requirements is necessary. Crew members will be equipped with flak suits.

f. Crew

*(1) The desired crew shall consist of pilot, co-pilot, two technicians, flight engineer, two bombardier-navigators, one RCM operator, one radio operator-gunner, and the minimum number of turret operators deemed necessary. The arrangements of the crew shall provide for efficient performance of missions over the maximum radius of operation and shall permit the interchange of station by crew members.

g. Equipment -

(1) Bombing and Electronic Equipment - In accordance with Material Requirement Directive 16-1 and Addendum I thereto, dated 16 May 1947, The best visual and radar bomb sights are required.

(2) Instruments and equipment shall be adequate for effective day and night operations of the airplane on military missions in all weather conditions.

h. Structure and Design Features -

(1) These features of design that will permit accurate bomb dropping, accurate navigation, the most effective defensive firepower, and maneuverability, will be of primary consideration in the design of this airplane.

Classification Cancelled or Changed to
~~Top Secret~~ Secret
~~Confidential~~ ~~Restricted~~
CHANGED NOV 1948
AUTHORITY, C. G., AIR MATERIEL COMMAND
REPORT CD-556 / APR 48
By: ALDEN R. CRAWFORD, Brig. Gen., U.S.A.

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13 Jan.
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Subj: Proposed Military Characteristics for Heavy Bombardment Aircraft

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* (2) Reliability and ease of maintenance under field conditions should be emphasized. Quick change features for engines and the main structural components are essential. Simplicity and ease of refueling, rebombing, and rearming should be stressed to insure extreme field flexibility.

* (3) Emphasis must be placed on features to expedite rebombing and rearming time so that such time shall not exceed preflight and refueling time.

(4) Consideration will be given to the use of increased engine ratings or assisted take-off devices for reducting the take-off distance below those specified in paragraph 1d (1) (g).

(5) Simplicity of design and suitability to quantity production should be emphasized.

2. The foregoing principal characteristics for military aircraft supersede "Military Characteristics for Heavy Bombardment Aircraft", dated 23 November 1945.

FOR THE COMMANDING GENERAL:

ALFRED R. MAXWELL
Brigadier General, USA
Chief, Requirements Division
Office of Asst. Chief of Air Staff - 3

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AUTHORITY, C. G., AIR MATERIEL COMMAND
REPORT CO 356 1 APR 48
By: ALDEN R. CRAWFORD, Brig. Gen., USAF

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SAVE

HEADQUARTERS
AIR MATERIEL COMMAND

IN REPLY ADDRESS BOTH COMMUNICATION AND IN REFER TO ATTENTION OF FOLLOWING OFFICE SYMBOL

TSEOA-2

SUBJECT: XB-52 Airplane

TO: Commanding General,
Army Air Forces
Washington 25, D.C.
ATTN: AC/AS-4

1. Reference is made to letter from AC/AS-4 dated 28 April 1947 and 1st Indorsement from AMC dated 9 May 1947, concerning the XB-52 Airplane and its relation to certain studies conducted by the "RAND" project on aircraft limitations.

2. Mr. Schairer of the Boeing Aircraft Company and Mr. Root of the Douglas Aircraft Company have discussed the "RAND" study as related to the XB-52, and the AMC has reviewed the matter with representatives of each company independently. Mr. Root also returned to Washington with additional information on the XB-52 Airplane for further conferences with General Crawford.

3. Memorandum Report No. TSEOA-2-1360, copies of which are inclosed for your office and for AC/AS-3 as Tab "A", has been prepared to present more detailed information on the XB-52 Airplane; however, the following additional comments are presented in answer to the points raised in the reference letter.

4. The "RAND" report emphasizes the fact that the requirements of range, speed and military equipment defines an airplane whose design point falls on a curve of rapidly diminishing returns. The AMC is in complete accord with this general conclusion and has emphasized the necessity of strict control of weight and equipment requirements and has repeatedly asked that the 5,000 mile radius requirement be reviewed to insure that it is a realistic requirement and that it does not contain any appreciable margin for contingencies. The "RAND" analysis is a generalized comparative study and is useful only in predicting a trend. The shortcoming of the analysis lies in the over-simplification of the basic assumptions. Such a study does not permit either scaling an

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TS-72 2 of 2 C-52 file
2-17 pp

airplane up or down in size to the extent which Douglas presented, and simplification to the extent of neglecting cruising speed and assuming a constant percentage of fixed equipment weight regardless of size obviously will give an erroneous picture when applied to modern bombardment aircraft. Reference is made to letter from Mr. A. E. Raymond, Douglas Aircraft Company, addressed to General Crawford, dated 16 May 1947 (see Tab "B"). It is believed that this letter presents the latest views of the "RAND" project which affect the XB-52, quoted as follows:

a. " 'RAND' did not consider the effect of different cruising speeds nor did it take into account cases where equipment instead of representing a fixed percentage of the weight empty, was a fixed weight regardless of size of the airplane. After allowance was made for these differences the so-called discrepancy disappeared.

b. "Boeing's figures for the B-52, so far as we know them, while imposing an admittedly difficult design problem, are feasible of accomplishment, provided the engines achieve the power and fuel consumption promised by the manufacturer."

5. Studies of ultimate airplane performance similar to the "RAND" study have been made by the AMC on previous occasions to predict trends. Such studies can be useful if properly evaluated; however, they must be kept up to date or they become meaningless. In retrospect, it is interesting to note that Douglas (author of "RAND") approximately six years ago made a similar analysis and, in general, concluded that the B-36 requirements of 10,000 miles range with 10,000 pounds of bombs were too severe, that there was little likelihood of their attainment, and that such an airplane was entirely impractical. Tremendous increases in armament, radar and equipment, as well as engineering compromises, have been absorbed in the B-36 and yet by improved weight control and planning to utilize the full capabilities of the B-36 design, which was developed under the most unfavorable war-time conditions, its design range objective can be met.

6. The referenced letter requested comments on the feasibility of the Delta wing configuration for the XB-52. It should be possible to construct such an airplane with a more favorable weight ratio than a conventional airplane; however, the range requirements would immediately dictate either reciprocating or turbine propeller power plants. It is not believed that the advantages would be large enough to justify consideration of a pusher propeller installation until considerably more experience has been gained on the XB-35 and YB-35 Airplanes. Considerable experience should be obtained on Delta wing configurations before

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a recommendation to adopt such a configuration for the heavy bomber could be presented. This is based on the monetary investment involved in the heavy bomber and the timing and urgency of the project, which has been expressed by representatives of AC/AS-3 and AC/AS-4, to fill the present gap in the heavy bomber field. Quoting from Douglas letter dated 16 May 1947 (Tab "B"), current "RAND" opinion is as follows:

> "There is no present indication that a Delta wing type would have any marked superiority over a conventional airplane for long range, high speed operation."

Additional studies may change these conclusions; however, it is believed that, based on data and experience now available, this configuration should not be considered as a sole entry for solution to the heavy bomber problem. When jet engine specific fuel consumption is reduced to a point to permit their use in such a bomber, and additional experience on the XB-35 and YB-49 configuration is obtained, then a re-evaluation should be made.

7. The XB-52 project, assuming procurement of two airplanes, will according to preliminary estimates, involve between 40 and 50 million dollars. Many tactical problems, yet unsolved, will confront the airplane. For these reasons, and the fact that the airplane will be depended upon to fill a vital spot in strategic planning, the XB-52 merits a frank and realistic appraisal as to the technical possibility of attainment of desired objectives. During conference conducted in the office of Chief, Engineering Division, AMC, on 23 May 1947, General LeMay stated that if the XB-52 Airplane for any reason falls below the 5,000 mile radius objective, Headquarters, AAF should be notified. The implication which might be drawn is that if such a condition should arise, then the AAF is no longer interested in the project.

8. That the range capabilities of the XB-52 will fall below the 5,000 mile requirement is a foregone conclusion; however, such deficiencies should be more than made up during the life cycle of the airplane. Based on the history of past bombers, there in inclosed under Tab "C", a prediction of the range potential of the XB-52 Airplane at any stage during its life cycle. For comparative purposes, the B-36 and the B-29 project histories are plotted against the same time scale. It is immediately apparent that had either of these projects suitability been based solely on the initial design point, both would have been cancelled prior to completion of the first experimental article. This comparison is made in order that any temporary deficiency of the XB-52 not be allowed to cloud the potentialities of the design and the possibility of ultimate attainment of the design range.

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[illegible] Air Land"

[illegible] above analogy with [illegible] record in the past [illegible] the XB-52 follow this [illegible] period before the air- [illegible] presents a vehicle which has [illegible].

[illegible] provides an airplane which will carry atomic bombs [illegible] and return to some alternate spot short [illegible].

[illegible] provides an extremely long range vehicle which can be [illegible] carrying [illegible] air-to-ground guided missiles.

[illegible]. At such time as low pressure landing gears are developed, [illegible] possible to stage this airplane through landing fields, or [illegible] advanced bases which cannot be held or supported for prolonged [illegible] operation.

[illegible]. It provides a high speed prime mover for the towing of very high speed bombers, such as the B-47, within range of the objective.

10. In summary, a strategically sound long range bomber capable of delivery of 10,000 pounds of bombs within a tactical operating radius of [illegible],000 miles can be developed from the basic XB-52 design. This will require that proper emphasis be placed throughout the entire development program on the attainment of the primary design range objective, subordinating all other lesser requirements to this objective, and that the necessary supplementary Research and Development Program for turbines, propellers and equipment be initiated and supported financially.

11. It is recommended that the XB-52 program be continued on its present high priority basis and that proper cognizance be taken of the more detailed recommendations contained in Memorandum Report No. TSEOA-2-1360, under Tab "A".

FOR THE COMMANDING GENERAL:

[illegible]

3 Incls
1. Tab "A", M.R. #TSEOA-2-1360 (in dup)
2. Tab "B", Douglas ltr 16 May 47
3. Tab "C", Range vs. Development time Trends (5 charts) (in dup)

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JUL 14 1947

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[illegible]

Commanding General
Air Material Command
Wright Field, Dayton, Ohio

[illegible]

1. The inclosed copy of a Headquarters Directive, dated [illegible] letter specifically directs in paragraph 2 that the [illegible] ment be pursued under a high priority. However, it is the desire of this headquarters to inform you and a very limited number of your key officers for information only, about the current thinking on this project.

2. a. The XB-52 is only a study of one method of accomplishing the strategic mission intended for this airplane. This project must be carefully and continuously scrutinized to assure its continuing practicability. Any directives to [illegible] actual construction will be dependent on express authority from the Joint Chiefs of Staff through the Commanding General, AAF.

b. It is directed that consideration and study of other means of accomplishing this primary mission be initiated to explore the following conditions:

(1) One-way flight to the target.

(2) The aircraft's return to friendly territory outside the United States.

(3) Pre-planned ditching areas.

(4) Use of sub-sonic pilotless aircraft manufactured and operated at a greatly reduced cost compared with the great financial and physical effort required by present VHB production - operation methods.

OFFICE SYMBOL	1	2	3	4	5
GRADE AND SURNAME OF COORDINATING OFFICERS					

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Ltr to CO, AMC, subject: "XB-52 Program". (cont'd)

(5) AMC project solutions for this strategic mission.

3. The intent of this letter is not to stop progress on the present XB-52, nor to add to its difficulties, but to ascertain that all interested agencies recognize the possibility of change occurring in this program. The strategic mission remains firm but the method of its accomplishment is not fixed. Economic considerations may force adoption of some other method, as outlined in 2b, of satisfying the long range requirement.

By command of General SPAATZ:

1 Incl
Cy ltr, subj:
"Long-Range Development
Program", fr Hq USAF, to
CG, AMC

Capt Whatley
Lieut Colonel

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TSTMG (TSECL)

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15 July 47

National Advisory Committee for Aeronautics
1724 F Street, N.W.,
Washington, D. C.

Attention: Director of Aeronautical Research

Gentlemen:

It is requested that the National Advisory Committee for Aeronautics conduct research investigations in the 16-Foot High-Speed Wind Tunnel at the Langley Memorial Aeronautical Laboratory, in connection with the problems relative to propeller-gas turbine installations on which no design criteria is currently available. The need for such data has become suddenly quite urgent because of the difficulties being experienced in arriving at an optimum design for power plant installations, such as that in the XB-52 airplane. Even though such data is needed for many other aircraft now in the planning stage, the importance of the XB-52 airplane to the national defense planning, and the early delivery date required for it, makes immediate action mandatory if the information obtained is to be of value.

Two major factors require investigations; the engine air entrance problem, which essentially consists of the study of the relative merits of the "D" and "E" type spinners, and the propeller itself, which largely reduces to a problem of determining the nature of the propeller shank-spinner junction for minimum losses in efficiency, drag and ram recovery.

It is realized that in the design of long-range aircraft, small losses of the above nature lead to serious losses in range or excessive fuel loads for a given range. For the ranges which are the objectives today for this class of airplane, such small losses as those caused by a poor spinner-shank junction, could easily result in failure to achieve the objective. Examination of existing data on these subjects by many of the aircraft industry's most highly qualified personnel has failed to lead to agreement on what can be expected regarding the nature and magnitude of the performance of various overall configurations of propeller-gas turbine installations. Therefore, in view of the above, and due to the urgency of the present situation in regard to the XB-52 airplane, the Air Materiel Command proposes the following program:

a. Wind tunnel test program be organized to evaluate the over-all combined performance of spinner-propeller configurations likely to be used in conjunction with gas-turbines. The program should be conducted in a tunnel capable of producing a near full scale Mach number and propeller blade loadings as possible and in addition as high Reynold's numbers as possible. A survey of wind tunnels available, and their ability to match expected airplane and propeller operating conditions

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Ltr to NACA HQ., Washington, D. C. - Request for Test AAF-34, dated 15 July 47

indicates that the Langley Field 16-Foot High-Speed Tunnel and its dynamometer are best suited to this purpose.

b. The configurations to be tested should include two basic spinners, a "D" and and "P" type, and with each type at least two currently proposed forms of spinner-shank junctions. With each spinner three propeller blade designs should be tested. These designs would be identical over the outer portions of the blades, but would vary in the shank-region thickness ratios to conform to what can be reasonably expected from current hollow steel blade fabrication forms. The overall picture presented thus involves 12 different configurations. It is felt that two basic ones, one with a "D", and one with an "P" type spinner should be tested completely, and the remainder tested only enough to evaluate their relative effects.

c. The following data are required of the models to be completely tested:

(1) Positive thrust, torque and efficiency over the range of power loadings, V/ND ratios, and Mach numbers the tunnel is capable of producing.

(2) Negative thrust and torque over a range of blade angles, V/ND ratios and Mach numbers. (The problem of balancing propeller torque against engine compressor torque in a windmilling condition is a critical one and vitally affects the overall engine-propeller control problem.) The blade angle here should include coverage of the feathering region.

(3) Isolated spinner drags and torques.

(4) Pressure recovery and mass flow at entrance to the engine under all test conditions.

(5) Velocity distribution in place of propeller over the area of the cowling. (At the present time there is much conflicting data in existence on this subject.) It is considered important that this factor be re-evaluated since the proper pitch distribution of the blades depends on it, and dependent upon the pitch distribution is the maintenance of good efficiency, pressure recovery, and engine air mass flow. Included in the instrumentation for the above should be wake survey makes for both thrust and torque if available.

It has been determined through preliminary informal discussions with the wind tunnel operating personnel at the Langley Memorial Aeronautical Laboratory that such a program is feasible with the presently available basic equipment. It is proposed to fit over the

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Ltr to NACA HQ., Washington, D. C. - Request for Test AAF-34, dated 15 July 47

16-Foot Tunnel dynamometer a cowling typical of gas turbine installations now under consideration and to match the spinner and blade design to this cowling. Based on present engine sizes, a scale model of approximately 1/3 can be fitted without trouble to the dynamometer.

It is proposed that the Propeller Laboratory, Engineering Division, Air Materiel Command, assume the responsibility for designing and furnishing to the National Advisory Committee for Aeronautics all models to be used in connection with these investigations. These studies will be conducted at the expense of the Government, and the data will be classified as Confidential.

It is requested that the information obtained as a result of these investigations be made generally available to the aircraft industry and other interested Government agencies, by means of reports in the most expeditious manner commensurate with the desires of the National Advisory Committee for Aeronautics regarding the means to be used in the immediate dissemination of research information.

Final approval by the National Advisory Committee for Aeronautics should be withheld until receipt from the Navy of the accomplished AAF Clearance Form AAF-34.

Very truly yours,

cc: AVCELO at:
AAL, Mft. Fld. Calif.
IMAL, Igly.Fld.Va.
FPSL, Clvd. Ohio
Capt.W.S.Diehl,USN,Wash.D.C.
AC/AS-4, Wash. D. C.
TSEPR-4, Mr. Dembach
TSEOA-2, Mr. Savage

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AF MO-33 (20 MAY 44) TC-72 14-1/1 CONFIDENTIAL 31

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	(6)
FILE NO.	

SUBJECT: XB-52 Airplane

TO: [illegible] Deputy Chief of Air Staff for Research & Development Requirements Division, AC/AS-3 DATE 18 July 1947

COMMENT No. 1

FROM Research & Engineering Division, AC/AS-4 Maj. W.D.Brady/bkw/3563

1. Attached is copy of a letter and Memorandum Report No. TSEOA-2-1360 from Air Materiel Command on the XB-52 airplane, forwarded for your information.

2. Air Materiel Command was directed by letter dated 3 July 1947 to prepare a summary of all of the controversial points of equipment installations, or special provisions which might affect the gross weight and hence the ability to accomplish the primary mission of the XB-52. At such time as this summary is complete it is planned to have a conference attended by all interested AAF agencies with the hope of rendering decisions on the various controversial points relative to this airplane.

452.1 Bombers

F. O. CARROLL
Brigadier General, U. S. A.
Chief, Research & Eng'g. Div.
AC/AS-4

2 Incls.
As listed above

AMDRE-4 Col Holtaway

AMDRE-4B Maj W D Brady
Capt. Cgottschy

Central Files 10/8/47

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August 1947

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EXCERPTS [illegible]
[illegible]

GENERAL LEMAY: I have a comment, Mr. Chairman. Let us consider what we are designing this airplane to do. This is to be our "work-horse" bomber—the one that will do the job in case our special attack fails and we have to fall back into World War II concepts of strategic bombing by large numbers of bombers who carry more or less conventional explosives. That weapon will then destroy the enemy's ability to wage war. That means that we will have to establish bases well in the rear of this airplane to do the job. We may not have them. It means that we are going to have to wait until we can build up an Air Force like we build up in this war. In all probability, it means amphibious landings on or around or envelopes to secure and hold our bases for us. All this will take time like we had in war. It means that we are going to have to attack a well-defended and well-organized enemy. I don't see how we can fight our way into a target that is well-defended without armament—now, all-around armament on this airplane. It may well be that we can do it for a little while without tail gunners, but certainly we won't be able to do it very long. So I think that we must have at least a provision in this airplane, for all-around armament, because we are going to have to fight [illegible] to have to fight them. The speed is fine. But your armament and defensive power in your formation is basic. All during the last war, we sacrificed speed time and time several times reduced the cruising speed of our formation to increase our firepower and our defensive capability. So I think [illegible] maximum speed and I see we can get no speed increase. Certainly, the range has to be increased, and 2,000 miles is the very minimum that we would accept. If we get no more than 2,000 miles, we are still able to do the job, because it covers about 35% of the target area. If we get all of that, certainly we can win. Japan was only destroyed, I am sure. So it seems to me that we [illegible] 2,000 miles, the least armament—your tail turret is fine, and [illegible] if necessary, to get the job done.

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Rtn by Capt Strathy/okw/3563
1 August 1947

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Basic Corr: Ltr fr Hq AAF to CG AMC, dtd 14 July 47, subj. "XB-52 Program"

2nd Ind. AFDRE-4F

Headquarters, Army Air Forces, Washington 25, D. C. Aug 1 1947

To: Commanding General, Air Materiel Command, Wright Field, Dayton, Ohio

1. The primary purpose of the basic letter was two-fold:

a. To indicate to Air Materiel Command that while no determent of B-52 progress is intended, there exists a possibility of change in the program. (Paragraph 3 of basic communication).

b. To initiate a study of other means, outside the XB-52, of accomplishing the primary mission. Suggestions in paragraph 2b (1), (2), and (3) of the basic letter envisioned the use of present or "immediate future" aircraft, (Example: B-50) as an economic or "time-element" necessity in accomplishing the job proposed for the B-52.

2. To assist your Command in considering "other means", "return to friendly territory outside the United States" involves utilising a range of 7,000 miles. "Ditching in pre-planned areas" where the crew may be recovered will necessitate a minimum flight plan of 6,000 miles.

3. Your Command will be furnished with copies of any further directives to R&D concerning this phase of development.

BY COMMAND OF GENERAL SPAATZ:

1 Encl.
n/c

CURTIS E. LeMAY
Major General, U. S. Army
Deputy Chief of Air Staff for
Research and Development

HQ AAF
AUG

	1	2	3	4	5
	AFDRE-4B	AFDRE-4	AFDRE-1	APACD	AFDRD
	Maj DD Barnes				

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BOEING AIRCRAFT COMPANY

SEATTLE 14, WASHINGTON

AAFPR
File No. 15465

AUG 7 1947

IN REPLY REFER TO REFERENCE NO.

X153-69

Classification cancelled
or changed to ...
AUTH: CG AMC per this letter
By ... Signature and Grade, W.S.D.
Date 11-3-47

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSEOA-2

Through: Army Air Forces Plant Representative
c/o Boeing Aircraft Company
Seattle 14, Washington

Subject: Contract W33-038 ac-15065,
Transmittal of Preliminary Design Data

1. Three copies of Contractor's document, D-8508, "Preliminary Design Data, Boeing Model 464-25", are forwarded under Shipment Notice No. 261,365 for the information of the Air Materiel Command. This document presents the latest configuration to be proposed for the Model XB-52 airplane and indicates those changes to previous configurations that are necessary to achieve the ranges shown.

2. The principal airplane changes to be incorporated are:

(a) The use of four main landing gears in the fuselage with nacelle outriggers.

(b) Reduction of defensive armament to provide one cal. .50 tail turret with radar sighting and two cal. .50 forward turrets with optical sighting.

(c) Revision of the fuel cell construction so as to utilize large fuel cells with wing rib structure inside the fuel tanks.

(d) Increase of bomb load to 12,000 pounds.

3. Air Materiel Command comments on these data will be appreciated.

CONTRACT FILES
W33-038-ac-15065
XB-52 Ltr rd

BOEING AIRCRAFT COMPANY

A. C. Carlsen
A. C. Carlsen
Chief Project Engineer

Enclosures (3)
Shipment Notice
No. 261,365

IF ENCLOSURES ARE WITHDRAWN (OR NOT ATTACHED) THIS CLASSIFICATION OF THIS CORRESPONDENCE WILL BE CANCELLED IN ACCORDANCE WITH PARA 20 AR 380-5

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MX-839
(6-V-47)
C.C9-B

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TSEFR-4

TSEPR4/WTG/met

12 AUG 1947

Data on MX-839 Propeller-Engine Configuration

AMC Engineering Liaison Officer
at the NACA Laboratory
Langley Field, Virginia

1. The NACA 16' Tunnel Group has requested airplane, engine, and propeller data for use in preparing schedules and requirements in connection with a test program on the MX-839 propeller nacelle configuration requested by Air Materiel Command. It is requested that the following comments and data be given to the 16' Tunnel Group.

2. Neither the airplane nor engine configuration has been finally established as yet but they are expected in the immediate future. It appears, however, that the configurations will not greatly differ from those upon which the preliminary calculations have been made. Preliminary airplane and engine performance was made available to the NACA in January.

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3. The following performance data are the latest available from the airplane manufacturer and constitutes the conditions at the three most important operating points:

Condition	Take-off	Cruise	High Speed
Gross Weight	400,000	311,000	240,000
Altitude	S.L.	35,000'	35,000'
Airplane Speed (Knots)	148	359	399
Airplane Speed (m.p.h.)	170	414	460
SHP	9470	4910	5500
Airflow (#/sec/eng)	95	35.5	35.7
Propeller r.p.m.	660	650	650

The propeller will be 23' diameter, 4 blade.

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AMC ltr, subject, Data on MX-839 Propeller-Engine Configuration

12 AUG 1947

4. The engine will be 59" in diameter and 163.7" in length. Using the front face of the engine thrust nut as the zero inch reference station, the nacelle would have a maximum outside diameter of 71" at the -65 inch station. The "D" spinner and inside "E" spinner should inclose a truncated cone of 28" diameter at the +14 inch station and 24.5" diameter at the +20 inch station. The face of the first centrifugal compressor is at approximately the -34 inch station.

5. The airplane and engine manufacturers have been requested to supply more information for this project. These data, including engine layout and air inlet drawings, are expected shortly and will be immediately forwarded to the NACA.

BY COMMAND OF LIEUTENANT GENERAL TWINING:

DAD
D. A. DICKEY
Chief, Propeller Laboratory
Engineering Division

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MX-839

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File 40 pt 2

Confidential

Boeing Aircraft Company
Seattle, Washington

Contract W 33-038 ac-15065

ac 15065

Classification cancelled
or changed to Confidential
AUTH: C. Spec. Cd. 356, 15 April '45
By C Gaudet Comm
Signature and Grade USCG
Date 6-8-45

3 August 1945
Approval recommended:

Deputy Chief, Procurement & Industrial Planning Division
Office, Assistant Chief of Air Staff-4

APPROVED: SEP 2 1945
By direction of the Under Secretary of War under the provisions of Public Law 703, 76th Congress (as amended by Section 13 of Public Law 580, 77th Congress); Title II of the First War Powers Act, 1941 and Executive Order No. 9001, 27 December 1941.

PHILLIPS W. SMITH
Colonel, GSC
Chief, Current Procurement Branch
Procurement Group, WDGS

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Contract No. [redacted]

Classification [redacted]

Airplane

Supply Contract

(Army Air Forces)

Preliminary Design Studies of [redacted]

Airplane

Estimated Cost $ 1,700,165.00

Fixed Fee $ 85,008.00

Payments to be made by the Finance Officer, U. S. Army, [redacted] Wright Field, Dayton, Ohio.

The supplies and services to be obtained by this instrument are authorized by law for the purposes set forth in, and are chargeable to allotments listed therein, the available balances of which are sufficient to cover the cost thereof.

[redacted] 0222-2000 [redacted] 33-038

This formal contract supersedes letter contract dated [redacted] June 1940, as [redacted]

The [redacted] Procurement Division, AMC, is hereby designated to be the office through which the Government will deal in the administration of this contract.

Award approved by Chief, Procurement Division, AMC, on behalf of Commanding General, AAF, and funds obligated prior to 1 July 1940.

[redacted]

Confidential

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COST-PLUS-A-FIXED-FEE

SUPPLY CONTRACT

THIS CONTRACT, entered into this 24th day of January, 1947, by THE UNITED STATES OF AMERICA, hereinafter called the Government, represented by the Contracting Officer executing this contract**, and BOEING AIRCRAFT COMPANY

* a corporation organized and existing under the laws of the State of Washington

* [redacted]

* [redacted]

* [redacted]

* [redacted]

of the City of Seattle

in the State of Washington

hereinafter called the Contractor, Witnesseth that:

*Delete all lines which do not apply.

**This contract has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

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ARTICLE 1 - STATEMENT OF WORK

(a) The Contractor shall, within the time specified in Article 4 hereof, perform the following services and manufacture, furnish and deliver to the Government the following articles and reports:

Item 1 - Conduct preliminary design studies of a long range bombardment airplane substantially as described in Contractor's Specification D-7603, dated 19 April 1946, by reference hereby made a part hereof. In these studies, the relevant portions of the current issues of the following specifications in effect on 18 April 1946 are incorporated herein by reference:

Army Air Forces - 1801	Form: Airplane Manufacturer's Model Specification
Army Air Forces - 40749	Data, Aircraft Performance
Army-Navy - AN9103	Group Weight Statement

In connection with these studies the Contractor shall also perform the work called for in Items 2 to 5, inclusive, below.

Item 2 - Conduct wind tunnel tests and design, construct and test wind tunnel models as follows:

(1) Conduct wind tunnel tests establishing:

a. Wing planform and dihedral.
b. Airfoil section.
c. Primary body shapes as affected by aerodynamics minimizing the number and extent of all protuberances.
d. Tail locations.
e. Tail size.
f. Rear spar locations in wing and tail surfaces.
g. Assurance of suitability of power plant locations.
h. Stability moments.
i. Sufficient flap information to proceed with the majority of wing design including full span flap development, leading edge slots or other devices to insure satisfactory stalling characteristics.
j. Optimum nacelle inlet including spinner, cowl and propeller blade shank fairings.

(2) Design and construct and test the following wind tunnel models:

a. Complete powered model (approximately .05 scale) which will be tested over the entire anticipated flight range.

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b. Powered nacelle model (approximately .15 scale) which will be tested over the entire anticipated flight range.

c. Additional models such as low speed two-dimensional wings, high speed two-dimensional wings, three-dimensional wings, fuselages, tail surfaces, and nacelles as found necessary to accomplish items listed in paragraph (1).

Item 3 - Furnish drawings and data as follows:

(1) General Arrangement Drawing - The general arrangement drawing shall show front, side and top views of the aircraft and shall be arranged in accordance with conventional third-angle projection, fully dimensioned. Six copies of this drawing shall be furnished and shall include at least the following:

a. Overall dimensions of the aircraft.
b. Span of wings.
c. Length of each panel.
d. Chord of each panel (in the case of tapered wings, the root and tip chords).
e. Incidence of wing (degrees, at root and tip).
f. Dihedral (degrees).
g. Sweepback (degrees).
h. Location of wing in relation to thrust line.
i. Mean aerodynamic chord length and location from leading edge of wing and thrust line.
j. Span, chord, and location of each aileron.
k. Span, chord, and location of each tab.
l. Overall dimensions of tail surfaces.
m. Span and chord of the horizontal and vertical tail surfaces.
n. Total wing area.
o. Area of each wing (including ailerons).
p. Total aileron area.
q. Area of each aileron.
r. Total area of horizontal tail surfaces (stabilizers and elevators).
s. Total area of vertical tail surfaces (fin and rudder).
t. Center of gravity locations for the design gross weight condition with the alighting gear retracted and extended. Center of gravity travel; that is, the extreme forward and extreme rearward positions in which the aircraft is likely to be flown with the alighting gear retracted or extended, whichever results in the greatest center of gravity movement. (A total of four center of gravity locations). The center of gravity shall be dimensioned from the leading edge of the wing at root chord and from the thrust line.

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u. Size of alighting gear wheels and tires. Confidential
v. Tread of wheels.
w. Wheel base.
x. Deflection of alighting gear shock absorbers and tires, both above and below the static position.
y. Angle between thrust line and ground line, the latter being a line tangent to the deflected alighting gear tires with the weight of the aircraft on the wheels.
z. Angle between line normal to thrust line and the line passing through the point of wheel to ground contact and design gross weight center of gravity.
aa. Propeller diameter, clearances in plane of propeller disc, and clearances normal to the propeller disc considering extreme blade settings.
bb. Location of engine nacelles.
cc. Location, span, and chord of all lift and drag increasing devices.
dd. Airfoil section designations (root and tip, and any intermediate variations thereof).
ee. Weight empty, design useful load, and design gross weight.
ff. Maximum alternate useful load and maximum alternate gross weight.
gg. Any other alternate useful loads and gross weights applicable to combinations of loads other than specified in ee. and ff. above such as used for maximum range, maximum range with reduced bomb load, maximum load with reduced range, etc., when applicable.
hh. Manufacturer's model number of aircraft.
ii. Engine model designation.
jj. Angle of pilot's vision over the nose with standard pilot and seat in normal position.

Scale - The scale of the drawing shall be 1 inch to 100 inches.

(2) Combined Inboard Profile and Fixed Equipment Drawing - The combined inboard profile and fixed equipment drawing shall contain suitable cross sectional views showing at least the interior arrangement and general structural arrangement, location of crew, power plant, armament, entrances, emergency exits, escape hatches, photographic provisions, and passageways, and shall show such items as seats and controls, crew accommodations, instruments, navigation equipment, furnishings, electrical equipment, miscellaneous equipment, communication equipment, etc. (location dimensions not required). Scale shall be 1 inch to 10 inches. Six copies of this drawing shall be furnished.

(3) Additional Drawings - Such additional installation assembly drawings and/or perspective drawings as may be required to show the suitability of the aircraft for the accomplishment of its mission shall be furnished as follows:

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c. Fuselage Structure.
d. Wing Structure.
e. Empennage Structure.
f. Landing Gear.
g. Flight Controls, including Automatic Pilot.
h. Defensive Armament.
i. Armor and Flak Protection.
j. Field of fire chart.
k. Sighting field charts for all optical and radar bomb and gunsights.
l. Ice removal system.
m. Power plant, including quick detach features.
n. Fuel system.
o. Lubrication system.
p. Hydraulic system.
q. Bomb provisions.
r. Bomb sight, radar and/or optical.
s. Communication system.
t. Photographic equipment.
u. Navigation equipment.
v. Flight and engine instruments.
w. Electrical system.
x. Oxygen system.
y. Crew compartment supercharging and air conditioning system.
z. Hoisting and jacking provisions.
aa. Life raft provisions.
bb. Fire extinguishing system.
cc. Tie-down provisions.
dd. Emergency exits.
ee. Propeller installation, if applicable.
ff. New and novel features.

The above drawings shall contain sufficient details to insure compliance of the airplane with the applicable specifications. The perspective drawings shall be superimposed on a silhouette of the airplane and shall be approximately 11-1/2 inches by 17 inches. The list of drawings as presented shall not necessarily be adhered to exactly, but the subject matter as given by the list shall be completely covered.

(4) Additional Data

a. Weight and Balance Report - The weight and balance report shall include the following:

1. Airplane Diagram - The airplane diagram shall consist of a side elevation of the airplane, showing the data listed below.

a. Horizontal reference datum and vertical reference datum.

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b. Scales in inches to facilitate the determination of approximate moment arms.

c. Length of m.a.c. and the distances from the leading edge of the m.a.c. to the horizontal reference datum and the vertical reference datum.

d. The location and letter designation of each fuselage compartment. The centroid of each compartment shall be indicated on the scale.

e. The location of crew stations, and principal items of equipment and useful load.

2. Estimated Group Weight Statement - Estimated group weight statement shall be in accordance with Form AN9103.

3. Horizontal Balance Calculations for Weight Empty Condition - The horizontal balance calculations for the weight empty condition shall be prepared in tabular form with the groups listed in the order shown on the Group Weight Statement, AN9103. Weights and moments shall be given in as much detail as possible, with totals for each sub-group and groups. Retractable alighting gear shall be shown in both the extended and the retractable position.

4. Horizontal Balance Calculations - Horizontal balance calculations shall be prepared in tabular form and divided into two sections of non-expendable and expendable useful load items. The items in each section shall be listed in progressive order according to their arms. Weights and moments shall be given as much detail as possible. The position of the retractable alighting gear shall be shown. These tabulations may be combined to form a single table.

a. Design gross weight.
b. Extreme forward and extreme aft centers of gravity. The takeoff conditions, the normal expenditure of load, and reasonable shifting of crew shall be shown. Retractable alighting gear shall be in the position which will give the most extreme center of gravity.
c. Maximum alternate gross weight.
d. Principal alternate gross weights.

5. Statement of Estimated Limits of Center of Gravity Travel - A statement of the estimated limits of center of gravity travel as determined by aerodynamics requirements for stability and control shall be furnished.

6. Supporting Data - Detailed data in support of the estimated weight and balance figures, such as methods used, assumptions made, etc., shall be furnished.

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7. Moment of Inertia Data - The estimated total moments of inertia about the three axes shall be furnished.

b. Structural Design Criteria Report - A structural design criteria report shall be prepared to include at least the following:

1. Summary of aerodynamic data for stress analysis.
2. Resume of weights and balances.
3. V-G diagram for critical design conditions.
4. Statement of design conditions for stress analysis.
5. Description of any special design conditions.

c. Aerodynamics Report - The aerodynamics report shall consist of the following:

1. Physical characteristics:

Weights
I. Design Gross Weight
II. Maximum Alternate Gross Weight

Fuel
I. Normal
II. Maximum

Bombs
I. Normal
II. Maximum

Areas
I. Wing
II. Horizontal Tail

Span
I. Wing
II. Horizontal Tail

Aspect Ratios
I. Wing
II. Horizontal Tail
III. Vertical Tail

Airfoil Sections
I. Wing
II. Horizontal Tail
III. Vertical Tail

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Type of Tabs
I. Elevator
II. Rudder
III. Aileron

Tabs Lengths
I. Distance from design c.g. to aerodynamic center of horizontal tail.
II. Distance from design c.g. to aerodynamic center of vertical tail.

Lift and Drag Increasing Devices
I. Type
II. Description
III. Dimensions and maximum deflection angles.

Determination of mean aerodynamic chord of:
I. Wing
II. Horizontal Tail
III. Vertical Tail

C. G. Data
I. Design
II. Max. forward
III. Max. aft

2. Performance Data - Performance data including at least the following shall be furnished:

a. Graphs of lift coefficient versus drag coefficient for the complete airplane in the normal flight condition, in the take-off condition and in the landing condition. The effects of compressibility on drag shall be considered. Corrections shall be based upon data taken from high-speed wind tunnel tests.

b. Details of range and endurance calculations; stalling speed calculations for normal flight configurations, and for power-off landing configurations; take-off and landing distance calculations, including ground run and total distance over 50 ft. obstacle (under conditions of a standard Army summer day, 100°F).

c. Charts of the following at various gross weights, including the design gross weight, the maximum take-off gross weight, and the minimum landing gross weight:

High speed vs Altitude
Rate of Climb vs Altitude
Time to Climb vs Altitude
Service Ceiling with all engines and two engines inoperative.

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Takeoff Distance over 50-ft. obstacle
Landing Distance over 50-ft. obstacle
Miles per pound of fuel vs. speed & altitude
Maximum Range
Range (with Design Fuel & Bomb Load) vs. Average Airspeed

3. Stability and Control Data - AAF Specification R-1815-A, by reference hereby made a part hereof, shall be used as a guide in the development of aerodynamic characteristics. At the end of Phase I, reports shall be submitted showing that the airplane possesses satisfactory stability and control characteristics insofar as can be determined from wind tunnel tests and studies.

4. A copy of the engine manufacturer's Model Specification (or equivalent data where specifications are not available) shall be included as Appendix I.

5. A copy of the propeller manufacturer's Model Specification (or equivalent data where specifications are not available) shall be included as Appendix II.

Item 4 - Perform the following developmental investigations including tests of full size or scale models where feasible:

(1) The following items shall be studied:

a. Flush armament and radar installations
b. Propellers
c. Ground test rig
d. Gunfire damage
e. Auxiliary Power Plant
f. Airplane defense
g. Fire detection and prevention
h. Oil cooling

(2) The following items shall be studied and tested:

a. Unconventional landing gear arrangement
b. Sealed low drag control surfaces
c. Low drag high ram spinner cowling
d. Full span flaps
e. Control surface boost
f. Ice prevention - engine installation
g. Structural innovations such as sandwich type construction, spar and rib support effect on panel allowables, methods of structural joining, laminated and tapered wing skin, molded structures, etc.

Deletions and additions to the foregoing list of developmental studies and tests shall be made as indicated by design progress and subject to approval of the Government.

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Item 5 - Construct a mock-up in accordance with the Contractor's Specification D-7627, dated 19 April 1946, by reference hereby made a part hereof. Two copies of photographs showing all installations and features of the mock-up also shall be furnished.

(b) All wind tunnel tests shall be conducted in the Contractor's high speed wind tunnel except icing tests which shall be conducted in National Advisory Committee for Aeronautics facilities.

(c) Unless otherwise noted in paragraph (a) above, three black and white legible copies of the model specification, drawings, weight and balance report, stress criteria report, and aerodynamics report and miscellaneous study and test reports as specified herein, shall be furnished.

(d) The Contractor will require no additional Government facilities for the performance of this contract except as follows:

(1) The use of an icing tunnel such as that afforded by the National Advisory Committee for Aeronautics Facilities to the extent necessary and as approved by the Chief, Engineering Division, Air Materiel Command, Wright Field, Dayton, Ohio.

(2) The use of testing facilities at Fort Lewis, Washington, or other similar proving grounds to the extent necessary and as approved by the Chief, Engineering Division, Air Materiel Command, Wright Field, Dayton, Ohio.

(3) The use of such other Government-owned testing facilities as may be made available to the Contractor at the convenience of the Government and as approved by the Chief, Engineering Division, Air Materiel Command, Wright Field, Dayton, Ohio.

(e) It is anticipated that the Government will lend to the Contractor such articles and equipment including a Government-owned B-29 airplane as may be deemed necessary for use in the performance of this contract by Chief, Engineering Division, Air Materiel Command, Wright Field, Dayton, Ohio, and as directed by the Contracting Officer, Headquarters, Air Materiel Command, such loans to be accomplished under the provisions of a separate bailment contract. This contract shall not be construed as effecting the bailment of such property nor as a commitment that such loan will be made.

(f) This contract is classified "Restricted".

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ARTICLE 4. - DELIVERY

(a) The services called for in paragraph (a) of Article 1 shall be completed and the articles and supplies called for therein shall be delivered to the Government in accordance with the following schedule:

Item No.	Time of Delivery
1	Studies shall be completed not later than 31 January 1948.
2	Wind Tunnel Test Reports shall be delivered within thirty days after completion of each test insofar as practicable, but not later than 31 January 1948.
3	Drawings and Data shall be delivered within thirty days after Contractor's release of same insofar as practicable, but not later than 31 January 1948.
4	Development Studies and test reports shall be delivered within thirty days after completion of tests and/or studies insofar as practicable, but not later than 31 January 1948.
5	Mock-up will be ready for inspection and acceptance at the Contractor's plant not later than 30 November 1947. The Contractor shall notify the Air Materiel Command at least two (2) weeks in advance of the date on which the mock-up will be ready for inspection. Photographs shall be prepared and furnished to Air Materiel Command not later than thirty (30) days after inspection and acceptance of the mock-up.

(b) The drawings, reports and data called for in Article 1 hereof shall be delivered to the Government by prepaid registered mail addressed to Commanding General, Air Materiel Command, Wright Field, Dayton, Ohio, Attention: Engineering Division, TSEOA-2.

(c) The mock-up called for in Article 1 hereof shall be delivered to the Government at the Contractor's plant, Seattle, Washington.

(d) The articles and supplies called for under this contract shall be packed in accordance with commercial practice and/or the Consolidated Freight Classification.

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ARTICLE 49 APPROVAL

This contract shall be subject to the written approval of The Secretary of War or such individual as said Secretary may designate and shall not be binding until so approved. The date of such approval shall be deemed to be the true date for the purpose of determining all times of performance.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day and year first above written.

NOTE: Type or print names under all signatures.

THE UNITED STATES OF AMERICA.

By W. E. Gerrity

T. P. GERRITY, Lt. Col., Air Corps
Contracting Officer
(Official Title)

Two witnesses:

C. E. Cameron

D. E. Patton

BOEING AIRCRAFT COMPANY } Contractor

By William M. Allen

William M. Allen

Seattle 14, Washington Business Address

I, H. E. Bowman, certify that I am the Secretary of the corporation named as Contractor herein; that William M. Allen who signed this contract on behalf of the Contractor was then President of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

H. E. Bowman (Corporate Seal)

H. E. Bowman, Secretary

I hereby certify that, to the best of my knowledge and belief, based upon observation and inquiry, William M. Allen who signed this contract for the BOEING AIRCRAFT COMPANY had authority to execute the same, and is the individual who signs such contracts on behalf of this corporation with the public generally.

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Boeing Aircraft Company

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1 set curves & Equiv
Letter & 2 sets of curves to Prop Lab
Letter & 1 set of curves to P. P. Lab

9/1 Copies in on Jay Gross.
Carried in on JJ 19 Sept 49
Copies of letters to Curtiss & Hamilton Std also.

E-70-437

SECRET

Mr. R. E. Gould
Aeroproducts Division
General Motors Corporation
Post Office Box 1047
Municipal Airport
Dayton 1, Ohio

Subject: Propeller Design Information for B-52 Airplane

References:
(a) Boeing Letter E-70-24 dated December 13, 1946
(b) XB-52 Conference at Wright Field February 4, 1947
(c) XB-52 Conference at Wright Field June 11, 1947
(d) WAC Preliminary Spec. 851 dated February 12, 1947

Dear Mr. Gould:

As XB-52 design discussions progressed at the June conference, it became evident that airplane and engine design considerations had advanced to the point where a restatement of the propeller design conditions was required.

1. As agreed in the February conference and confirmed in June, powers available for takeoff and cruising are as shown on Figure 1.

   a. Takeoff - 8900 SHP at 7200 RPM at zero velocity
      10,000 SHP at 7200 RPM at 200 mph

   b. Climb and cruise - Maximum continuous power limit at 2160°R at 7080 RPM

   Curves showing the availability of 10,000 SHP at takeoff have been placed in WAC Preliminary Specification 851.

2. Long range cruising is shown on Figures 2 and 3. These two curves present the airplane flight variables throughout the climb and cruise. Note that the functions influencing propeller design are constant for 75% of the calculated range. The calculations are based on a 23 ft. diameter propeller turning 650 RPM.

3. Takeoff flight paths and airspeeds are shown on Figure 4. This curve provides data on several climbout procedures which might be followed on takeoff. Both 3 engine and 4 engine performance data are shown which indicate that positive rates of climb are available at all times even with an engine failure. It is necessary that propeller feathering be coincident with an engine failure.

4. High speed airplane variables are shown on Figure 6. The airplane weight

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9.1 Thrust Recovery
22 - (7 & 8 pp)

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used on this curve is the target weight for the long range mission.

5. Representative propeller design conditions for future analysis are proposed in the following tabulation.

	Cruise	Takeoff	High Speed
Distance - miles	3,150	0	----
Altitude - feet	35,000	S.L.	35,000
Wing angle of attack	6.25°	1.1°	3°
Lift coefficient - C_L	.693	1.64	.432
Airplane weight - lbs.	311,000	400,000	240,000
Airplane true speed - MPH	414	170	460
SHP used	4910	9470	5700
Propeller RPM	650 (644)	661 (655)	650 (644)
Airplane fwd. Mach No. - $M_{fwd.}$	.626	.224	.696
Prop. tip Mach No. - M_{Tip}	1.02	.742	1.065
Power coefficient - C_p	.455 (.468)	.254 (.261)	.522 (.539)
Advance ratio - J	2.44 (2.46)	.98 (.99)	2.71 (2.73)
$J/\sigma_p^{1/3}$	3.18	1.55	3.37

Numbers in brackets are for latest information on gear ratio.

6. The XB-52 airplane is defined as a single purpose airplane with a maximum takeoff weight of 400,000 pounds. Previous to establishing a fixed maximum takeoff weight, the thrust available at takeoff was considered equal in importance to cruising efficiency in extending airplane range. However, at a fixed takeoff weight the takeoff thrust requirements assume less importance particularly since quoted 50 foot obstacle distances for the maximum weight condition are only about 6000 feet. For these reasons the effects of changes in various parameters on range as stated in reference (a) is changed to the following:

a. 1% increase in average cruising propeller efficiency equals 120 miles increase in range.

b. 100 pounds increase in propeller weight per propeller decreases range 30 miles.

c. 1% increase in thrust at 100 mph decreases takeoff distance 90 feet.

The following tabulation was presented at the June conference. This tabulation indicates the takeoff weight must increase 10 pounds for each 1 pound of useless load added to the airplane in order to break even on range.

Useless load - - - - - - - - - - - - - - - -	1.0 lbs.
Fuel -	6.3
Fuel tanks - - - - - - - - - - - - - - - - -	0.5
Airplane structure - - - - - - - - - - - - -	2.2
Gross Weight	10.0 lbs.

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Boeing Aircraft Company

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Mr. R. E. Gould
Page Three

Reference
E-70-437

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7. In summarizing the foregoing data, we do not believe cruising efficiencies should be compromised by takeoff considerations when the airplane is on the ground. Regardless of analysis, it does not appear desirable to reduce blade camber below current values. Since the airplane will always leave the ground at speeds not higher than 170 miles per hour, it seems probable that this should be the lowest speed used in any formal analysis. Loss of thrust at speeds below this will lengthen takeoff runways but will not affect maximum weight at which the airplane can be flown. For special missions of this type, increased runway lengths can certainly be required.

Very truly yours,

BOEING AIRCRAFT COMPANY

ORIGINAL SIGNED BY G. S. SCHAIRER

G. S. Schairer
Staff Engineer - Aerodynamics
and Power Plant

Attachment
Cc: M. P. Crews (2)

VLB:wk

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AND RECORD SHEET

DATE 26 SEP [illegible]

COMMENT NO. -

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SEP 29 1947

Coordination of Development Projects Related
to the XB-52 Airplane Project

Curtiss Propeller Division
Curtiss-Wright Corporation
Caldwell, New Jersey

1. It had been planned during the meeting on 9 September 1947 of the airplane, engine, and propeller manufacturers concerned with projects related to the XB-52 airplane to emphasize the importance of close coordination, particularly with reference to conferences and exchanges of correspondence. Since this meeting has been postponed, it is desired to take this opportunity to comment on this subject.

2. The parallel development of an experimental airplane, engines, and propellers is an undertaking that can be accomplished only if the exchange of design data is maintained at a high level. The Air Materiel Command is responsible for building a satisfactory article and therefore requires an up-to-date summary of progress from each manufacturer in order to correctly interpret various investigations and to accurately inform other manufacturers of the overall progress of the project. At the present stage of development, modifications to one manufacturer's design may vitally affect the investigations of another. Only a thorough knowledge of each manufacturer's development will enable this Command to properly resolve the problems that arise.

3. It is believed that conferences between individual Contractors are necessary and should be continued. However, in the past this Command has received meager, and in some cases, no information concerning discussions and decisions that have been made at these conferences.

4. Often a copy of correspondence from a manufacturer to another has been received in which the basic problem was contained in a referenced letter from the other Contractor. It can easily be seen that the picture of each manufacturer's development cannot be gained if this practice continues.

5. It is requested that the following steps be taken to increase the exchange of information among all parties concerned:

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AMC ltr to Curtiss Propeller Division, Subj: Coordination of Development Projects Related to the XB-52 Airplane Project.

a. This Command be notified in advance of conferences between manufacturers in which items affecting the overall progress of the project will be discussed.

b. Summaries of all important conferences be forwarded to this Command.

c. A copy of correspondence from one manufacturer to another be forwarded to this Command.

d. It should be realized that this exchange will be advantageous to all parties in that anticipated requirements and preliminary designs can be intelligently resolved during the early stages of development and that factual data will be available for future reference. Cooperation in this manner is solicited.

FOR THE COMMANDING GENERAL:

/s/ H. Boykin

GEORGE T. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

cc: New York AAFPRO
AAFIC
TSEPA-2 (Lt. Sawyer)
Mr. A. L. Irvin, Curtiss Prop. Depr.
TSEPD-2

Same ltr sent to Aeroproducts Division, and Hamilton Standard Propellers.

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AMC Form No. 10-3
Rev 19 Mar 43)

ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

Use this form for inter-office correspondence within headquarters.

Use authorized office symbols to designate addressee and addressor.

Place initials of dictator and typist, telephone number and location to right of signature.

Use entire width of sheet, both sides

Number all comments consecutively.

Separate comments by horizontal lines across page.

SUBJECT Heavy Bomber [illegible] Study SECRET

TO	FROM	DATE	COMMENT NO.
[illegible]	[illegible]	9 Oct 47	

1. A review of the heavy bomber military characteristics and requirements by a committee composed of representatives from United States Air Force, Strategic Air Command, Air University, and Air Materiel Command. The Committee has revised these characteristics and proposes to recommend to the Air Force Vehicles and Armament Panel that the heavy bomber characteristics be amended in accordance with the attached general characteristics. Prior to the next Board meeting, it is desired to ascertain the configuration airplane defined by these characteristics.

2. It is, therefore, requested that the Aircraft Laboratory conduct a study of an airplane to meet these characteristics. The required cruising speed of 360 MPH should be considered as flexible, i.e., it is desired to know what our airplane will be required to meet this cruising speed and what weight saving could be effected by a comparatively small reduction in cruising speed. Any detailed questions or required coordination should be made with Det (A-2).

3. This work should be charged to Expenditure Order Number [illegible]. A subsequent [illegible] of this expenditure is being prepared and will carry a 1-B priority.

[illegible]
[illegible], Col., Air Corps
Chief, Aircraft Projects Section
Engineering Division

1 Attach.
Gen Heavy Bomb. Charac.

Classification Cancelled or Changed to
~~Top Secret~~ Secret
~~Confidential~~ Restricted

Changed [illegible]

[illegible] AIR MATERIEL COMMAND
[illegible] APRIL 1945
By Authority of the C.G. U.S.A.

Ltr: AMC ltr 452 from TSEAC-4 dtd 5 Dec 1947 Subj Same as above

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1 Air Lab Com.
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Salient MC's [redacted]

1.	Range	7000 statute miles
2.	Speed	350 mph cruise
3.	High speed over defended area	350+ mph
4.	Tactical operating altitude	35,000 ft
5.	Service ceiling 1/2 engine	15,000 ft
6.	Take off over 50' obstacle with assisted take off	9,000 ft
7.	Landing over 50' obstacle at design gross wt less bombs and droppable fuel	9,000 ft
8.	No armor	
9.	Best available visual - radar bombsight	
10.	Tail armament only (radar controlled)	
11.	Bomb load	10,000 lbs
12.	No RCM required	
13.	Landing Gear may be droppable with provisions for skid type landing gear or other ideas along this line	
14.	Full purging and self-sealing for fuel	
15.	Crew of five (5) - Pilot, relief pilot (engineer & radio), navigator-bombardier, weaponeer (navigator-bombardier), gunner	
16.	This airplane must be refuelable in the air.	

Note:

1. Since Pars 12 & 13 and perhaps 14 may be thrown out by the Board, let's have the figures on:
   a. Putting in RCM
   b. Have conventional gear
   c. Droppable tanks don't need to be self-sealing
2. This airplane should stress cruise speed if everything we have asked for is available and anything else is available in the way of performance.
3. A minimum of accessories and equipment are required.
4. Simplicity of construction should be stressed.
5. It will have to be an all-weather airplane.

Classification Cancelled or Changed to
~~Top Secret~~ Secret
~~Confidential~~ ~~Restricted~~
Changed Nov 1943
AUTHORITY, C.G. AIR MATERIEL COMMAND
REPORT CARDS APRIL 1948
By: ALLEN R. CRAWFORD, Brig. Gen., U.S.A.

~~CONFIDENTIAL~~
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1. The Committee on Long Range Reconnaissance has now [illegible] present configuration does not present a [illegible] problem, and has recommended that the YB-[illegible] to an airplane having 8,000 mile range, and other changed characteristics for this airplane are outlined in the Board report. In view of [illegible] planned by this office to direct the Air Material Command to withhold further [illegible] of funds on the YB-[illegible] in its present configuration. In addition, if approval is received from the U.S.A.F. Aircraft and Weapons Board to designate [illegible] state, in place of the present YB-[illegible], an 8,000 mile, high speed [illegible], the YB-52 contract will be change ordered to result in an aircraft meeting the [illegible] ed new characteristics. Due to budget reasons it is expected that the new [illegible] will have to be designated the YB-52.

2. The present status of funds on the YB-[illegible] contract is as follows:

a. $1,785,176 have been obligated from FY 1946 for initiation of [illegible] of the YB-52. To date $430,000 of this amount has actually been spent and [illegible] for. It is estimated that it will be necessary to expend a total sum of approximately $1, [illegible],000 to pay for work completed to date. This includes part of the fabrication of the mock-up.

b. $2,892,587 of FY 1947 have been obligated for YB-[illegible] airframe and subsequently stop ordered. In addition, $4,857,340 of FY 1948 have been obligated, and [illegible] not recoverable, for YB-52 GFE.

c. Approximately $7,000,000 of FY 1948 have been allotted to the YB-[illegible] project for continuation of Phase II.

3. It is requested that any comments you have on the above be forwarded to this office at the earliest possible date.

L. C. CRAIGIE
Major General, U. S. Air Force
Director of Research & Development
Office, Deputy Chief of Staff, Material

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Bomb. Br., Eng. Div.

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18 November 1947

Conference with the Bombardment Subcommittee, Air Force Aircraft and Weapons Board to Discuss the Military Characteristics for Strategic Bomber Requirements

Generals Craigie, Smith and Partridge

General Fred Smith, of Requirements Division, called the meeting with the Chiefs of Operations, Plans, Intelligence, and Research and Development. It had been General Smith's impression from contacts with the Intelligence Division that the Air Forces could not expect to operate from bases 2000 miles from the target and that it would be necessary to have airplanes of at least 3000 miles radius. Further, because of the time over the target area he felt that 550 miles per hour was a minimum cruising speed. From studies by RAND and AMC it appeared that the 3,000 miles tactical radius (6000 miles range) could be met but only at 500 miles per hour and that it would take a great deal of development of airplane, engines, armament, and propellers before any of the performances could be met.

General Partridge asked if there had been any change in Intelligence or Joint Chiefs of Staff planning since the last Air Forces Aircraft and Weapons Board meeting. He reminded the meeting that the matter of bases for operation and targets has been thoroughly studied and discussed during that meeting. Both Generals McDonald and Wayland agreed that there had been no changes in the thoughts given at that time. It was therefore agreed by the assembly to allow the present work-horse bomber Military Characteristics to continue in effect and not drop them in favor of a 550 mile per hour, 3000 miles tactical radius airplane at this time. General Smith agreed to this and further stated that he would recommend to R&D to drop the XB-52 as presently envisioned, and launch on a development airplane of 500 miles per hour cruising speed, of 8000 miles range, and weighing approximately 300,000 pounds.

Before the above meeting the undersigned was requested to compare the AMC studies with those of the RAND project with Mr. Root. A direct comparison was not possible because the AMC studies had been based on an exact analysis with power, velocity, and altitude of both engines and airplane. The RAND analysis, on the other hand, was based on bank parameters of wing loading, thrust, and power loading; assumption of wing end areas that precluded compressibility correction and propeller development that would permit 85 per cent efficiency at the cruise conditions of 550 miles per hour. An indirect comparison was attempted and it appeared that the AMC figure of 6,350 miles at 500 miles per hour cruise could be raised to 8000 miles range at 500 miles per hour without too much optimism. The RAND and AMC studies together with some studies by Boeing indicate that approximately 300,000 pounds would be the optimum gross weight. It should be pointed out here that all of the data in this paragraph are based on a cleanness and weight of armament comparable to present limit angle tail turret only.

REQUESTED: That the Aircraft Laboratory, Power Plant Laboratory, Propeller Laboratory, and Aircraft Projects Section arrange, through a

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conference, to continue the study of heavy bomber parameters.

(a) To be in a position to intelligently direct the recommendation of the XB-52 along the lines indicated above.

(b) To more intelligently continue the present work started by the Aircraft Laboratory and the Power Plant Laboratory.

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AF HQ-33 (20 MAY 44)

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	mrc
FILE NO.	17

SUBJECT: XB-52

TO: Director of Research and Development, DC/S, Materiel DATE 19 NOV 1947

FROM: Director of Training and Requirements, DC/S, Operations COMMENT No. 2 Col Perkins/js/6328

1. Your plan to stop all development of the XB-52 in its present configuration is approved.

2. It is planned that the military characteristics of the new heavy bomber, substantially as recommended by the Heavy Bombardment Committee, will be substituted for the B-52 characteristics.

3. In view of the fact that these new characteristics seem to exploit the potentialities inherent in the flying wing, it is recommended that the contract not be awarded directly to Boeing Aircraft Company but be awarded on open competition of all interested manufacturers.

4. The next USAF Aircraft and Weapons Board meeting is now scheduled for 20 January 1948. The Secretary of the USAF Aircraft and Weapons Board will circulate the new military characteristics to Board members for approval prior to the January meeting if budgetary considerations require you to have approval at an earlier date. Action will be taken immediately on receipt of your reply.

Encl - n/c

AFORQ

AFOR/B

E. B. Partridge

E. E. PARTRIDGE
Major General, USAF
Director of Training & Requirements

FILE
AIR MATERIEL COMMAND

4 Dec 47
Billy Mary Bomber
XB-52

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HEADQUARTERS STRATEGIC AIR COMMAND
ANDREWS FIELD
WASHINGTON 20, D. C.

2 November 1947

[illegible]

[illegible]:

[illegible] the preparation of the Report on Heavy Bombardment, prepared [illegible] Committee, the individual members of the [illegible] have continued their study of the problem. As individual [illegible] our responsibility ended with the preparation of the report itself.

[illegible] with my normal work with the Strategic Air Command [illegible] a member of two B-50 Mockup Boards [illegible] Committee work which has involved my contact [illegible] Company, North American, Northrup, Pratt & [illegible] Standard, and Curtiss, in the course of which [illegible] has been accumulated.

[illegible] like to take this informal opportunity of bringing this [illegible].

[illegible] characteristics for heavy bombardment aircraft, as [illegible], was written around a minimum requirement of [illegible] statute miles) - in order to reduce vulnerability [illegible] by high performance jet fighters. [illegible] information from studies by Rand and others, that [illegible] miles per hour was necessary, if we were going [illegible] with this armament, only.

[illegible] available to the Board at the time the meetings [illegible] smaller performance of speeds of over 450 [illegible]. Recent studies carried on by [illegible] indicate that with new designs of blades [illegible] and lower than 70 could be attained at [illegible] miles per hour. The range of 7000 statute [illegible] was selected since this range would permit [illegible] miles from base and return to base by refueling [illegible] the out-bound trip. Studies that I [illegible] aircraft, have so far indicated that jet engine [illegible] range to about 6000 statute miles for [illegible], miles. In short, our present jet

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[illegible] appear to be quite ready [illegible] statute [illegible] miles.

[illegible] to recommend for your consideration [illegible] was informally discussed with the [illegible]. This aircraft, with tail armament only, would [illegible] miles with a speed over 4[illegible]0 miles defended area, of [illegible]ur, a wing area of 2400 square feet, and a gross [illegible] level, of [illegible],000 pounds. This airplane, [illegible] be [illegible] difficult of attainment. The power [illegible] Wright T [illegible]-[illegible] turbo prop engines, such as were [illegible] XB-[illegible]. The fuselage configuration could be [illegible] the wing model of the XB-[illegible]C, except that it [illegible]t, only. The landing gear arrangement planned for [illegible] [illegible]. The wing arrangement would [illegible]-[illegible], except for a reduction in thickness ratio to [illegible].

[illegible] some engineering data which were prepared [illegible] of [illegible]ffice, in coordination with work done by Boeing. [illegible]ttached sheets [illegible] show three basic airplanes with the same [illegible]ght, [illegible],000 pounds, with a target speed of 525 [illegible]r hour, as referred to above; the second airplane weighing 535,000 [illegible] [illegible]t speed of [illegible]00 miles per hour and is, of necessity, [illegible] new airplane. The third aircraft is the XB-52, weighing [illegible] with tail armament, only, and is a completely new airplane [illegible] every respect.

[illegible] of the fact that the Boeing Engineering Company has completed [illegible] work on the XB-[illegible] design around turbo prop power plants, [illegible] that they could carry on with the development of a smaller [illegible] simultaneously. Re-opening a design competition at this [illegible] Air Forces at least six months, and probably a year, [illegible] time.

[illegible] very strong feeling that a 525 mile an hour speed over the [illegible] certainly [illegible] a very great engineering advance over the [illegible] speed of military power at 35,000 feet is approximately [illegible] less.

[illegible] that a directive [illegible] Boeing be changed to provide [illegible] studies, looking toward an experimental [illegible] gross weight category of [illegible],000 pounds, with a minimum [illegible] per hour, and a required high speed of 550. [illegible] the use of the Wright T-[illegible] turbo prop engine, [illegible], supplemented by the inclusion of [illegible] best foreseeable design. In this connection it

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AF HQ - 50 (4 NOV 1947)
HQ 10-5

DEPARTMENT OF THE AIR FORCE

Director of Research & Development, DCS/Materiel

AIR STAFF SUMMARY SHEET

TO	ROUTE	DESIRED ACTION	INITIALS
AIR COMPTROLLER			
DCS / PA			
DCS / O			
DCS / M			
CHIEF OF STAFF			
Vice Chief of Staff		Signature	
SEC. OF THE AIR FORCE			

OFFICE OF PREPARATION: Director of Research and Development, DCS, Materiel

GRADE - SURNAME: Maj Gen Craigie/ee — TEL: 71500

DATE: [Approx 1 Dec. 1947]

SUBJECT: Heavy Bombardment Aircraft

SUMMARY

1. There is transmitted herewith a memorandum for the Secretary of the Air Force relative to the cancellation of the XB-52 contract and the initiation of a new development to meet newly approved heavy bomber characteristics. The memorandum cites the recent decisions on this subject, gives the present status of the XB-52 project indicating the funds situation with respect to this contract. It cites the two alternative methods of carrying out this development; namely, a change order to the present contract or a new competition open to industry, gives the reasons favoring both, and recommends competition.

2. This is being referred to the Secretary because of its major significance, because the recommended method of procedure might conceivably result in $2,800,000 reverting to the Treasury and, thereby, being lost to R&D. This matter was the subject of a conference held on 1 December, attended by Generals Kuidlaw, Carroll and Crawford of AMC, Generals Partridge, Power and Smith of DCS, Operations, and Generals Powers and Craigie of DCS, Materiel. It was the agreement in this conference that it would be desirable to clear the method of procedure with the Secretary prior to issuance of directive to AMC.

RECOMMENDATION

It is recommended that the attached memorandum for the Secretary of the Air Force be signed.

Craig

H. A. CRAIG
Lt. General, USAF
Deputy Chief of Staff, Materiel

Incl:
Memo for Secretary of Air Force

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S-2737, AF

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[illegible]

. [illegible] Long Endurance Con-
[illegible] it has been decided to -

. [illegible] Development project.

. [illegible] the development of a new design to meet new mili-
[illegible] modification.

. The [illegible] of the YB-52 contract is as follows:

a. Approximately $[illegible] has been expended to date on Phase 1 [illegible] study.

b. $[illegible] has been obligated and subsequently "stop ordered" for [illegible] Phase 2 of this project.

c. $[illegible] has been obligated for Government Furnished Equipment. This equipment will be required on the new version of the airplane.

3. Two alternative methods of carrying out the development of this [illegible] are available to the Air Force; to wit:

a. Change order present YB-52 contract and call for a new Phase 1 design study of an airplane which meets the new characteristics.

b. Circularize selected members of industry and request competitive proposals with the view of contracting with two winners for Phase 1 design studies.

4. The reasons favoring 3 a. above are:

a. It would save time to write a change order rather than to conduct a competition.

b. The $[illegible],000 which has been obligated and "stop ordered" could be made applicable to the new project.

The arguments favoring 3 b. above are:

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[redacted]

[redacted]

[redacted]

[redacted]

5. In the event the Boeing Company were to win the competition, it would in all probability be possible to utilize the [redacted] which would have been obligated and "stop ordered".

6. In view of the fact that the competition might result in the $2,000,000 reverting to the Treasury and, thereby, being lost to Research and Development, this matter is forwarded to your office for decision. It is recommended that, in spite of the possibility of losing the above sum, the new characteristics be circularized to industry for competitive proposals.

[redacted]
General, United States Air Force
Vice Chief of Staff

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1.2 Airc. General
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Bomb. Br., Eng. Div.

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7 December 1947

Conference on XB-52 with the Director of
Research and Development
See Paragraph 1 of Factual Data below.

1 December 1947

1. Those in attendance were: Generals Craigie, Chidlaw, Powers, Carroll, Crawford, Smith and Partridge. Colonels Perkins, Ritland, Demler, and Warden. Major Brady and Mr. Reichart.

2. General Craigie presided at the meeting and started by reviewing the Perkins Committee report on the XB-52 and the Committee's requirements based on the findings of their studies.

3. It was almost unanimously agreed by this assembly to discontinue any further work or expenditure on the present XB-52 airplane because of two very important factors: First, the Strategic Bombing Command can not visualize long range action with the speed this airplane is capable of making. It has been estimated that the B-52 would be subjected to interception for nearly nine hours of its flight. The second important reason for discontinuance of the XB-52 was the inability of both industry and national economy to support the procurement of this airplane in any quantity whatsoever.

4. This assembly next took up the requirements of the Perkins Committee for the development and procurement of a replacement airplane for the XB-52. After considerable argument it was finally adopted that the following Military Characteristics would be pursued:

That a cruising speed of 500 miles per hour, a range of approximately 8,000 miles with a gross weight not to exceed 300,000 pounds. The range figure of 8,000 miles is in excess of any findings by AMC studies. It does seem to be in agreement with studies by RAND and Boeing. One item of allowable performance that may permit more than 7,000 miles if found feasible by AMC is that the cruising speed of 500 miles per hour is not a required average cruising speed for the entire mission but is to be an attainable speed during flight through the zone of the interior.

5. How the launching of the new design is to be handled, either by circularizing the industries or by change-order to the present B-52 contract, is to be studied by the Director of Research and Development and decided after consultation with the Secretary for Air.

ACTION REQUESTED: None, data merely submitted.

CER
Carl E. Reichart TSEAC-4 T-127-

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TC-92 2.471 B-52 Eng
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HEADQUARTERS, UNITED STATES AIR FORCE
Office, Deputy Chief of Staff Materiel

MEMORANDUM FOR RECORD

2 December 1947

SUBJECT: XB-52 Conference

1. The undersigned attended a conference, for the purpose of discussing the XB-52, held in General Craigie's office, Hq. USAF from 1400 to 1715 hours on Monday, 1 December 1947. The following personnel were in attendance:

Lt. Gen. B. W. Chidlaw	Air Materiel Command
Major General F. O. Carroll	Air Materiel Command
Brig. General A. R. Crawford	Air Materiel Command
Major General E. E. Partridge	
Brig. General F. H. Smith	DC/S, Operations
Brig. Gen. T. S. Power	DC/S, Operations
Maj. General E. M. Powers	DC/S, Materiel
Maj. General L. C. Craigie	DC/S, Materiel
Colonel N. C. Demler	DC/S, Materiel
Colonel N. T. Perkins	DC/S, Operations
Colonel Pitland	Air Materiel Command
Lt. Col. H. E. Warden	Air Materiel Command
Mr. Carl Bickert	Air Materiel Command
Colonel Spicer	AFACC
Major W. D. Brady	DC/S, Materiel

2. After considerable discussion it was agreed that the military characteristics for the XB-52 would be an 8,000 mile range, 500 mph cruising speed, special purpose bomber. It was pointed out by General Craigie that Boeing, RAND, and Northrop had indicated from preliminary studies that the 8,000 mile, 500 mph special purpose bomber was feasible and that this airplane would weigh on the order of 300,000 pounds. However, Air Materiel Command representatives did not agree that this was feasible. It was their contention (Mr. Carl Bickert and Lt. Col. Warden) that the best attainable performance was 7,500 miles range at 500 mph cruising speed.

3. It was indicated that the crux of the successful development of this airplane is complete and enthusiastic development of ~~both~~ engines and a successful propeller. Lt. Col. Warden pointed out by the use of curves of propulsive efficiency for both gas turbine and turbojet engines that in the neighborhood of 500 mph (without continued and successful attainment of improved propeller efficiency) turbojet engines appear to be the more feasible.

4. Considerable discussion took place on whether or not the design of the new B-52 should be on a competitive basis or awarded to Boeing on a change order of the present XB-52 contract. Air Materiel Command (General Crawford) felt that the new design study should be placed with Boeing by change ordering current B-52 contract. Air Materiel Command's reasons for the above were:

a. Considerable time would be lost by awarding a new contract on a competitive basis.

b. $4,000,000 would be lost to the Air Force.

c. Boeing is the best qualified contractor in the heavy bomber field.

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[illegible] pointed out for competitive bidding are:

[illegible] or political repercussions of change ordering the [illegible].

[illegible] present contractor, they would win on a competitive basis.

[illegible] majority of the Air Force's business.(d) No appreciable delay [illegible] would be working on preliminary designs for the [illegible].

The final decisions reached were:

[illegible], as Secretary of the USAF Aircraft and Weapons Board, [illegible] to have military characteristics for the new heavy bomber [illegible] concurrence of General McKinney, General McNarney and General [illegible].

The characteristics to be approved were as outlined in the Heavy [illegible] Report with a change of the cruising speed from 550 mph to 500 mph; [illegible] that the words set concerning droppable landing gear be deleted.

[illegible] subject military characteristics are approved, Mr. Symington will be [illegible] decision as to whether to put the awarding of this contract on a [illegible] or merely change order the present XB-43 contract now with Boeing. [illegible] Mr. Symington will be to award a new contract on a competitive [illegible].

[illegible] Crawford indicated that there are approximately $7,000,000 in [illegible] for phase II of the XB-43. Of this, only $2,000,000 could be [illegible] that the remaining money could be applied to other [illegible]. It is recommended by the undersigned that as much of this money [illegible] initiation and development of an all-around firing tail [illegible].

[illegible] characteristics will be forwarded to Air Materiel Command [illegible] Mr. Symington's decision.

[illegible] pointed out that by initiating a new aircraft [illegible] there would not have sufficient funds in FY 1949 to [illegible] project. As a result of this, it was agreed [illegible] to $7,000,000 donated for development of 50,000 [illegible] Armed Forces should be appeased [illegible] he said he had read where [illegible] and entitled with World [illegible] to retrieve funds currently [illegible] Chance Aircraft Company. [illegible] would look into this

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7. General Carroll brought up the feeling of Air Materiel Command relative to the numbers of persons that are currently attending mock-ups. It was his feeling that something should be done to limit the number of persons. General Chidlaw stated that hereafter the number of persons would be closely monitored by General McNarney through the project officer.

WDB
WILLIAM D. BRADY
Major, United States Air Force
Chief, Bomber Section
Aircraft Branch

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8 December 1947

SUBJECT: Military Characteristics for Heavy Bombardment Aircraft

TO: Deputy Chief of Staff, Materiel

1. The following principal characteristics for Heavy Bombardment Aircraft are approved:

a. Class - High speed, high altitude, land airplane.

b. Mission - The destruction of surface military targets by atomic bombs.

c. Requirements -

(1) Performance (At design gross weight condition less one-half fuel unless otherwise specified)

	Minimum Requirements
(a) High speed Tactical Operating Altitudes	435+ knots
(b) Tactical Operating Altitude	35,000 ft.
(c) Service ceiling 1/2 engines	15,000 ft.
(d) Range at design gross weight condition	5650 N. Miles
(e) Average speed for above range	435 knots
(f) Take-off over 50' obstacle at design gross weight condition (with assisted take-off devices)	6,000 ft.
(g) Landing over 50' obstacle at design gross weight condition less droppable fuel and bombs.	6,000 ft.
(h) Average bomb load	10,000 lbs.

(2) If, after the above requirements have been met, additional performance may be realized, consideration in the design of this aircraft for utilizing this performance should be given to increased cruising speed.

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d. Armament

(1) Guns - Tail only (radar controlled). (200° arc of fire)

(2) No armor protection.

e. Crew

(1) The crew (of five) shall consist of a pilot, relief pilot (engineer & radio operator), bombardier-navigator, weaponeer (bombardier-navigator), and one (1) gunner.

f. Equipment

(1) Instruments and navigation equipment shall be the minimum consistent with the requirements for effective day and night operation of the airplane on military missions under all-weather conditions. The best radar-visual bomb sight is required.

(2) No RCM is required.

g. Structure and Design Features.

(1) Simplicity of design and suitability to production should be emphasized.

(2) All-around purging and self-sealing for fuel.

(3) Provisions for refueling in the air.

2. The foregoing principal characteristics for military aircraft supersede "Military Characteristics for Heavy Bombardment Aircraft", dated 23 June 1947, under which the present B-52 aircraft is being studied.

FOR THE CHIEF OF STAFF:

/s/ F. H. Smith, Jr.

F. H. SMITH, JR.
Brigadier General, USAF
Secretary, USAF Aircraft & Weapons Board

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, UNITED STATES AIR FORCE
~~HEADQUARTERS/ARMY/AIR FORCES~~
WASHINGTON

IN REPLY REFER TO: 12-253

11 DEC 1947

SUBJECT: Heavy Bombardment Aircraft

TO: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSTEX (TSENG)

1. It is requested that your Command take necessary action to cancel the XB-52 contract (contract No. W-33-038-ac-15065). It is desired that all possible funds be salvaged in the cancellation of this contract. If the scheduled XB-52 mock-up can be held without incurring additional costs from this date on, it is desired that this mock-up be conducted as scheduled.

2. There is forwarded herewith original of new Military Characteristics for Heavy Bombardment Aircraft, dated 8 December 1947. It is requested that these characteristics be reviewed, reproduced and returned to this office with twenty (20) copies. In addition, it is desired that the new Heavy Bomber Characteristics, when published, be circularized throughout the aircraft industry as the award of this contract should be on a competitive basis. The necessary funds to cover Phase I for subject new heavy bombardment aircraft will be taken from the Fiscal Year 1948 funds currently allocated for Phase II of the XB-52.

3. In the development of subject aircraft it must be remembered that the bomber, to accomplish its primary mission, must be refueled in flight. Thus, the design must include a fully adequate one point, high pressure, refueling system. It is proposed that the refueling shall be accomplished with B-50 or B-36 aircraft, and the design of subject bomber must incorporate such features as to enable this to be accomplished if possible. It may be, however, that range or altitude parameters or speed differentials will preclude the use of the B-50 or B-36 for this purpose. In this case it may be necessary to build one-half of the new heavy bombers as "tanker" aircraft, to refuel the other half. In the development of subject aircraft, it is requested that your Command give careful consideration to the

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Ltr fr Hq USAF to CG, AMC, subj: "Heavy Bombardment Aircraft" (cont'd).

aforementioned problem in your evaluation of design proposals submitted.

4. The fact that the aircraft is designed around air refueling is considered highly classified and it is desired that it be kept as quiet as possible.

5. Because the remaining time in this fiscal year is so short, every effort will have to be made to obligate funds for the Phase I of subject heavy bombardment aircraft by 30 June 1948.

BY COMMAND OF THE CHIEF OF STAFF:

1 Incl.
As listed

withdrawn
per McCREARY 1st

/ Craig

H. A. CRAIG
Lieutenant General, USAF
Deputy Chief of Staff, Material

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

IN REPLY REFER TO:
AFMRD-7B

15 December 1947

SUBJECT: Fire Control System for the Revised B-52 Heavy Bomber.

TO: Commanding General
Air Material Command
Wright Field, Dayton, Ohio
ATTN: Chief of Administration (TSCAD and TSTEX).

1. This Headquarters has recently approved the revised Military Characteristics for the new Heavy Bomber Aircraft (XB-52) which requires in paragraph 1 e(1) tail-only guns (radar controlled) with 220 degrees arc of fire. These approved characteristics will be forwarded to your command by separate correspondence.

2. This aircraft is considered a special purpose airplane and it appears that a reasonable degree of protection from attacks by flexible or fixed gunned fighters may be achieved by the use of only one very wide angle tail turret which will have a minimum field of fire through an angle of 110 degrees in all directions from the longitudinal axis of the airplane in the rear hemisphere. If it is practicable, the field of fire from this turret may extend as far forward as the wing tips except where it may be interrupted due to the possibility of scoring hits on the empennage of the airplane.

3. Since this tail turret will constitute the only fire power available to the aircraft over its long range, it is obvious that this fire control system must contain the maximum fire power possible. Accordingly, this Headquarters does not desire to limit the Air Material Command by specifying further details other than to state that all elements of this fire control system must be equal to or greater than any comparable equipment now covered by presently approved characteristics.

4. As cited in paragraph 2 above, this airplane is considered a special purpose airplane and requires only a tail turret. This requirement should not be construed to mean that the "Military Characteristics for Heavy Bomber Fire Control Systems", dated 27 May 1947, are no longer in effect for other future heavy bomber developments.

5. Since time is of the essence of this requirement, it is mandatory that this turret and fire control system must be tested, approved, or cured, and made available for installations on the production line commencing with the first airplane. Further, it is understood that FY 1948 funds will be available through the cancellation of the XB-52

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Ltr to CG, AMC, dtd 15 December 1947, Subj: Fire Control System for the Revised B-52 Heavy Bomber. (Cont'd).

contract. It is suggested that a portion of these funds be allocated to the development of the wide angle turret and fire control system for this new heavy bomber.

6. It is therefore desired that the Air Materiel Command take the necessary action to provide the above described fire control system for the new heavy bombardment aircraft.

BY COMMAND OF THE CHIEF OF STAFF:

L. C. CRAIGIE
Major General, U. S. Air Force
Director of Research & Development
Office, Deputy Chief of Staff, Materiel

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AMC Form No. 10-3
(Rev 19 Mar 45)

ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

Use this form for inter-office correspondence within headquarters.

Use authorized office symbols to designate addressor and addressee.

Place initials of dictator and typist, telephone number and location to right of signature.

Use entire width of sheet, both sides.

Number all comments consecutively.

Separate comments by horizontal lines across page.

SUBJECT: Mock-up Inspection - XB-52 Airplane, E. O. 426-253, Project No. MX-839

TO	FROM	DATE	COMMENT NO.
TSEOP	TSEOA-2	23 December 1947	1

Attn: Brig. General Morgan

1. The mock-up of the subject airplane will be completed and ready for inspection on 19 January 1948.

2. While all work on the configuration presented by the subject mock-up will be discontinued and a new configuration will be initiated based on new requirements, it is considered that the inspection of the present configuration will provide valuable information toward the evaluation of the new medium bomber program and future programs. Accordingly the subject inspection has been scheduled to start on 19 January 1948 at the contractor's plant, Boeing Aircraft Company, Seattle 14, Washington.

3. A listing of the personnel requesting to be designated as the mock-up committee will be submitted at least one week in advance of the inspection.

GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

JWB/gt
Div. 3 132
Bldg. 126

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TSEOA
Col Smith

23 Dec'47

Action Engineering is concurred in.

Brgen

WF-L-17 JAN 47 1500M

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J.'Y

December 2[illegible], 1947

AIRMAIL

Honorable Stuart Symington
Secretary of the Air Force
Pentagon Building
Washington, D. C.

Sir:

Subject: Proposed amendment to letter contract for Heavy Bombardment Airplane and Contract W33-038 ac-13065 with Boeing for Phase I and Limited Phase II Program for Heavy Bombardment Airplane (Model XB-52)

We have been informed, unofficially, that a decision has been made to hold a new competition for the Heavy Bombardment airplane and to amend the above contract in such manner that it will only call for studies and data rather than the building of prototypes. We are advised that this action is proposed because it is felt that the performance requirements for the Heavy Bombardment Airplane which the Air Force desires to obtain.

[illegible] unofficial information, that [illegible] and with[illegible] the proposed action would [illegible] from the present status of the contract [illegible], would result in serious injustice to this Company.

So that [illegible] bidders [illegible] possible, we desire to set forth the facts relating to this matter. In February, 1946, we received notice of the competition for a Heavy Bombardment Airplane by letter of February 1[illegible] and dated February 19[illegible] (33[illegible]-2/MJ/ics). [illegible] with a [illegible] additional [illegible] was amended, but the Air Force did not require any modification to the contract to be submitted with the proposal, and the competition was conducted on the basis of the contract as it existed. The following is from the letter:

> "It is [illegible] that a contract for a Phase I development [illegible] these heavy bomber characteristics. In view of this competition will be awarded a Phase I contract [illegible] fiscal year".

J.'Y

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Honorable Stuart Symington
Washington, D. C.

Confidential

After due consideration of the uncertain potential prospects of an airplane meeting the stated requirements and the more favorable aspects of the stated intent of the development program with respect to an airplane of balanced performance, this Company concluded to enter the competition. Our proposal, dated 15 April 1946, was for an airplane with a 3,100 mile T.R. and a cruising speed of 400 plus miles per hour.

We do not know how many manufacturers considered participating in this competition. However, we do know that at least two other companies submitted proposals together with small-scale models of their proposed airplane configurations. Boeing's proposal was accepted, and a letter contract was approved on 25 June 1946. A definitive contract has since been entered into for Phase I of this project.

We understand that it has now been determined by the Air Force that the objectives should be for an airplane with a T. R. of 3,000 miles and a cruising speed over a limited area of 500 miles per hour. Based on the development work which Boeing has performed on this project and concurrent with the development, we can definitely modify the present design, and by decreasing the T. R. to approximately 3,000 miles achieve the new high speed requirements. We have already submitted data to AMC supporting this modified performance.

It will be observed that the present determined requirements of the Air Force much more closely approach the original proposal that Boeing submitted in April of 1946 than did the stated requirements set forth in the Notice of Competition dated 15 February 1946. If the Air Force was justified in awarding the project to Boeing originally, we are unable to understand why the new requirements should indicate that the project should be thrown open to new competition. Our contract provided for projected, parallel development of the basic airplane and the Boeing to offer an airplane which satisfied the present requirements. In addition, by means of the development program, it has been possible to offer a plane with an initial T. R. of 3,000 miles and a cruising speed of 500 plus miles per hour. The Navy has recently proposed a modification to the specifications which calls for an airplane in this category, which specification changes were accepted in a supplement dated 17 April 1947 to the letter contract, which agreement calls for a limited Phase II program on this subject. These modifications were as fundamental as those now proposed on this subject. Consequently, is it not proper for further changes in the specifications to set forth the new requirements by a similar amendment to the present contract? It is our understanding that the practice in the past to change specifications in projects on research or competition, such changes as have since been made, after consideration have been made on the limit to redundant project which were originally let on competition more than one time.

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Honorable Stuart Symington
Washington, D. C.

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No question as to the quality of the Company's performance on this project is involved; in fact, we believe that the Air Force will certify that our performance has been entirely satisfactory.

We are not advised of the considerations underlying your conclusion to hold another competition instead of proceeding with the XB-52 contract. However, if one of the reasons for the decision is the feeling that this Company has more than its proportionate share of present Air Force business, we desire to point out that the production work on this project—if the project is found worthy of quantity production—would not come for a substantial period and after all known present production projects will presumably be completed.

From the Government's standpoint substantial disadvantages must necessarily arise from the proposed action. If a new competition is held, and if Boeing is awarded the contract, delay in the development of this aircraft will be inevitable as, in the meantime, work must terminate. In addition, there is always a great deal of lost effort incurred in such interruptions. If Boeing is not successful in the new competition, the company receiving the award must necessarily duplicate at the Government's expense much of the work being now performed which, of course, would cost the Government both money and time.

The Company has consistently advocated that the Air Force award its business on a basis of merit. In our opinion, if the Government does not adhere to this policy, the aircraft industry will deteriorate and our national security will be placed in jeopardy. We feel that the proposed action of reopening the Heavy Bombardment Airplane competition is directly contrary to this policy of free competition and the award of business on the basis of merit. In this instance, the Contractor has won a competition and has proceeded successfully with the resultant contract. If there were any claim that the Contractor had not performed properly, we could understand the proposed action. However, since this is not the case, and since there are no more than normal variations involved, why should the project again be thrown open, thereby giving other companies a second chance to acquire a contract which has already, on the basis of merit, been won by this Company? Furthermore, we point out that any new competition at this stage will necessarily give our competitors the advantage of the development we have already made. If this is to become a practice, what incentive is there for a company to engage in any such competition in the future? In other words, by entering into this particular competition we are to forego application in other projects. Since the award for this contract, we have tied up some of our finest talent in the country for a period of eighteen months. Now, if we are not to continue with it, we are left with a serious void in our development of future production. We cannot too strongly emphasize that a fundamental policy is involved in this matter.

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Honorable Stuart Symington
Washington, D. C.

It is requested that the Air Force reconsider its proposed action.

Respectfully yours,

William L. Allen
President

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PRIORITY

PARAPHRASE NOT REQUIRED. HANDLE AS SECRET COMMUNICATION IAW AR 380-5 and 60a (4) AR 380-5

From: COMMANDING Wright Fld Ohio

To: CSUSAF for Maj Gen Craigie

Nr: AT 1016 30 December 1947

Subject is your ltr dated 11 December 1947 on heavy bombardment acft.

Prior to formal cancellation of B-XB-52 and actual issuance of circular for proposals to industry on heavy bomber, this Command again requests reconsideration your decision to cancel present XB-52 and open new heavy bomber to competition for following reasons: Opinion of acquainted personnel of this Command is that final bomb bay size and weight of bombload will not be fixed until end of summer.

If final size and weight figures are materially different than preliminary figures to be received in January, a major change in acft design will be result. Continuation of project to that time will enable Boeing to undertake government sponsored preliminary studies of airframe carrying different tentative sizes and weights of load to be available when these parameters are finally determined.

Boeing received award to construct original XB-52 similar in every respect to new heavy bomber characteristics as result of competitive action in which three companies participated. This elaborated upon in ltr. of protest to Honorable Stuart Symington from Mister Allen President of Boeing Aircraft dated 22 December 47 a copy of which has been furnished this Command by local Boeing representatives.

Competition will cause new heavy bomber to be designated other than XB-52. As result $2,800,000 of fiscal year 1947 will be lost regardless of winner of competition. Also approximately $6,000,000 of fiscal year 1948 will be lost to project unless partial phase 2 can be negotiated prior to 1 July if this sum can be reallocated to other Dil projects but will result in greater heavy bomber costs during ensuing years.

In event contract for phase 1 is awarded 2 companies approximately $6,500,000 will be lost to project but can be reallocated to other Dil projects.

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From: COMGENAMC Wright Fld Ohio
To: AF 1016

30 December 1947

Although it appears that only time lost would be between the opening and contract awds amounting to three months, it is strongly felt that a more accurate figure would be 6 to 9 months. As directed in referenced letter, it is anticipated that design directive material will be ready for circularization Wednesday 31 December 1947 for action will be withheld until Monday 5 January 1948 awaiting your final reply.

End

ADDR: AF

OAI IN 5215 (31 Dec 47) DTG: 302031Z

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2.1 Arm. Lab. Comments
Bomb. Br., Eng. Div.

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Design Requirements - Heavy Bomber

MCREVG · MCREQA5 7 January 1948 1.

1. New requirements for a heavy bomber have been established by the USAF and a design directive presenting the new requirements has been prepared. It is the intention that the XB-52 airplane will be changed to comply with these requirements, and they will be presented to the contractor on 7 January 1948.

2. Inclosed herewith for the Laboratories comments are three (3) copies each, "Design Requirements - Heavy Bomber" dated 6 January 1948, with a copy of "Military Characteristics for Heavy Bombardment Aircraft" dated 8 December 1947. These requirements are similar to those of the new medium bomber, except that the armament, crew and equipment has been reduced to a minimum.

3. It is desired to point out the following errors appearing in the inclosed Military Characteristics and for which clarification has been requested from USAF Headquarters.

a. Cruising speed defined as Block Cruise Speed for, from 1737 Nautical miles to 5210 Nautical miles, in lieu of "average speed for above range."

b. Range quoted as 6087 Nautical miles (7,000 S. miles) in lieu of 6955 Nautical miles.

c. Average bomb load quoted as 15,000 pounds in lieu of 10,000 pounds.

Formal circularization will be made upon conformation of the above corrections.

4. In view of the high priority of this program, the limited time available for contractual obligation, and the similarity of the requirements with those of the new medium bomber, it is requested that all comments be forwarded to this Office by 20 January 1948.

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GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

GWB/mr
Ext 39172
Bldg/126

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161 Contr., Vol. 1, 1948
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D/C&R, Requirements Division

x Necessary Action

Col. Perkins/js 6328

8 JAN 1948

New Heavy Bomber Contracts

1. On 8 December 1947, General Vandenberg approved new heavy bomber Military Characteristics which superseded the then current B-52 characteristics and indicated that competition precede the awarding a contract.

2. After careful Air Staff briefing of the pros and cons of awarding the contract directly to Boeing Aircraft Company or to the winner of industry-wide competition, the Under Secretary directed that the Boieng contract for the B-52 be terminated and that the entire Aircraft Industry participate in competition for the contract.

3. Before the aforementioned directive was implemented, Mr. W. M. Allen, President of Boeing Aircraft Company, wrote a letter of protest to Mr. Symington, stating, in essence, that Boeing could and should build the new bomber without competition. A reply has been prepared for Mr. Symington's signature i n which it is stated that "the thought of new competition has been dropped," and it is planned to award a new contract to Boeing.

RECOMMENDATION:

That you oprose any change to the directive issued by Mr. Barrows for reasons enumerated in Inclosure #1.

1 Incl.
Reasons why competition
is desirable

E. E. PARTRIDGE
Major General, USAF
Director of Training & Requirements

AFORQ/B
Col Perkins

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161 Contr., Vol. 1, 1948
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REASONS WHY COMPETITION IS DESIRABLE

1. An aircraft of the extremely high performance of the new heavy bomber will require the concerted effort of the entire aircraft engine, propeller, and airframe industry plus advanced armament development if a satisfactory airplane is to be developed. It is obvious that if one company is awarded the contract without competition, we will not receive the benefit of wholehearted effort of seven or eight other top manufacturers.

2. If Boeing Aircraft Company presents the best design, it will win the competition. If Boeing does not present the best design, they will not win the competition and justly so.

3. The decision by Mr. Barrows to award two (2) Phase I Contracts to the two top competitors is sound and has been employed in the past. It insures the Air Force an airplane should one design later prove unsound. Two of Boeing's heavy bomber designs have been rejected since 1946.

4. It is believed that Boeing will present a better design under the pressure of competition than if awarded a direct contract.

5. Since September 1947, preliminary design studies by both RAND and N.A.C.A. have indicated that the flying wing type airplane may well be the best suited design for long range bombers of this size. If Northrop is not allowed to compete, we may be shutting ourselves off from consideration of the best bomber design.

6. The Air Staff considered the financial implication, time phasing, and the impact on the aircraft industry of arbitrarily awarding a multi-million dollar contract without competition. The Air Staff recommended competition.

7. Notwithstanding Mr. Allen's letter, both of Boeing's previous B-52 designs have been radically different from the characteristics for the new heavy bomber. Their implication that Boeing has won a contract and should be allowed to build any heavy bomber under that contract is unfounded. Boeing was awarded a contract for an entirely different airplane which is not satisfactory to the Air Force. Boeing may not be capable of winning a competition for this new bomber.

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B-52
161 Contr., Vol. 1, 1948 COPY
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(3/3 pp) CONFIDENTIAL

8. The new heavy bomber will play a primary role in the implementation of our Future Plans. The failure of the bomber will jeopardize the stature of the Air Force and the security of the nation. Successful accomplishment of the mission of the aircraft demands that it incorporate the best performance consistent with the military characteristics required, that can be achieved by the Aircraft Industry. This can only be assured through competitive study by the entire industry. It is not felt that we can afford the terrific result in arbitrarily awarding the contract to one company whose designs may well be inferior to others.

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1³ General YB-52 12
9 — (1/1p)
Bomb Br., Eng. Div.

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Record of Long Distance Telephone Conversation
Between Colonel Burnside, Washington, D. C.
and Colonel George F. Smith, Chief, Aircraft
Projects Section on 1/8/48.

/cal
8 January 1948

B. Yesterday General Craigie asked me to call you to ascertain if you would set aside any of that famous B-52 money to be available to allow Fairchild to finish their track landing gear. A couple hundred Thousand is involved, I believe.

S. I know that the track landing gear is being handled by Aircraft Laboratory.

B. There seems to be a lot of interest on the track landing gear. I understand they have the airplane with the landing gear on it but they are out of "dough" and nothing is set up to complete the testing.

S. The story I heard was that we were going to do the testing.

B. How about getting in touch with "Dinty" and let me know the story on it. "Bill" was under the impression that the airplane would just set there. The Company told him that it should have very extensive taxi tests.

S. I am not familiar at all with it except what I told you but I will check with "Dinty" and call you back.

B. In case we decide to go into the flight testing, would there be B-52 money?

S. You can always cut it down but you will have to make it up some time. You can't bleed that project and ever get the project done. "Bill", the other day when I talked to him, said something about taking a million dollars out here and a million dollars out there for different things. First thing you know, we won't have enough money to get it started.

B. This is probably the reason for that kind of thing. At one time they were thinking about outright cancellation.

S. Cancellation with Boeing, but going on with competition. Boeing is in here today and we are going over the details of this new airplane and we are going over a proposal and we have to get that money obligated and committed within the next few months. I will tell you what I think on this C-82. It was "Dinty" Moore's intention that we run the tests here but I will check with him and let you know.

Cy. to
MCREOA-2

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Air Materiel Command

Extracts from Daily Activity Reports of Headquarters, U. S. Air Force

TO: [illegible] - Col. Smith FROM: MCRE DATE: 12 Jan 48 COMMENT NO. 1

The following items have been extracted from the daily activity reports of Hdqrs. USAF, and are hereby transmitted to you for informational purposes only:

1. DELEGATION OF AUTHORITY TO MUNITIONS BOARD (Unclassified)

The Secretary of Defense has delegated to the Munitions Board the authority for making final decision in the assignment of procurement responsibilities among the several departments of the National Military Establishment. This includes the assignment of the procurement of any item to any of the three depts. or to a joint agency. It also includes the power of final decision in the event of disputes among the departments arising from the determinations made by the Chairman. Such decisions will be binding on the three departments. (Col Burstow - Logistics Plans Group report of 8 Jan 48)

2. UTILIZATION OF P-9 POSITIONS (Unclassified)

Approval has been secured for the utilization of the fourteen P-9 positions ($10,000 to $15,000) available under Public Law 313. Three of the fourteen positions have been allocated to this Hdqrs, ten to AMC, and one to the Air University. To date only one position has been filled, that for the Research Scientist in Atomic Energy. Other positions were not filled as it was felt desirable to obtain approval of the over-all plan prior to recruitment. Now that the plan has been approved, firm steps are being taken to fill remaining positions. (Gen. Craigie - M&L report of 8 Jan 48)

3. BOEING CONTRACT FOR XB-52 (Confidential)

Boeing Aircraft was informed that the USAF would carry out the development of the new heavy bomber by changing the present XB-52 contract which they hold. However, Boeing was advised that the Air Forces would not have considered it a breach of faith if the Commanding General, AMC elected to hold a new competition for the development of this heavy bomber. Decision in favor of Boeing was made because of our ability to use funds already obligated on the XB-52 contract and the appreciable saving in time which would be made by this procedure. (Gen. Craigie - M&L report of 9 Jan 48)

L. L. PUTT
Brigadier General, USAF
Deputy Chief
Engineering Division

LFS:vjm
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[redacted]

Director of Research & Dev.
DD/S, Materiel

Gen Ord die/ec 71500

15 JAN 1[illegible]

1 Approval
2 Signature

XB-[illegible] Development

1. B-[illegible] History

a. [illegible] original XB-[illegible] heavy bomber for which contract was written [illegible] aircraft [illegible] a combat radius of 3,000 miles, a cruising speed of 410 miles per hour, a range of [illegible],000 miles. It was originally decided that additional [illegible] for the special [illegible] issue of the Secretary's letter.

b. In consequence, the XB-[illegible] was changed in December 1944 to the [illegible],000 mile, 400 mile per hour, 4[illegible],000 lb. vehicle.

c. It was originally intended that [illegible] to live in [illegible] but in July 1947 the Headquarters Air Force Board-committee of the Aircraft [illegible] recommended that the operation [illegible] military characteristics, [illegible] committee, [illegible] miles per hour, [illegible] miles per hour.

d. A contract involving [illegible] was entered into, which provided [illegible], to be [illegible] to [illegible] flying and [illegible] per hour. It was believed that this combination would [illegible] the [illegible] of the Strategic Air Command for [illegible] five (5) years.

e. A conference involving [illegible] and A.A.F. decided that [illegible] characteristics [illegible] aircraft. In fact, the [illegible] involved in the [illegible] characteristics, [illegible] desire to [illegible] expressed that [illegible] to [illegible], would [illegible] that it a new [illegible] should be [illegible].

f.

(1) Following this [illegible], the Atomic Energy Commission notified the [illegible] of the A-[illegible] bomb [illegible] prior to completion of the aircraft. Because the bomb-cargo size is one of the [illegible] matters in design, A.A.F. recommended that the project XB-[illegible] be continued. A.A.F. believed it would be unwise to [illegible] a heavy-ride [illegible] with [illegible] of new [illegible] as the [illegible]-by-[illegible] bombs.

(2) Likewise A.A.F. [illegible] that original weight, [illegible] entered into XB-[illegible] contract, [illegible] 4[illegible],000 miles [illegible] that, therefore, the new characteristics [illegible]

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(Cont'd - page 2)

[illegible] officially must charge to jointly sponsored [illegible] contract with a resulting loss of time and loss to [illegible] reserve your funds already obligated to this [illegible]. A decision was made to adopt the A.F.C. recommendation.

[illegible] current NACA, NACO and M-40 CAL(S) test reports concerning the aerodynamical characteristics of a long range flying wing type airplane, a conference [illegible] staff officers was called to reconsider the decision to continue the [illegible] project with Boeing Aircraft Company. M/S, Operations and Army [illegible] competitive effort. Concern was evidenced that the USAF might not [illegible] operable aircraft unless the flying wing was considered. The decision [illegible] Mr. Allen as a result of the above conference.

3. [illegible]: Enclosed letter

[illegible] letter is in answer to Mr. Allen's letter protesting the proposed plan [illegible] new competition on the changed Heavy Bombardment Aircraft Characteristics, [illegible] the advisability of continuing with Boeing. It emphasized the importance [illegible] project, the absolute necessity of the USAF receiving the best possible [illegible] current confirmation of flying wing theoretical information. It [illegible] that Boeing Aircraft has not considered a flying wing configuration, but it [illegible] more efficient than the conventional type, and requests Mr. Allen's [illegible] consideration of it.

4. RECOMMENDATION:

Recommend this letter be approved.

Incl.
Ltr to Mr. Allen
of Boeing Aft.

H. A. CRAIG
Lieutenant General, USAF
Deputy Chief of Staff, Material

	ACTION	a. ACTION	b. [illegible]	c. [illegible]	d.
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]			

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15.7 Contractual Corres. 13
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Bomb. Br., Engr. Div.) COPY

Transfer of Aircraft Projects Section's 611-1 Funds to Laboratories

MCRE MCRSOA 16 January 1948 1.

1. It is requested that you authorize and so instruct the comptroller to transfer the following sums of money from the Aircraft Project Section's 611-1 money on the XB-52 for the following purposes and to the Laboratories indicated. The development of these items must be started in the Fiscal Year 1948 in order to meet the desired time schedule on the new XB-52 airplane. Arrangements are being made with the Laboratories concerned whereby the money transferred is on a loan basis and will be returned to the XB-52 project should the Laboratories be able to obtain the necessary money from the Fiscal Year 1949 appropriations.

a. Propeller Laboratory. For the development of propeller hubs--$750,000.

b. Power Plant Laboratory. For development of dual rotation gear box for the next 20 months--$1,'19,412.

c. Power Plant Laboratory. For development of accessory drive gear box for the T-35-1 and T-35-3 engines--$267,004.

d. Armament Laboratory. For the initial study of the wide angle tail turret on the XB-52--$500,000. (It is desired that armament Laboratory thoroughly investigate the possibility of letting this contract with Boeing Company in view of this company's interest in the armament for this particular airplane.)

2. The total amount of money transferred to the Laboratories on the above items, is $2,036,506. This action insures the earliest possible starting of the development on these critical items and the money will be back in the B-52 program by the next action on the Fiscal Year 1949 Budget.

George F. Smith
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

CFS/cal
2-3122
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BOEING AIRPLANE COMPANY

Seattle DIVISION

SEATTLE, WASHINGTON.

In Reply Refer to
1002 Harries Building
Dayton 2, Ohio.

January 16, 1948

To: Commanding General,
Air Materiel Command,
Wright Field, Dayton, Ohio.

Reference: D02-6225

Attention: MCREOA-2

Classification RESTRICTED

Subject: Contract W33-038 ac-15065
Model XB-52 Airplane.

AUTH: Ltr, AMC
Hutchinson P. Pope, USCO
(MCPPX43)
Date 27 April 1948

In accordance with agreements reached by representatives of this Contractor and personnel of the Engineering Division, AMC, during the week of January 12, 1948, Contractor proposes that it shall continue Phase I design studies of a long range bombardment airplane described in AMC's report entitled "Design Requirements for Heavy Bombardment Airplanes", dated 8 January 1948.

The Contractor proposes to conduct such Phase I design studies in accordance with Contractor's Document D-8852, "Design Development of Heavy Bombardment Airplane - Model 464-35-0", dated 14 January 1948, copies of which have been submitted to Engineering Division, AMC.

Contractor further proposes, in connection with said design study, to construct mockups as set forth in Contractor's Document D-8851, "Mockup Specification for Airplane-Heavy Bombardment - Model 464-35-0", dated 14 January 1948, copies of which have been submitted to Engineering Division, AMC.

Delivery of the design data, engineering data, drawings and test reports called for in Contractor's Document D-8852 shall be accomplished eight months after the effective date of the change order or supplemental agreement authorizing Contractor to perform such work. Delivery of the mockup called for by Contractor's Document D-8851 shall be accomplished six months after the effective date of the change order or supplemental agreement authorizing Contractor to perform such work.

See letter 2-6-48

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The Contractor proposes to perform the foregoing work at an increase in the estimated cost of $529,377.00 and a fixed fee of $37,056.39, a total estimated cost to the Government of $566,433.39.

In substantiation of the foregoing quotation, the Contractor submits the following detailed breakdown:

Engineering Labor	
92,700 hours at $2.75	$ 254,925.00
Overhead at 78%	198,841.50
Developmental Shop Labor	
12,200 hours at $1.75	21,350.00
Overhead at 123%	26,260.50
Materials and Equipment	26,000.00
Direct Charges	
Travel and Consultants' Fees	2,000.00
Estimated Cost	$ 529,377.00
Fixed Fee at ~~7%~~ — 6.5%	34,409.50
	~~37,056.39~~
TOTAL ESTIMATED COST	~~$ 566,433.39~~
	563,786.50

It is requested that a change order or supplemental agreement to subject contract be submitted to the Contractor for its approval and acceptance as soon as possible.

BOEING AIRPLANE COMPANY
Seattle Division

M. P. Crews
Dayton Representative

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HqAMC Form No. 10-514 (Rev 10 Sep 46)

WF-L-2 SEP 47 250M

SAVE

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL, AIR MATERIEL COMMAND, ATTENTION FOLLOWING OFFICE SYMBOL:

MCRE

HEADQUARTERS
AIR MATERIEL COMMAND

MCREDA-4/3WB/emh
WRIGHT FIELD, DAYTON, OHIO
25 January 1948

SUBJECT: Heavy Bombardment Aircraft

TO: Chief of Staff
United States Air Force
Washington 25, D. C.
ATTN: Deputy Chief of Staff, Materiel

1. Reference is made to letter from Deputy Chief of Staff, Materiel, Headquarters, USAF, dated 11 December 1947, subject as above, transmitting Military Characteristics, dated 8 December 1947, Air Materiel Command teletype AT-1016, dated 29 December 1947, and the conference held at Headquarters, USAF, on 18 December 1947, attended by Colonel J. R. Sutherland of this Command.

2. In accordance with the referenced letter, Design Requirements have been prepared and were released to the Contractor on 7 January 1948. It was considered necessary to release the Design Requirements prior to a final settlement of several requirement details and the clarification of several items of the referenced Military Characteristics in order that a minimum of time and funds will be lost.

3. It was stated in the referenced conference that the bomb bay configuration described by Air Force Drawing No. S48B4194 probably may not be suitable for a long range planning, because of the probable increase in size of this special bomb. Information received from AEC indicates that a twelve-inch increase in diameter, coupled with the increased length that is dictated by aerodynamic and ballistic characteristics, will define a bomb whose weight is approximately twice that of the bomb load required in the Military Characteristics. Further, because of the severity of the basic military characteristic requirements, a change of this magnitude will cause a major change in the configuration of the airplane. In view of the reasoning behind defining the bomb bay requirement described by Air Force Drawing No. S-48B4194, 15,000 pounds appear to be a much more realistic bomb load with a heavy bomber. Pending concurrence or comments from Headquarters, USAF, preliminary design studies made by Boeing will consider this bomb load. This has been coordinated with Colonel Sutherland of Air Materiel Command, who considers this bomb load as being a more realistic approach than with that defined by the Military Characteristics.

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Ltr, AMC, to CofS, USAF, 26 Jan 48, subj: "Heavy Bombardment Aircraft"

4. Considering the historical developments of the special bomb carrying heavy bomber, it is readily apparent that the effect of time of development, budget, equipment planning, etc., which will be reflected by another major change in configuration, will be of major proportions. It is, therefore, imperative that the Air Force and the Atomic Energy Commission agree upon a long range plan as soon as possible in order that sound planning and an efficient expenditure of development funds may be made.

5. In the Design Requirements being issued, the cruising speed has been defined as "block cruise speed for, from 1737 nautical miles to 5210 nautical miles" in lieu of "average speed for above range" as stated in the referenced Military Characteristics. This definition is in accordance with the decision of the 1 December conference in the Office of Deputy Chief of Research and Development.

6. The range has been defined as 6947 nautical miles, which corresponds to 8,000 statute miles in lieu of 6956 nautical miles as stated in the referenced Military Characteristics. It is assumed that this was a conversion error.

7. The Design Requirements have provided for interchangeability of personnel in different pressurized compartments during unpressurized flight only. Therefore, it will be necessary to depressurize and go on oxygen, if it is necessary to go from one compartment to another. This has been done to eliminate weight and decrease vulnerability of the aircraft. This is considered to be one of the many compromises which may be necessary in order that the requirements as presented may be realized.

8. It is requested that the following corrections be made to the referenced Military Characteristics:

a. Cruise speed be defined as "block cruising speed for from 1737 nautical miles to 5210 nautical miles" in lieu of "average speed for above range".

b. Range be given as 6947 nautical miles in lieu of 6956 nautical miles.

c. Average bomb load be stated as 15,000 pounds in lieu of 10,000 pounds.

d. Add "Complete crew interchangeability during unpressurized flight is required."

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4-(3/13/48)

Ltr, AMC, to CofS, 26 Jan 48, subj: "Heavy Bombardment Aircraft"

9. It is understood that the Air Force and Atomic Energy Commission are studying the problem of bomb bay requirements. It is requested that this Command be informed as soon as practical the results of these studies.

FOR THE COMMANDING GENERAL:

O. L. Putt

O. L. PUTT
[illegible]

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BOEING AIRPLANE COMPANY

Seattle, 14, Washington

William M. Allen
President

Confidential

Dear Mr. Symington:

Pursuant to the invitation contained in your letter of January 25, and the discussions with members of your Staff and our personnel in Washington, we have made further careful studies relative to the use of all-wing type aircraft in meeting Air Force long-established military requirements for long range bombardment operations.

In the case of extremely large aircraft, there appears to be a potential advantage for the all-wing type. However, in our opinion, this advantage cannot be realized in the near future, since design refinements are believed necessary in order to reduce the magnitude of any control problems for the all-wing configuration of very large size. Moreover, there are certain disadvantages, such as inherent stability characteristics and increased power required in present production aircraft, are inherent in the all-wing design. These disadvantages were referred to in both Memorandum Report No. 1-77 and in studies performed by RAND, with a clear indication that the difficulties can be overcome in large aircraft.

We believe that research on the all-wing design should be encouraged and that experimental aircraft should be built for the purpose of eliminating, if possible, the inherent deficiencies of this type. However, we strongly recommend against the development of this type in the near future for combat use, since it does not offer the quality characteristics in a combat airplane which would make it an effective heavy bombardment aircraft. The development of a conventional type aircraft which would be substantially equivalent to that of the all-wing type, would require almost all of the same effort that is required for a combat aircraft. This being the case, since the all-wing aircraft is considered by the Air Force to be a long-time development and, in any project, we should strive to limit first effort, we feel that the development of aircraft must be the

We would be happy to discuss this matter with you and [illegible] Vice President - [illegible] to [illegible] by

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M[illegible] W. Stuart Symington — Page -2-

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Mr. [illegible] Secretary, our Staff Engineer in Charge of Armaments and Power Plant. He will be available at your office that you will be informed from Washington at that time, the formal arrangements can be made by our Staff to attend [illegible] discussion of this project with members of your Staff. I am sure that following these discussions they will decide that the best course of action is to produce our activities on the B-32 following the experimental-established heavy-bombardment design requirements.

Very truly yours,

[illegible]
/s/ [illegible]

[illegible]
Executive Officer

[illegible]
Secretary of [illegible]
Room [illegible]
Washington, D. C.

[illegible], 1945

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February 1948

General J. T. McNarney
Commanding General, Air Material Command
Wright-Patterson Air Force Base
Dayton, Ohio

Dear General McNarney:

We here in Washington are still very much concerned about the future heavy long range bomber. I presume you have seen the Secretary's letter to Mr. Allen, which presents our current thinking.

However, we should like to have your recommendation as to the steps we should take in this matter. It seems to me that your engineers must first reconcile and evaluate Northrop's claims for the Flying Wing and Boeing's claims for the conventional aircraft.

Will you please have your report here by 13 February, the approximate date the Secretary is due to return to Washington.

Sincerely,

H. A. CRAIG
Lieutenant General, USAF
Deputy Chief of Staff, Material

AFMDC

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OFFICE SYMBOL	1. AFMDC	2. AFMRD-3	3. MRD	4. [illegible]
GRADE AND SURNAME OF COORDINATING OFFICERS		Col Holtaway	Treasured	10 FEB 1948
				CAC-MAIL BRANCH

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D. C.

Fell

10 February 1948

MEMORANDUM FOR GENERAL CRAIG

SUBJECT: XB-52 Problem

1. Analysis of subject problem reduces the XB-52 situation to several fundamental facts and one question, the answer to which will determine the final decision. These are listed below.

2. The current unsettled status of the XB-52 project has been brought about by

a. a desire to insure that the best airplane is developed and produced,

b. doubt that the current version of the XB-52 represents the most advanced design that is technically possible at this time,

c. recent information on the possibilities of the "flying wing" type of aircraft.

3. It is fundamental that, the longer we wait to commit ourselves to an actual aircraft design, the farther advanced, technically, the design will be when the commitment is finally made.

4. It is also fundamental that, once a commitment is made, thereafter at anytime prior to completion, the current project can be stopped and a new one of more advanced design begun. However, the new design cannot possibly be delivered at the same time as that scheduled for the first design.

5. Although the "flying wing" indicates considerable promise and advantages, the Air Force does not now have sufficient experimental test data to warrant placing sole reliance on this configuration for the long range bomber. It is estimated that six to nine months will be required to fully substantiate the superiority of the "flying wing".

6. Until such time as the superiority of the "flying wing" configuration is accepted by other manufacturers, only Northrop can undertake a "flying wing" project since its success is dependent upon the manufacturer being a proponent of and believer in the merits of the type.

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7. It is believed that a decision can only be made when we have an answer to the question: "When must we have a long range bomber in combat service?"

8. Dependent upon the answer to the above question we can follow

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either of two courses of action, namely:

a. Continue present XB-52 project, if the time element is critical.

b. Cancel present XB-52 project and hold a design competition to insure most advanced design, if time element is not critical.

9. If the time element dictates 8 a above and if funds could be made available, an insurance program could be undertaken by holding an informal design competition on which to base negotiations for a second long-range bomber project. This would permit continued exploitation of the "flying wing" type.

10. It is recommended that the Air Staff furnish the date on which the long-range bomber must be in service before final decision on the XB-52 project is made.

D. L. PUTT
Brig. General, U.S.A.F.
Acting Asst. Deputy Chief of Staff,
Materiel

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HEADQUARTERS STRATEGIC AIR COMMAND
ANDREWS FIELD
WASHINGTON 20, D. C.

CSB

12 Feb 48

SAC 452 (12 Feb 48)

SUBJECT: Crew Arrangement on Advanced Types of Strategic Bombers

Same letter to 8 AF

TO: Commanding General
Fifteenth Air Force
Colorado Springs, Colorado

1. The crew arrangement in the B-50A series is not considered too desirable when an additional crew member is added and aircraft is fully equipped with turrets. This deficiency may be attributed primarily to the fact that adequate representation of personnel familiar with the problem was not accomplished in the membership of the mockup boards.

2. Experienced personnel from this headquarters and from the Eighth Air Force participated in the B-50B mockup and it is felt that a very great improvement has been made as a result. The same procedure has been carried out in the preliminary planning on the B-50C aircraft.

3. Preliminary mockup work has been initiated on the aircraft series which will follow the B-50. This aircraft has been known, in the first phase of the program, as the XB-52. Due to the very long range and very high speed characteristics which are planned for this aircraft, it is necessary to limit the number of crew personnel and the amount of armament to the minimum. Otherwise we must sacrifice either its range or its high speed.

4. Studies have already been made by personnel from this headquarters, Air Materiel Command and Boeing in connection with the arrangement of a reduced crew. Copies are inclosed of three arrangements which are identified as 7-A, 6-A, and 3-A. The first crew arrangement (7-A) shows the pilot and co-pilot in tandem (similar to the B-47 arrangement). Provision has been made for the additional crew member and radio operator, where they will have ample space provisions to do their work and to have comfortable seats. The two 1037's are located side by side with arrangements for the bombardier on the bottom center line of the aircraft. The bombardier will have a retracting optics tube, which will be used for both visual and radar bombing. The co-pilot will also act as flight engineer. This arrangement has the very positive advantage over the drawings 6-A and 3-A in that it is relatively simple to provide for individual ejection of crew members either from the top or bottom of the aircraft.

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CSB
Subj: Crew Arrangement on Advanced Types of Strategic Bombers

5. Drawings 6-A and 3-A are the conventional side by side arrangement of the pilot and co-pilot, and require an additional crew member as a flight engineer. Drawing 6-A is considered to be somewhat the better of the two side by side arrangements due to the better location of the two 1037's adjacent to each other. It is difficult with the side by side arrangement to provide for crew ejection, which is considered highly desirable in an aircraft of this type, which will have a cruising speed in excess of 500 statute miles per hour. A side by side arrangement does not lend itself to as good an aerodynamic shape as the tandem arrangement, and will of necessity require a somewhat larger fuselage. With each of these arrangements consideration is being given to the installation of tail armament covering a 220 degree arc of fire with a special gunner in a position in the rear to do either visual or radar sighting. Remote control of the guns will also be carried to one of the positions in the front cabin.

6. Four copies of each of the above mentioned drawings are inclosed. It is desired that you forward these copies, without delay, to the commanding officers of the 301st, 92nd, 93d, and 28th Bomb Wings, for their review, consideration and comments. It is desired that these comments be compiled, together with the comments of your headquarters, and forwarded to this headquarters, attention A-3, in order that they may be considered in the preparation of the final mockup in the near future.

BY COMMAND OF GENERAL KENNEY:

/s/ C. S. Irvine
C. S. IRVINE
Colonel, USAF
Asst to the Chief of Staff

3 Incls.
1. Dwg No. 9-15887 (in quad)
2. Dwg No. 9-15888 (in quad)
3. Dwg No. 9-15890 (in quad)

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w/1 2 Encs. Rec. XB-52
1- [illegible]
Comb Rec [illegible]

SAC 452 (12 Feb 48) 12 Feb 1948
Subject: Crew Arrangement on Advanced Types of Strategic Bombers

AG 452 A3 1st Ind

HEADQUARTERS FIFTEENTH AIR FORCE, Colorado Springs, Colo., 8 MAR 1948

TO: Commanding General, Strategic Air Command, Andrews Air Force Base, Washington 20, D. C. ATTN: AC/S, A-3 Division

1. In accordance with paragraph 6 basic communication, the following comments and recommendations are forwarded:

a. The 28th Bomb Wing recommends that:

(1) Crew compartment drawing 7A be adopted without change.

(2) In event that drawing 7A cannot be adopted, crew placement be arranged as outlined in drawing 6A.

b. The 92d Bomb Wing recommends that:

(1) Crew compartment drawing 7A be adopted with the following changes:

(a) The pilot and co-pilot positions be reversed. Under present arrangement, the pilot is isolated from the rest of his crew by being placed out in front. By switching positions the pilot will have much easier access to the other members of the crew and can effect better coordination between members of the bombing team. Also, the pilot will have as good, or better, field of vision from the co-pilot position then he would have from the pilot position as shown.

(2) Special attention be given to the design of the seats, making them fully adjustable in order to reduce fatigue to the minimum.

c. The 93d Bomb Wing recommends that:

(1) Crew compartment drawing 6A be adopted for the following reasons:

(a) A flight engineer is provided. It is believed that the tactical efficiency of the whole crew would be enhanced by retention of the flight engineer. It is believed that a co-pilot could

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1-2 Aire. Gen.
1-(4½ rpl).
Bomb Av., Eng Div

AG 452 A3
Subject: Crew Arrangement on Advanced Types of Strategic Bombers

1st Ind

not efficiently perform the duties of alternate pilot and crew commander in addition to the duties of flight engineer on a long range mission. Secondly, side by side positioning of pilots will provide better communication and will result in less fatigue by allowing more functions to be shared or alternated between pilots.

(b) Streamlining is better than shown in drawing 3A and closely approaches that achieved in drawing 7A.

(c) Ejection for pilots is feasible, while still allowing reasonable escape facilities for the balance of the crew.

(d) All crew positions are easily accessible in flight and easy movement between various crew positions is provided.

(e) Crew positions are more nearly on the same level. This is considered an advantage over the arrangement shown in drawing 7A.

(f) The grouping of the navigator, bombardier, and radio crew members is considered ideal inasmuch as it provides closer visual and verbal coordination between these 3 positions.

(2) To reduce fatigue and inefficiency resulting from lack of crew comfort, the following be considered:

(a) Development of reclining seats, permitting crew members to rest or sleep comfortably in the regular crew position, be adopted.

(b) Development of parachutes, clothing and otherpersonal equipment that can be worn comfortably for long periods, and yet furnish adequate protection if it is necessary to abandon the aircraft.

(c) Development of an instrument lighting system which is less fatiguing when used over long periods.

d. The 301st Bomb Wing recommends that:

(1) Crew compartment drawing 7A be adopted for the following reasons:

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1-2 Aero. Sqn
1-15/7 AAF)
Bomb Sec, Log. Div.

AG 452 A3 1st Ind
Subject: Crew Arrangement on Advanced Types of Strategic Bombers

(a) The aerodynamic shape in the tandem arrangement provides for better streamlining of the aircraft, increases speed, and eliminates necessity for heavy armament.

(b) It is more convenient from the crew standpoint and allows for greater freedom of movement than the arrangement shown in the other drawings.

(c) Provides for a more compact crew compartment.

(d) Eliminates the flight engineer as a crew member.

(2) The radio operator also be qualified as a RCM operator.

2. After considering the comments submitted by the wings, and studying the attached drawings, the following is recommended:

a. That the tandem arrangement as shown in drawing 7A be adopted for the following reasons:

(1) Provides for better streamlining of the fuselage, which will increase aerodynamic efficiency, speed, and range.

(2) Provides the pilot and co-pilot with a more complete field of vision.

(3) Ejection type seats can be provided for all crew members. This is considered a very desirable feature in high speed aircraft.

(4) The position of flight engineer is eliminated. It is believed that the co-pilot can adequately handle the additional duty of flight engineer because it is assumed these duties will be less complicated with the type of power proposed for this aircraft as compared with present conventionally powered aircraft. Also, by cross training additional crew members as flight engineer, adequate relief from this duty can be obtained for the co-pilot.

(5) All crew members face forward and have convenient access to each other for conversation, coordination, and cross handling of various functions, when required.

b. That the following changes in the arrangement shown in drawing 7A be considered:

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1-2 Cons. Gen.
1-(6/7 ppl)
Bomb Ab. Br., Air.

AG 452 A3 1st Ind
Subject: Crew Arrangement on Advanced Types of Strategic Bombers

(1) The position of the pilot and the co-pilot be interchanged to place the pilot in the rear, and that one of the three seats on the pilot deck be eliminated.

(2) The levels of the pilot's and co-pilot's flight deck be arranged and the seats be adjustable so that the pilot is afforded maximum vision regardless of the stature of any individual occupying these positions. By placing the pilot to the rear of the co-pilot, he has better access to his entire crew for purposes of monitoring and coordinating their activities, and giving necessary commands, either visually or verbally.

(3) The flight engineer panel be placed to the left of the co-pilot at such an angle that it may be conveniently viewed by the pilot.

c. That in order to provide for maximum crew comfort, convenience, and efficiency, the following be considered:

(1) An instrument lighting system be provided which will be less fatiguing than the present system, when used over long periods of time. It is suggested that an indirect, individual lighting system for each instrument be devised with controllable intensity which will illuminate the entire dial rather than causing only the calibrations and indicator hands to stand out, as in the present fluorescent system.

(2) A hood be provided for each instrument, or the entire instrument panel, to prevent reflection on the canopy, or that a non-reflecting type canopy be provided, if such a material is available.

(3) A transparent panel be provided at the navigator position to permit adequate visual checking of aircraft position when weather conditions permit.

(4) The cabin and individual crew position lighting systems be so designed to give each individual crew member adequate light to perform his duties without interfering with the other crew members.

(5) The rear portion of the cabin be of sufficient size to accomodate such RCM, communications, and electronics equipment as is necessary to be adjusted in flight.

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1-2 Adm. Encl
1-(7/7 Sep)
Engr Air, Bomb Res

AG 452 A3 - 1st Ind
Subject: Crew Arrangement on Advanced Types of Strategic Bombers

(6) Ejection type seats be designed to be fully adjustable and fully reclining to allow relaxation of crew members in the crew position. Also, harness and safety straps be designed to be quickly attached, but not necessarily worn throughout the flight, and in such a position to present minimum interference with the crew member while not worn.

(7) Seats and parachutes be designed so that essential arctic, tropical, or water survival equipment is attached and is available after ejection.

(8) Folding or collapsable, comfortable bunks be provided. It is suggested that these might be placed in the passageway along the right hand side of the pilot deck.

(9) Provision be made for an adequate, fully controllable cabin air conditioning system.

FOR THE COMMANDING GENERAL:

/s/ G. J. deCisneros
G. J. deCISNEROS
Major, USAF
Asst Adjutant General

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1 thru 3 w/d

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON

13 February 1948

MEMORANDUM FOR THE DEPUTY CHIEF OF STAFF, MATERIEL

SUBJECT: Development of Heavy Bombardment Aircraft

1. In an effort to clarify the procedure for development of the Heavy Bombardment Aircraft to meet the revised military characteristics for Heavy Bombardment Aircraft, a chronological history of events leading to the present status has been compiled and is presented for your information.

a. "Report on Heavy Bombardment" by the Heavy Bombardment Committee of the USAF Aircraft and Weapons Board was prepared and circulated in November 1947. This report contained the recommendation that the development of the XB-52 in the present configuration be discontinued. In addition, the revised military characteristics for a Heavy Bombardment Aircraft were presented in this report.

b. The aforementioned recommendation and revised military characteristics were the subject of a conference held on 1 December 1947, attended by Generals Chidlaw, Carroll, and Crawford of Air Materiel Command, Generals Partridge, Power, and Smith of Deputy Chief of Staff, Operations, and Generals Powers and Craigie of Deputy Chief of Staff, Materiel. The decisions reached at this conference were:

(1) General Smith, as Secretary of the USAF Aircraft and Weapons Board, would take immediate steps to have the revised military characteristics for the new heavy bomber approved by getting the concurrences of General Kenney, General McNarney, and General Vandenberg only.

(2) When these characteristics were approved, the Secretary of the Air Force would be requested to make the decision as to whether the awarding of the contemplated contract should be on a competitive basis or merely change order the existing XB-52 contract now with Boeing. The recommendation to the Secretary of the Air Force would be to award a new contract on a competitive basis.

c. General Vandenberg gave written approval of the recommendation to discontinue development of the XB-52 in its present configuration, and approval to the revised military characteristics on 8 December 1947.

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Memorandum for the Deputy Chief of Staff, Materiel
Subject: "Development of Heavy Bombardment Aircraft"

d. The recommendation that a new contract for development of a Heavy Bombardment Aircraft to meet the revised military characteristics was forwarded in a memorandum to the Secretary of the Air Force. This memorandum was signed by the Vice Chief of Air Staff.

e. Verbal approval of the recommendation as contained in paragraph d was given by the Under Secretary of the Air Force.

f. Air Materiel Command was advised of the decision to proceed with the development of a Heavy Bombardment Aircraft to meet the revised characteristics and to award a contract on competitive basis, by letter, subject, "Heavy Bombardment Aircraft", dated 9 December 1947. (Copy attached as Tab A).

g. The aforementioned decision was reversed by verbal agreement between the Under Secretary of the Air Force, General Craig, and General Craigie following receipt in this headquarters of a cable dated 30 December 1947 from Air Materiel Command over the name of General McNarney requesting that the decision to award a new contract on a competitive basis be reconsidered. A copy of this message is attached as Tab B. In addition, the Secretary of the Air Force was in receipt of a letter from Mr. William Allen of the Boeing Company protesting the decision to award a new contract on a competitive basis. Copy of the letter from Mr. Allen is attached as Tab C.

h. Air Materiel Command was advised of the new decision to continue the development of the Heavy Bombardment Aircraft with the Boeing Company under the existing XB-52 contract. This decision was forwarded to Air Materiel Command by TWX WAR 93273 dated 31 December 1947, copy attached as Tab D.

i. The Secretary of the Air Force replied to the letter from Mr. Allen of the Boeing Company by letter dated 26 January 1948. The Secretary of the Air Force's letter stated that the Air Force desired to withhold confirmation of the tentative decision to modify the existing XB-52 contract. Copy attached as Tab E.

j. The Secretary of the Air Force's letter to Mr. Allen indicated a possible future divergence from the then existing plan. It definitely indicated that the existing directive was not firm. Consequently, Air Materiel Command was advised by cable to discontinue any

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...Chief of Staff, Materiel
Subject: "Development of ... Heavy Bombardment Aircraft"

...rther discussions or negotiations with the Boeing Company on this ... (Copy of this enclosure attached as Tab F).

2. In view of the circumstances outlined above, the development of a Heavy Bombardment Aircraft to meet the new military characteristics is presently held in abeyance.

L. C. CRAIGIE
Major General, U. S. Air Force
Director of Research & Development
Office, Deputy Chief of Staff, Materiel

Enclosures:
Tab A As listed.
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HqAMC Form No. 10-514 (Rev 10 Sep 46)
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HEADQUARTERS
AIR MATERIEL COMMAND

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL, AIR MATERIEL COMMAND, ATTENTION FOLLOWING OFFICE SYMBOL:
MCRE (MCRECA2)

WRIGHT FIELD, DAYTON, OHIO
13 February 1948

SUBJECT: Heavy Bombardment Configuration

To Central Files
Replied to by TWX WAR # 1717 Feb 18 1948

TO: Chief of Staff, USAF
Washington 25, D. C.
Attn: Deputy Chief of Staff
Materiel

1. The recent presentation of Mr. J. K. Northrop to Headquarters, USAF, claims marked superiority of the wing-type airplane over the conventional airplane. These claims are of such order that the Air Force must resolve the question of building the heavy bomber as a "wing" or conventional airplane. In resolving this problem, it should be clearly recognized that it is a problem of technical evaluation of relative merits. If the Air Force should dictate the continuance of the heavy bomber as a wing-type airplane, such development could be accomplished by any of several of the large airplane contractors, as well as Northrop Aircraft.

2. It is important in considering this problem to consider the premise upon which the Northrop and N.A.C.A. analyses are based. This premise is that the space requirements for the military stores are coincident with the space available in the optimum wing. Studies by the Air Materiel Command and various aircraft companies have indicated that under this condition the pure wing airplane is more efficient than the conventional airplane. However, the space required to house the military stores required by the military characteristics for medium and heavy bombardment aircraft is not coincident with the space available in the optimum wing to accomplish the range, speed and weight carrying requirements demanded by either of these military characteristics. Therefore, a nacelle or body must be added to contain these military stores. The conclusions of N.A.C.A. Report 1177 are invalidated by this configuration change, for as stated by this report "None of the bombers considered in the present comparison were small enough to be limited by the space available. Therefore, the tailless airplanes were always shown to have much better performance than either the tail boom or the conventional airplane." It would be possible to deviate from the optimum wing size to such an extent that it would be small enough to contain these military stores. However, a much more efficient solution would be the addition of the nacelle or body to the smaller

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size wing permitting the carrying of required military stores. In the medium bomber competition, this is exactly what Northrop Aircraft has done in its proposal. The body required in this case is 74 feet and is compared with the fuselage of a B-29 under Tab A. Also, under Tab A. is a similar comparison of the body size requirement as estimated by Boeing for the optimun tailless airplane to meet the heavy bomber requirements. The addition of this body, although presenting the optimum tailless airplane, ceases to be an all-wing airplane and loses the advantages of the all-wing airplane. Using Northrop's uncorrected figures and comparing them with two other contractors submitting conventional designs, it is clearly demonstrated that no superiority of the wing exists when equipment requirements are such as to preclude the designs being a pure wing. A comparison of Northrop designs submitted in the medium bomber competition, with those of two other contractors is contained under Tab B. Also under this Tab is contained a similar performance comparison of a wing and conventional design to meet the heavy bomber requirements based on a Boeing all-wing study. It is interesting to note that this is the first real comparison of a wing-type airplane and a conventional-type airplane designed to do the same job.

3. In that it is apparent that no marked superiority exists in going to a wing-type airplane, it is considered good business to continue with the design which has the fewest unsolved problems. The wealth of data accumulated in the aircraft industry, the N.A.C.A. and the Air Materiel Command is essentially based on the solution of problems pertaining to conventional aircraft. Although the Northrop B-49 has demonstrated high altitude speeds in the order of 500 MPH, the problem of high speed longitudinal stability on a swept pure wing airplane is unexplored, and it is believed will present severe problems. The N.A.C.A. Technical Report 1477 states that consideration has not been given to the problem of compressibility at high speed and implies that the problem will be more serious and difficult to solve on the all-wing airplane. Boeing's experience gained through extensive wind tunnel tests on the swept B-47 wing confirms this implication. Further, the problem which has compromised the B-35 position so severely, namely, that of pusher propellers, is still unsolved. While these and other problems are in no way insurmountable, it is evident that a time consuming problem must be pursued to assure the development of a satisfactory airplane.

4. With further reference to the two major problems confronting the flying wing, namely, pusher dual rotation propellers and high speed stability and control, it is logical to assume that these problems could eventually be solved. The weight increase on the propellers and the weight and drag increase associated with the development and installation of devices to give equivalent stability and control to the flying wing, are factors which are difficult to estimate at the present time but which could well grow to the extent that any theoretical gains claimed for the flying wing could be estimated.

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Ltr, AMC, to Wash. 25, D. C. dated 13 February 1948,
subject, "Heavy Bombardment Configuration"

5. Irrespective of the original requirements for tactical aircraft, it has been repeatedly demonstrated by tactical groups that airplanes will be tactically employed to their fullest versatility. The wing is much more sensitive to loading changes, i.e., changes of center of gravity and, therefore, has a considerably less utility of loading. Further, airframe changes to accommodate future changes in bomb configurations or guided missiles can be more readily handled in the conventional airplane than in the wing-type airplane.

6. In summary, approximately the same weight airplane will be required, whether of conventional or flying wing design, to meet the current heavy bomber characteristics. The vast amount of engineering data possessed by the N.A.C.A., Air Materiel Command and the aircraft industry is on conventional type aircraft, thus, making the solution of problems associated therewith more feasible. The definite problems associated with the flying wing, such as pusher dual rotation propellers, high speed stability and control, stable high altitude bombing platform and versatility in accommodating various shapes and weights of required military load does not justify from either a National security or National economy standpoint the reliance on this type of design as the sole design in the heavy bomber field, which field is already critical from a monetary and timewise standpoint. In consideration of the factors and in view of the strategic planning which will be predicated on this country's having heavy bombers meeting the current military characteristics at a given time, it is strongly recommended by the Air Materiel Command that the course of action be followed which will offer the best possibilities of solving the engineering problems associated with this development within the given time period. This planning definitely dictates a conventional design for the heavy bombardment airplane currently under discussion.

7. It is, therefore, recommended that the directive contained in Joint Chiefs of Staff message number WAR 94961, dated 30 January 1948 be rescinded and that the XB-52 continue to be accorded the highest possible support from Headquarters, USAF.

FOR THE COMMANDING GENERAL:

F. O. CARROLL
Major General, USAF
Director, Research & Development
Engineering Division

Attachments:
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2. [illegible]

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON

17 February 1948

MEMORANDUM FOR: Vice Chief of Staff

Subject: Capability of B-52 to Perform Long Range Strategic Mission

1. During the B-52 conference in the Air Room on 14 February, certain statements were made by a representative of Deputy Chief of Staff, Operations, which cast some doubt on the ability of the B-52 to perform the special strategic A-Bomb mission. It is the purpose of this memorandum to clarify this situation. In a conference, this date, in my office, attended by General F. H. Smith, General L. C. Craigie and myself, it was agreed that if the B-52 meets the requirements of the contract under which it is being bought, it will satisfy strategic requirements. The essential performance characteristics specified by the Heavy Bombardment Committee of the Weapons Board, and which Boeing has agreed to meet, include a range without refueling of 8,000 statute miles and a sustained cruising speed of 500 miles per hour at 35,000 feet over 4,000 miles of enemy territory (2,000 in, 2,000 out).

2. The operating radius of the airplane refueled will depend upon the point at which the refueling is accomplished. General Smith, representing the Deputy Chief of Staff, Operations, concurs in the statement that the B-52 will satisfactorily perform the long range strategic mission.

H. A. CRAIG
Lieutenant General, U.S.A.F.
Deputy Chief of Staff, Materiel

CONCURRENCES:

AFORO Partridge

AFMPD LC Craigie 17/2 USAF

Noted by VC

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15.7 Contractual Corres. 14
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Bomb. Pr., Eng. Div. COPY

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Priority [Appears 18 Feb. 1948]

FROM: Washington Spd AFCOR 18211[illegible]2

TO: CGAMC Attn General Alden R. Crawford

IN REPLY CITE: AFDDC 1817

Confirming the decision reached at the conference in this Headquarters 17 February 48 between Deputy Chief of Staff, Material, representatives of the Deputy Chief of Staff, Operations, and your Command, it is the desire of this Hqs that the development of the heavy bombardment aircraft be continued with the Boeing Aircraft Company under the new existing XB-52 contract. In view of the above, instructions contained in WAR 94061 dated 30 January 47 to your Command are rescinded. The Under Secretary of the Air Force has voiced the opinion that this program should be pushed vigorously.

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AF HQ-53 (20 MAY 44)
1-(2-Apr)

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HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	OTC
FILE NO	

SUBJECT: Heavy Bombardment Aircraft

TO: Requirements Division, Director of Tac. & Req., DC/S

DATE 19 February 1948

COMMENT No 1

FROM: Director of Research & Dev., DC/S, Materiel — Major W.D.Bruce/dkm/43735

Reference: Military Characteristics for Heavy Bombardment Aircraft, dated 3 December 1947

1. Attached is a copy of letter from Air Materiel Command, subject as above, dated 26 January 1948. This letter requests that certain changes be made in the referenced characteristics.

2. The comments of this office in regard to the requested change as listed in paragraph 8 a through d are as follows:

8a. As the prime requisite in the design of subject aircraft is range, with a minimum speed over enemy territory of 300 m.p.h, cruising speed defined as "block cruising speed for from 1737 nautical miles to 5210 nautical miles" is considered acceptable.

8b. Actually, 8000 statute miles when divided by the conversion factor of 1.151553 converts to 6947 nautical miles.

8c. In view of the information furnished, it [illegible] 15,000 pounds is a more realistic bomb load.

8d. Although it is felt to be undesirable to have crew interchangeability limited to unpressurized flights, this appears to be one of the compromises which will be necessary to meet the requirements.

3. It is requested that your office review the requested changes and forward your concurrence and/or comments to this office at the earliest practicable date.

1 Incl.
As listed

L. C. CRAIGIE
Major General, U. S. Army Air Force
Director of Research & Development
Office, Deputy Chief of Staff, Materiel

AF TD-3 [illegible]

AF TD-3B Maj W D Bruce

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Communication Number		Indicate Whether This Is An Original Communication Or An Answer By "O" or "A"
Date 25 FEBRUARY 1948		A

To	Sig., Rank, and Title of Originating Officer	Sig., Rank, and Title of Officer Authenticating Content and Classification
CHIEF OF STAFF UNITED STATES AIR FORCE WASHINGTON 25, D. C. ATTN: Deputy Chief of Staff, Materiel	JAMES A. BOYKIN, JR., ASS'T CHIEF, BOMBARDMENT BRANCH Phone No. of Sender 7-4305/JAB/emh	WILLIAM M. MORGAN Brigadier General, USAF Chief, Engineering Operations Engineering Division

SUBJECT IS XRAY BAKER DASH FIVE TWO CMA REFERENCE MIKE ABLE FOX MIKE DOG CHARLIE ONE SEVEN ONE SEVEN CMA DATED ONE EIGHT FEBRUARY PD IN ACCORDANCE WITH REFERENCED TELETYPE CMA THIS PROJECT IS BEING ACCORDED HIGH PRIORITY AND FOLLOWING ACTION IS BEING TAKEN BY THIS COMMAND CBN PAREN ABLE CHANGE ORDER THE REMAINDER OF FUNDS FROM FISCAL YEAR ONE NINE FOUR SIX AND ADD FIVE NINE TWO ZERO ZEROZZERO DOLLARS TO COMPLETE PHASE ONE OF MIKE XRAY DASH EIGHT THREE NINE CONFIGURATION PD ESTIMATE COMPLETION DATE FOR PHASE ONE AUGUST ONE NINE FOUR EIGHT PD PAREN TO COMGENAIR FOR DEPUTY CHIEF OF STAFF CMA MATERIEL FROM COMGENAMC PAREN PAREN BAKER PARTY CHANGE ORDER THE WORK NOW ON CONTRACT IN THE AMOUNT OF TWO CMA EIGHT NINE TWO CMA FIVE EIGHT SEVEN DOLLARS FROM FISCAL YEAR ONE NINE FOUR SEVEN FUNDS TO MAKE APPLICABLE TO THE NEW MIKE XRAY DASH EIGHT THREE NINE CONFIGURATION PD PAREN CHARLIE PAREN CONTRACT FOR CONTINUATION OF PARTIAL PHASE TWO IN THE AMOUNT OF FOUR CMA FIVE ZERO ZERO CMA ZERO ZERO ZERO DOLLARS PAREN APPROXIMATE PAREN FROM FISCAL YEAR ONE NINE FOUR EIGHT FUNDS.

Distribution of Copies: MCREQA-2, MCAAGR-21

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HqAMC Form No. 10-514 (Rev 10 Sep 46)

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IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL, AIR MATERIEL COMMAND, ATTENTION FOLLOWING OFFICE SYMBOL:

MCREOA(MCREOA-2)

HEADQUARTERS
AIR MATERIEL COMMAND

MCREOA-2/JAB/emh
WRIGHT FIELD, DAYTON, OHIO
27 February 1948

SUBJECT: Crew Arrangements and Crew Responsibilities, XB-52 Airplane

TO: Chief of Staff
United States Air Force
Washington 25, D. C.
ATTN: Deputy Chief of Staff, Materiel

1. The mock-up inspection was completed on the XB-52 airplane 30 January 1948. Numerous studies have been completed by Boeing of crew arrangements, from which fairly complete crew compartment mock-ups of the three better arrangements were constructed and were available for this inspection. Although these mock-ups were predicated on the 480,000 pound XB-52 configuration, the basic fuselage outline and pilot and co-pilot arrangements are in general applicable to the new XB-52 configuration. In order to meet the planned program for this airplane, it is necessary that the mock-up inspection of the final crew arrangement be held in July 1948. To meet this date, the AMC must give the Contractor a firm fix on the mock-up configuration in the immediate future. Before this can be done, however, complete concurrence between the AMC, Strategic Air Command and Training Command must be achieved, in order that once a configuration is established the project can be actively pursued without fear of re-arrangement of the basic crew members.

2. Basic problems confronting both the XB-52 and the new medium bomber are (a) location and definition of functions and responsibilities of the two bombardier-navigators, (b) the determination of the necessity of a flight engineer on these respective airplanes. With reference to the bombardier-navigator problem, two of the XB-52 mock-ups and studies by the AMC indicate that the diameter of both the medium and heavy bombers is so small that it precludes a satisfactory side-by-side arrangement of these two crew members in the nose of the airplane with adequate space, without excessive weight and drag penalties. This conclusion was presented in AMC Memorandum Report TSEAC-44621-5-3, dated 19 December 1947, subject: "Design Requirements of HB Forward Crew Compartment". Also, due to the bulk of equipment required by the bombardier, it is questionable whether worthwhile auxiliary scanning vision can be provided for either a single bombardier-navigator or a dual side-by-side or staggered ar-

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(Office)

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Ltr, AMC, 27 Feb 48, to Chief of Staff, USAF, subj: "Crew Arrangements and Crew Responsibilities, XB-52 Airplane"

rangement of the bombardier-navigator in the nose of either the medium or heavy bomber. Due to the speed and altitude at which bombs will be released in these aircraft, it is the opinion of many that practically all of the bombing will be accomplished by radar and that visual bombing will only be resorted to in the event that enemy jamming precludes the use of radar bombing on a particular mission. It then follows that it may be preferable to favor a side-by-side arrangement of the two bombardier-navigators located in the rear section of the forward pressurized compartment where ample space and adequate coordination between these two members can be provided. Either this arrangement or a single bombardier-navigator's position in the nose of the airplane with the alternate position in the aft section of the forward crew compartment can be satisfactorily arranged, and the choice, it is believed, should be largely dependent upon the willingness of the using agencies to trade questionable auxiliary scanning vision in the forward arrangement for more convenient and superior functional arrangement in the aft section of the forward crew compartment.

3. With reference to the flight engineer's position, it is believed that the B-29 aircraft has established a precedent which has resulted in the definite requirement for a flight engineer in the medium and heavy bombers. It is considered that this requirement should be reviewed in the light of the power plant installation, which will be used on the new aircraft. It is anticipated that the heavy bomber will be equipped with the new Wright turbo propeller power plant.

4. It is considered that the necessity for a flight engineer must be carefully reviewed in light of the new engine installation, in consideration of the fact that satisfactory experience has been had in two six-engine jet aircraft without the use of a flight engineer. It has been achieved. However, this problem must be [illegible] training program.

5. In view of the necessity to reduce the weight of medium and heavy bombers to an absolute minimum, [illegible] duties must be carefully analyzed to determine if the tasks of [illegible] cannot be provided [illegible]

6. In an effort to arrive at a satisfactory arrangement of [illegible] the Strategic Air Command, Tactical Air [illegible] all other interested agencies to [illegible] config[illegible] that will [illegible] [illegible] ment [illegible] [illegible] shown that [illegible]

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[illegible] will be available [illegible]

[illegible] proposed that [illegible] be established [illegible] resolve the subject problem. It is requested that the AMC be advised of the names of personnel [illegible] Headquarters, USAF, Tactical Air Command, Strategic Air Command [illegible] Training Command who will participate in this meeting. The success of this meeting will largely depend upon assembling personnel who will have authority to effect complete concurrence on the spot with the arrangement naturally considered to be the most acceptable.

FOR THE COMMANDING GENERAL:

C. F. Tutt

ALDEN R. CRAWFORD
Major General, USAF
Chief, Engineering Division

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HEADQUARTERS, UNITED STATES AIR FORCE
Office, Deputy Chief of Staff, Materiel

Inter-Desk Memorandum

TO: GENERAL CRAIGIE

DATE 1 March 1948

SUBJECT: XB-52 Project

Major Brady/bkw/6235

Reference: WAR 1717 AFMDC, dated 18 February 1948 (copy attached).

1. In accordance with instructions from this headquarters to Air Materiel Command contained in referenced teletype, this project is being accorded high priority and following action is being taken by the Air Materiel Command:

a. Change order the remainder of funds from Fiscal Year 1946 and add $592,000 to complete Phase I of MX-839 (B-52) configuration. Estimated completion date for Phase I is August 1948. (DCS/M from CG, AMC).

b. Change order the work now on contract in the amount of $2,892,587 from Fiscal Year 1947 funds to make applicable to the new B-52 configuration.

c. Contract for continuation of Partial Phase II in the amount of $4,500,000 (approximate) from Fiscal Year 1948 funds.

J. S. Holtoner

1 Incl.
As above

J. S. HOLTONER
Colonel, U. S. Air Force
Chief, Aircraft Branch

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B-52
452.1 VHB
Vol. 2, 1948
CF-Wash.
(1/3 pp)

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AFORQ/B
LtColThorup/cem/71608
Wrtn: 1 March 48

3 MAR 1948

SUBJECT: Military Characteristics for Heavy Bombardment Aircraft

TO: Deputy Chief of Staff, Materiel

1. The following principal characteristics for Heavy Bombardment Aircraft are approved:

a. Class - High speed, high altitude, land airplane.

b. Mission - The destruction of surface military targets by atomic bombs.

c. Requirements -

(1) Performance

(a) High Speed at Tactical Operating Altitude (at design gross weight condition less one-half fuel)	478+ knots desired 435+ knots required
(b) Tactical Operating Altitude (at design gross weight condition less one-half fuel)	45,000 feet desired 40,000 feet required
(c) Service Ceiling 1/2 Engines (at design gross weight condition less one-half fuel)	20,000 feet
(d) Range at Design Gross Weight Condition (4,000 N.M. Radius)	9,500 N.M.
(e) High Cruising Speed (High cruising speed must be maintained over the 4,000 N. Miles subsequent to the first 2,000 N. Miles of flight. Lower cruising speeds are acceptable for balance of flight)	478 knots desired 435 knots required
(f) Take-Off over 50-foot Obstacle at design gross weight condition (without assisted take-off devices)	6,500 feet desired 9,000 feet required

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B-52
452.1 VHB
Vol. 2, 1948
CF-Wash.
(2/3 rp)

Subj: Military Characteristics for Heavy Bombardment Aircraft

(g) Landing over 50-foot Obstacle at design gross weight condition	6,500 feet desired 9,000 feet required
(h) Average Bomb Load	15,000 Lbs.

(2) If, after the above requirements have been met, additional performance may be realized, consideration in the design of this aircraft for utilizing this performance should be given to increased cruising speed.

d. Armament

(1) Guns - tail only (radar controlled) (arc of fire from wing tip to wing tip)

(2) No armor protection required except for engines.

e. Crew

(1) The crew (of six) shall consist of a pilot, relief pilot (radio operator), bombardier-navigator, weaponeer (bombardier-navigator), engineer, and one (1) gunner (radio operator).

f. Equipment

(1) Instruments and navigation equipment shall be the minimum consistent with the requirements for effective day and night operations of the airplane on military missions under all weather conditions. The best radar-visual bombsight is required. RCM equipment is required.

g. Structure and Design Features

(1) Simplicity of design and suitability to production should be emphasized.

(2) All-around purging required. Self-sealing required for all fuel except that which is used in the first 2,000 miles of flight.

(3) This aircraft design must incorporate wheel loadings suitable for continuous operation from Limestone Air Force Base.

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Vol. 2, 1 of 5
CF-Wash.
(3/3 pp)

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Subj: Military Characteristics for Heavy Bombardment Aircraft

h. Reconnaissance Provisions

(1) The design of the aircraft should permit production line changes to be made which will provide the Special Equipment Installations and Tactical Capabilities envisaged by current military characteristics for Strategic Reconnaissance aircraft. In conversion for reconnaissance utilization emphasis will be placed upon increasing the speed and altitude performance of the aircraft.

FOR THE CHIEF OF STAFF:

Leslie O Peterson
Colonel, USAF

LESLIE O. PETERSON
Colonel, USAF
Chief, Requirements Division
Directorate of Training & Requirements

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[redacted]

CLMT-C
Col. Eckert/ Lt. Col. Crabb:y/mr/71673

5 March 1943

[redacted]

[redacted] consists of, under date of until June 30 [redacted] A.A.F. [redacted] that time that they have, if [illegible].

[redacted] [illegible] Control, [illegible] Maintenance, [illegible], Director of Service, [illegible], and [illegible], and [illegible].

[redacted] [illegible] 3-12 to 3-119 is [illegible] from [illegible]. [illegible] has been [illegible] [illegible] of [illegible] [illegible] [illegible]

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8 March 1948

"Mock-up Inspection of Boeing Airplane Company--XB-52 Airplane"

Aircraft Projects Section

MCRECA-2-1403

U37-038 ac-15065

426-253

A. PURPOSE:

1. To report on the mock-up inspection of the XB-52 airplane held at Boeing Airplane Company, Seattle, Washington from 26 January through 30 January 1948.

B. FACTUAL DATA:

2. The personnel, other than those of the Boeing Airplane Company, attending the mock-up inspection were as follows:

Committee Members

Lt. Col. L. M. Sowers - Office, Deputy Chief of Staff
Major W. C. Williams - Armament Laboratory
Mr. J. A. Boykin - Aircraft Projects Section
Mr. R. E. Murnert - Maintenance Division

Technical Advisors

Colonel C. S. Irvine - Strategic Air Command
Colonel Stuart F. Wright - Strategic Air Command
Major W. P. Clarke - Flight Safety Division
Major F. C. Auten - Flight Safety Division
Major J. M. Townsend - Flight Test Division
Captain R. D. Smith - Flight Test Division
Captain A. I. Thayer - Armament Laboratory
Captain F. W. Peckstrom - Equipment Laboratory
1st Lt. D. R. Smith - Flight Test Division
J. F. Rowland - Equipment Laboratory
J. P. Rendack - Equipment Laboratory
L. V. Larson - Equipment Laboratory
R. C. Johnson - Aircraft Laboratory
John Carrell - Aircraft Laboratory
M. A. Bennett - Power Plant Laboratory

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"Mock-up Inspection of Boeing Airplane Company XB-52 Airplane" dtd 8 March 1948

Technical Advisors (Cont'd)

H. R. Shows	- Power Plant Laboratory
J. A. Vileti	- Power Plant Laboratory
J. E. Scott	- Systems Laboratory
R. I. Ring	- Aero Medical Laboratory
G. W. Bollinger	- Aircraft Projects Section

Observers

E. V. Farrar	- Wright Aeronautical Corporation
H. E. Moerman	- Wright Aeronautical Corporation

3. The XB-52 airplane as presented in the mock-up was a high altitude, heavy bombardment airplane with a design gross weight of approximately 400,000 pounds, representing an airplane with performance in accordance with the requirements of "Military Characteristics for Heavy Bombardment Aircraft" dated 25 November 1945, as revised 8 October 1946, built in accordance with Boeing Airplane Company Document No. D-7527 dated 19 April 1946 and revised 21 April 1947, which constituted the governing mock-up specification. The airplane was to be powered by four XT-35-W-3 turbo-prop units with single rotation propellers. The crew consisted of pilot, co-pilot, engineer, navigator, flight engineer, radio operator-gunner, forward gunner, aft gunner, and one auxiliary crew member. All crew members were located in a forward pressurized compartment of the airplane. The armament system consisted of a 2-gun, 50 caliber, retractable lower forward deck turret, and a 4-gun, 50 caliber tail turret. All turrets were power operated and remotely controlled from the forward pressurized compartment by optics and radar. The landing gear was of the bicycle type, four dual gears in tandem with one dual wheel outrigger on each wing. Prior to the inspection, the performance requirements for the airplane were changed to conform with "Military Characteristics for Heavy Bombardment Aircraft" dated 8 December 1947. However, the inspection was conducted on the previous configuration in the interest of salvaging as much as possible of the work already accomplished and with the purpose of enabling detail requirements to be injected into the new configuration so as to effect a time savings later in the program.

4. The inspection was conducted on one wood mock-up of the fuselage, the empennage and the right half of the wing and four additional nose mock-ups depicting various crew arrangements. Since the new

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"Mock-up Insrection of Boeing Airplane Company XB-52 Airplane" dtd 8 March 1949

configuration embodies reduced crew, reduced armament, reduced range, reduced weight and increased speed, considerable emphasis was placed on crew arrangement. Of the five crew arrangements presented, the three most promising were selected for further discussion with respect to the new configuration requirements. The Contractor prepared several drawings during the discussion which incorporated modifications to the three basic configurations as they were suggested. Drawings of these revised arrangements are presented in Appendix IV. The order of preference expressed by the Mock-Up Committee for the arrangements presented on the drawings was: Cab #7B, #7A, #6B, #6A, #5A, #7C, and #6C. The arrangement designated as Cab #7B was selected as most desirable because it appeared to be able to absorb a greater number of the detail requirements discussed during the inspection with the least compromise to the airplane than any other arrangement.

5. Requests for studies or changes to the mock-up were submitted on prepared forms by individual members of the committee. The committee reviewed each request with the Contractor and decided on the desired action to be taken. The results of these decisions are presented in Appendices I, II, and III of this report. Those items in Appendices with "Cab No. ____" in the subject are applicable to the airplane in general, but apply only wherein they are applicable to the final configuration of the airplane decided upon. This decision shall be made at a later date.

6. CONCLUSIONS:

6. The mock-up represented an airplane with performance requirements in accordance with "Military Characteristics for Heavy Bombardment Aircraft," dated 27 November, as revised 8 October 1948. However, with the exception of crew arrangements, possible changes in external appearance, increased bomb bay size and various other modifications, the engineering data and considerations expressed in the mock-up are applicable to the new requirements even though a complete new mock-up will be required.

7. Considerable emphasis was placed on crew requirements and arrangements, particularly on the bombardier-navigator's position, by the Contractor and it is evident from the mock-up and a large number of lay-outs, that the space available in the nose of the airplane, as dictated by aerodynamic considerations, is not adequate to house two bombardier-navigators and their required equipment in a manner conducive to efficient operation nor is there sufficient room for crew members to maneuver for a safe escape in case of emergency.

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"Mock-up Inspection of Boeing Airplane Company XB-52 Airplane" dtd 8 March 1948

D. RECOMMENDATIONS:

8. That a contract change-order be issued providing for the discontinuance of work on the mock-up configuration presented and for the initiation of a new Phase I development, including a new mock-up, of an airplane in accordance with Air Materiel Command Document entitled, "Design Requirements for Heavy Bombardment Aircraft," dated 5 January 1948.

9. That the Contractor consider the changes and detail requirements outlined in Appendix I in the pursuance of the new design.

10. That the Contractor conduct the studies outlined in Appendix II.

11. That the responsible laboratories of the Air Materiel Command initiate and conduct the studies, and establish policies where required as outlined in Appendix III.

12. That a conference be held as soon as possible between all the interested parties to select one of or a modification of one of the configurations presented in Appendix IV for application on the subject airplane.

/s/ F. I. Thomas
Prepared By: F. I. THOMAS, Major, USAF

/s/ G. M. Bollinger
Prepared By: G. M. BOLLINGER

Approved By: F. S. WARREN, Lt. Col., USAF
Chief, Bombardment Branch

Approved By: GEORGE E. SMITH, Col., USAF
Chief, Aircraft Projects Section
Engineering Division

Distribution:
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8 March 1943

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1. [illegible] characteristics for the [illegible] aircraft [illegible] co[illegible] i[illegible] [illegible] [illegible] [

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11 MAR 1948

Mr. William M. Allen
Boeing Aircraft Company
Seattle, Washington

Dear Mr. Allen:

This will acknowledge receipt of your letter of 6 February, which received the consideration of the Air Staff during my absence from Washington. In your letter you outlined the results of your recent discussions on the use of all-weather type aircraft for [illegible] operational requirements for heavy bomber operations.

A revised operational requirement, submitted by you on 4 March, and additional data requested by the Air Material Command, a decision has been reached to modify the present XB-52 contract, now held by your company, in such a manner as to result in an aircraft which meets the modified military characteristics as formulated by the Long Range Requirement Sub-committee of the USAF Aircraft and Weapons Board.

I wish to thank you for your letter and your deep interest in this matter which so materially affects the accomplishment by the United States Air Force of its mission in our national defense. We cannot urge too strongly that you exert every effort to accelerate the development of this most important aircraft.

Sincerely yours,

(signed) W. Stuart Symington

W. STUART SYMINGTON

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HEADQUARTERS
AIR MATERIEL COMMAND
Wright-Patterson AF Base
WRIGHT FIELD, DAYTON, OHIO

11 MAR 1948

SUBJECT: Request for Permission to Negotiate
Purchase Request No. 63002

TO: Chief of Staff
United States Air Force
Washington 25, D. C.

Attn: Director of Procurement & Industrial Planning
Office, Deputy Chief of Staff, Materiel

1. Pursuant to Joint Procurement Regulation 4-201, there is forwarded a proposed statement of the required findings and determination, prepared for signature of the Under Secretary of the Air Force, requesting authority to negotiate the following procurement:

a. Contractor: Boeing Airplane Company, Seattle 14, Washington.

b. Services: Conduct Phase I design studies of the long-range bombardment airplane described in AMC Report entitled "Design Requirements for Heavy Bombardment Airplanes" dated 6 January 1948 in accordance with Contractor's Document No. D-8852 dated 14 January 1948. In connection therewith furnish design data, engineering data, drawings, wind tunnel test report, mock-up, and photographs.

c. Prices: A firm quotation has been negotiated on a Cost-Plus-A-Fixed-Fee basis at an estimated cost of $529,377.00, plus a Fixed-Fee at 6 1/2% of $34,409.50, total $563,786.50.

d. This procurement will be chargeable to 1948 Fiscal Year Funds.

e. Additional Information:

(1) This is a research and development procurement. The original XB-52 Phase I development program is being extended in order to incorporate the revised tentative military characteristics for heavy bombardment aircraft as directed by Headquarters, USAF, under date of 8 December 1947.

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(2) There has been invested to date $1,785,176.00 on the Phase I program of the XB-52 model.

(3) It is expected that the amount in this request will complete Phase I development.

(4) No progress has been accomplished on this procurement.

f. Boeing Airplane Company, Seattle 14, Washington, has been designated as sole source since it is the designer of the USAF model XB-52 airplane.

g. This procurement is necessary in order to bring the design of the heavy bombardment airplane, USAF model XB-52, up to the desired military characteristics as directed by Headquarters, USAF.

2. The services to be furnished are of a research and development nature, are covered by Project No. 611-1 on the approved Research and Development Program, and are within the scope of Joint Procurement Regulation 4-112.

FOR THE COMMANDING GENERAL:

A. A. SHEPARD
Brigadier General, USAF
Chief, Procurement Division

Incl:
Statement

APPROVAL RECOMMENDED:

K. B. WOLFE
Major General, USAF
Director, Procurement and
Industrial Mobilization Planning

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DEPARTMENT OF THE AIR FORCE

Office of the Under Secretary

18 MAR 1948

Findings and Determination

1. The USAF proposes, under Purchase Request No. 63002, to enter into a contract with the Boeing Airplane Company, Seattle 14, Washington, for the extension of the Phase I development of the experimental heavy bombardment airplane, USAF model XB-52 in accordance with Contractor's Document No. D-6852 dated 14 January 1948, in order to incorporate the revised tentative military characteristics for heavy bombardment aircraft as directed by Headquarters, USAF, under date of 8 December 1947.

2. I hereby find that:

a. This procurement, the estimated cost of which is $563,786.50, chargeable to FY 1948 funds, Project No. 611-1, is for the continuation of the Phase I development of the experimental heavy bombardment airplane, USAF model XB-52, which will incorporate the revised tentative military characteristics as directed by Headquarters, USAF. This research and development program shall include the furnishing of design data, engineering data, drawings, wind tunnel test reports, mock-up and photographs.

b. That the proposed procurement is for research and development and is required in the interest of National Defense.

3. Upon the basis of the findings set forth in paragraph 2 above, I hereby determine that pursuant to paragraph 4-112, Joint Procurement Regulations, negotiation of a contract for the above-described procurement is authorized.

A. S. BARROWS
Under Secretary of the Air Force

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Rev 29 Jul 47

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ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

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Note warning signal at lower left of form. Remaining space is sufficient only for proper spacing of typewritten signature

Place initials of dictator and typist, telephone number and location to right of signature.

Separate comments by horizontal lines across page.

SUBJECT

TO

FROM

DATE

COMMENT NO

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TO 17 - [illegible] FROM 57 DATE COMMENT NO.

7. The eight engines called for under Item 1 of Exhibit 3D are scheduled for installation in the first XB52 airplane making it essential that these engines be fabricated to the Bill of Materials of the engine which successfully completes a 50-hour preliminary flight rating test. Since the extended delivery date of the engines as requested by Wright Aeronautical Corporation does not appear to interfere with the delivery schedule of the XB52 airplane, delivery date of the eight XT35-W-1 engines should be extended as requested by Wright Aeronautical Corporation in consideration of the benefit of obtaining 50-hour engines due to cancellation of the 10-hour engine contingency clause from the contract as agreed by the contractor.

8. The extension of delivery dates of the eight engines under Item 1 of Exhibit 3D will extend the delivery past the date which 1947 fiscal year funds are available. It is recommended that the necessary action be taken to make these funds available to cover this procurement, as Engineering Division will not be in a position to reallocate 1949 fiscal year funds for this purpose. The amount necessary to cover this procurement is $2,979,904.00.

9. It is requested that a no cost change order to Contract W33-038-AC-14145 be initiated to cover the following changes in contract requirement:

a. Section 3, Exhibit 3C, Item 2 of the Supplemental Agreement No. 2 shall have the present statement of work replaced by the following:

"Four (4) complete AAF Type XT35-W-1 turbo-prop engines, fabricated substantially in accordance with the designs submitted under Contract No. W33-038-AC-6247, except that the configuration of the first two engines shall be similar to that of the engine used in conducting the testing called for in Item 3, Article 15 of the Contract No. W33-038-AC-6247. The first two (2) engines, after delivery to and acceptance by the Government, shall be returned to the contractor for use in future development of the Type T35 turbo-prop engine. The third engine shall be fabricated in accordance with the design that successfully completed the 10-hour full-scale developmental test run called for in this contract and shall be delivered with a temperature control in lieu of a complete power control. The fourth engine shall be fabricated in accordance with the design that successfully completed the 10-hour full-scale development test run called for in this contract and shall be delivered less the 10-hour power control. A power control fabricated substantially in accordance with the power control which successfully completes the 50-hour test to be run on an XT35-W-1 engine under Section 3, Exhibit 3C, Item 6 of Supplemental Agreement No. 7 of this contract shall be delivered within 90 days after completion of the 50-hour preliminary flight rating test of the XT35-W-1 turbo-prop engine. The third and fourth engines and the power control for the fourth engine shall be delivered to: Transportation Officer, Wright-Patterson Air Force Base, Wright Greene County, Ohio, Attn: 909 SO, marked for Power Plant Laboratory, 57, MCREXP78. The said engines shall be furnished at a unit price of four hundred seventy thousand, four hundred eighty-one dollars ($470,481.00). Total price - one million, eight hundred eighty-one thousand, nine hundred twenty-four dollars."

$1,881,924.00

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(Rev 29 Jul 47)

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ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

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Place initials of dictator and typist, telephone number and location to right of signature.

Separate comments by horizontal lines across page.

SUBJECT

TO | FROM | DATE | COMMENT NO.

b. Section 3, Exhibit 3D, Item 1 of Supplemental Agreement No. 8 of the subject contract shall have the following statement deleted:

> "Delivery of the engines as 50-hour preliminary flight rating test engines is conditional upon the Government's placing a contract prior to 1 September 1947 to cover the additional full-scale and component development testing necessary to attain the stage of development defined by the test specification covering the 50-hour preliminary flight rating test. If the contract is not placed by 1 September 1947, the engines are to be furnished as 10 hour preliminary flight rating test engines."

c. Delivery dates for the eight XT35-W-1 engines called for under Section 3, Exhibit 3D, Item 1, Supplemental Agreement No. 8 of the subject contract shall be changed as follows:

Engine No.	From	To
1 and 2	March 1949	June 1949
3 and 4	April 1949	October 1949
5 and 6	May 1949	November 1949
7 and 8	June 1949	December 1949

10. Attached for information is the original and one copy of Wright Aeronautical Corporation letter dated 19 February 1948 setting forth the proposed changes to the subject contract.

Incl. Same as listed in Para 10 filed herewith

/s/
R. J. MINTY
Colonel, USAF
Chief, Power Plant Laboratory
Engineering Division

RHR/gst
2-4238
Bldg. 18A

Con #3 5/12
" #4 6/25
" #2 4/26
" #1 4/8
" #2 ?

See Con #1 dtd 4/8/48
for MCPPXE 4
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"Reallocation of 1947
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etc".

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WRIGHT AERONAUTICAL CORPORATION

Wood-Ridge, New Jersey

February 19, 1948

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: MCREXP

Subject: Contract W33-038 ac-14145, Section 3, Exhibit 3C, Item 2 and Section 3, Exhibit 3D, Item 1.

Reference: (a) Subject Contract Supplement No. 2, dated 6 June 1947, received approved September 11, 1947. Approved Letter of Award dated May 19, 1947.
(b) Subject Contract Supplement No. 7, dated 24 September 1947, received approved November 26, 1947.
(c) Subject Contract Supplement No. 8, dated 21 November 1947, received approved December 15, 1947. Approved Letter of Award dated June 9, 1947.

1. Under reference (c), the Government procured eight model XT-35-W-1 engines which were to be 50-hour preliminary flight rating test engines only if the procurement effectuated by reference (b) was accomplished by September 1, 1947. The foregoing requirement was incorporated in subject contract because the delivery schedule and pricing basis of the engines contemplated completion of fabrication of all parts expected to be marginal after the completion of the 50-hour test procured by reference (b). Due to the fact that reference (b) was not received approved until November 26, 1947, the completion of the 50-hour test has been delayed by an equivalent time. This delay will be increased somewhat by the fact that it will cause the fabrication of the marginal parts to conflict with other parts to be fabricated at that time in the factory.

2. The delay experienced, as a result of a propeller suitable for the development of the beta-dot control not having been furnished promptly after this company's request in September 1946, has retarded the development of the control required for the 50-hour preliminary flight rating test engine. Inasmuch as a substantial amount of development work on the beta-dot control must be accomplished after the receipt of an appropriate propeller, and since the earliest indicated availability of the propeller is August 1948, a corresponding delay in the 50-hour test and the delivery of 50-hour type engines is indicated.

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3. It is understood that the Government does not desire to accept pre-50-hour flight rating test type engines in accordance with the minimum contractual requirements. It is strongly the desire of this company to furnish the Government 50-hour test type engines, but it is not possible to do so within the present contractual delivery period without an increase in the contract price for the cost of having to rebuild the engines subsequent to delivery. If, however, the Government does not desire to increase the contract price for this cost, this company will be pleased to furnish 50-hour type engines at no increase in price if delivery date adjustments can be made to keep the additional cost to this company to a reasonable minimum. The required schedule change is as follows:

Present Schedule	Proposed Schedule
2 March 1949	2 June 1949
2 additional April 1949	2 additional October 1949
2 additional May 1949	2 additional November 1949
2 additional June 1949	2 additional December 1949

4. Based upon the knowledge in this company's possession relative to the anticipated availability of a ground test rig and of the anticipated airplane requirements, it is believed that the foregoing change in delivery schedule will not in any way inconvenience the Government insofar as their requirements for the engines are concerned. However, based upon information that the funds appropriated for the procurement of the engines will expire on June 30, 1949, this company believes its request for an extension of time must be predicated upon a provision being made to insure that funds will be available at the proposed time of delivery of the engines.

5. In conjunction with the foregoing proposed no-cost change, this company proposes an additional no-cost change which, it is believed, is also of benefit to the Government. Under reference (a), Contract Section 3, Exhibit 3C, Item 2, the Government is procuring four XT-35-W-1 engines. These four engines were purchased by the Government at a unit net price which was less than the price of other XT-35-W-1 turbo-prop engines purchased to that date by the Government from this company. It was believed by this company at the time reference (a) was executed that it would be possible to effect certain savings over its previous cost experience to permit later modification of the third and fourth engines to the 10-hour test configuration and additional revisions to a 50-hour configuration. For the reasons advanced in paragraphs 1 and 2 of this letter, however, the delay in the development of the 50-hour engine has and would so increase the cost of rebuilding these two engines to the 50-hour preliminary flight rating test configuration, that such a procedure has become prohibitive without a corresponding adjustment in the contract price. Since it is understood that for the purposes for which the Government has procured these engines the Government will be fully satisfied with the minimum contractual requirements for 10-hour test type engines, this company proposes that, in consideration of the advantages granted by this company in other phases of this letter, the Government simultaneously accede to the acceptance of the two engines as 10-hour test type engines.

6. As a further related change to the same supplement and contract item, the unavailability of an appropriate propeller has necessitated the

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construction of power controls for these engines which, although they will operate, are unsuited for analysis of the final objective of a gas turbine control. Inasmuch as it is believed that the Propeller Laboratory does not have a propeller suitable for successful testing of the 10-hour type control at this time, and as it is believed the Government will be benefited by receiving for Propeller Laboratory testing purposes a beta-dot type control, this company proposes to furnish at no increased cost to the Government a beta-dot control instead of the 10-hour control provided by subject contract for the engine to be delivered to the Propeller Laboratory. Based upon an anticipated delivery of a beta-dot type propeller by August 1948, it is believed that delivery of the beta-dot control can still be accomplished by the contract delivery date of November 1948, or eight months earlier than it otherwise will be. This company desires to emphasize that it will necessarily incur a substantial additional expense over and above that originally contemplated to be spent on power controls because of the necessity of having had to develop two types of controls.

7. It is recognized by this company that the Electrical Laboratory desires to obtain access to a power control in advance of the delivery date provided in subject contract. In order that the foregoing change will not result in delaying the availability of a control in any way, this company is pleased to invite a reasonable number of Laboratory personnel to visit its plant for the week beginning March 22, 1948, or as the next most advantageous time, the week beginning March 8, 1948, to examine and analyze the power control available at this company's plant. The available company laboratory facilities and the services of a reasonable number of personnel will be furnished to assist the Electrical Laboratory personnel.

8. It is understood that the Power Plant Laboratory requires only a temperature control for its testing of the first of the last two of the engines procured under reference (a). As a partial offset to the costs which this company will incur as a result of the changes proposed above at no increased cost to the Government, this company proposes that subject contract be amended to provide a temperature control instead of a 10-hour power control for this engine.

9. It is believed the changes proposed by this letter, as summarized in the next paragraph, will result in a moderate, or somewhat greater, overall cost to this company. Due to the fact it is not practicable to evaluate the specific costs involved between performance to the minimum requirements of the contract and the more advantageous basis proposed in this letter, since this company's objective and cost commitments have been [redacted] upon a basis of achieving more than the minimum, no price analysis will be submitted to establish the amount of this cost increase. Inasmuch as the proposals made herein are made upon a no increased cost to the Government basis, it is necessary to require that the proposals be considered and/or accepted in their entirety.

10. Summary of Proposed Changes to Subject Contract.

A. Section 3, Exhibit 3C, Item 2

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[illegible], at no change in price, that the third and fourth engines called for in this item be 10-hour test type engines. Provide that the third engine will be furnished with a temperature control instead of a power control. Provide that the delivery of a power control for the fourth engine may be made after the delivery of the engine but within 60 days after the receipt of a notice-to-proceed. Provide that the power control will be notice-to-proceed instead of 10-hour test type.

P. Section V, Exhibit B, Item 1

Delete the provision for accelerated delivery of these engines as 10-hour test type. Add a new contract article IX, paragraph 2 to provide delivery as indicated in paragraph 2 of this letter. Provide for the termination provisions of these items.

11. This proposal will be worked for a certain type, but it is hoped that the Air Material Command can consummate a supplemental contract change order effectuating the changes requested in this letter within a shorter period of time, so that procurements and planning cycles may be initiated at the earliest possible date.

Respectfully,

[illegible]

s/ J. J. Mitchell
for Geo. T. Tubb
Assistant Sales and Service Manager

JJM:cw
cc: Wright Aero (3)

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AF HQ-53 (30 MAY 44)

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	
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SUBJECT	Heavy Bombardment Aircraft
TO	Directorate of Research and Development
DATE	
COMMENT No	2
FROM	Directorate of Training and Requirements
	Col Perkins/js/6328

1. The comments of this office in regard to changes in the Military Characteristics for Heavy Bombardment Aircraft, dated 8 December 1947, requested in paragraphs 8 a through d of attached letter, are as follows:

a. Reference paragraph 8 a - Approved. This change is regarded as a definite compromise to the Military Characteristics, as established, but such a compromise may be considered acceptable.

b. Reference paragraph 8 b - This office does not approve the proposed change to reduce the range of the subject airplane from 6956 nautical miles to 6947 nautical miles. While the actual mileage concerned may appear to be inconsequential, it is emphasized that the range for this airplane is already critical and <u>any</u> reduction in the established requirement, whether based on a mathematical technicality or otherwise, is considered unacceptable. With one refueling, which, according to recent studies by RAND, will afford a 40% increase in radius, this airplane is expected to reach targets 4350 nautical miles from its base and return with a reserve in the order of 1040 nautical miles. It is not believed that a two and one-half ($2\frac{1}{2}$) to three (3) hour reserve requirement is unreasonable where twenty hour, or more, missions are concerned, and where air-to-air refueling is involved. At a recent conference in this headquarters, an Air Materiel Command representative expressed doubt that the 40% increase in radius through one (1) refueling was realistic. It was his opinion that the percentage increase would fall considerably short of this figure. Should this prove to be the case, the 1040 nautical mile reserve will be reduced to what may be a dangerous level. The proposal that the range of this airplane be reduced, coupled with the statement that a 40% increase in radius will not be achieved through one (1) refueling, may well result in the airplane's failure to perform its mission. It is desired that any change in range of this airplane be an <u>increase</u> rather than a reduction.

c. Reference paragraph 8 c - Approved.

d. Reference paragraph 8 d - This change is approved provided that all crew members, with the possible exception of a gunner in the rear of the airplane, will be interchangeable during pressurized flight.

1 Incl - n/c

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AFORQ/B

E. E. Partridge

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S E C R E T

Basic Ltr 12-15-47 fr Hq USAF, subj: "Fire Control System for the Revised XB-52 Heavy Bomber"

1st Ind MCRE(MCREOA-2)JA5/EJG/elb

Hq AMC Wright-Patterson Air Force Base, Dayton, Ohio. 12 March 1948

TO: Chief of Staff, United States Air Force, Washington 25, D. C.
ATTN: AFMRD-7B, Deputy Chief of Staff, Materiel

1. In accordance with instructions of the basic communication, action has been taken to place this project in work and to transfer $500,000 from Fiscal Year 1948 budget XB-52 funds to the Armament Laboratory for initiation of necessary development. Firm plans for development of the armament system and for obligating this money are expected to be formulated in approximately six (6) weeks at which time Headquarters USAF will be notified of the recommended course of action.

2. Investigation is presently underway on the part of the Air Materiel Command and the Boeing Airplane Company as to the best possible arrangement of a turret or turrets to provide the 220° rear protection specified in the current Military Characteristics for the revised XB-52 heavy bomber.

3. The development of a satisfactory fire control system to meet the new characteristics is considered by the Air Materiel Command to be an extremely difficult job and one which will require approximately five (5) years and $3,000,000. to consummate. Due to the complexity of this problem, preliminary study would seem to dictate a two-fold program to supply armament for the XB-52, the first portion of this program to be largely a utilization of presently available equipment possessing a minimum of unknowns. Even though it is possible that the are of fire and weight and drag penalties are of considerable moment, at least there could be assured on schedule an armament installation for the airplane. Present thinking has been developed around an arrangement using two twin 50 cal. gun turrets, namely an upper and lower deck turret from a standard B-50 installation which could be arranged in the tail of the XB-52 aft of the control surfaces. A pressurized compartment for the gunner could be located between the two turrets. This arrangement would appraently provide an acceptable installation to meet the required fire coverage. It is noted, however, that the weight and drag penalties are far from optimum. The second portion of the proposed two-fold program revolves around a long range program to develop the optimum single turret which would give 220° protection and would fit the airplane on an optimum weight and drag basis.

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Basic ltr 12-15-47 fr Hq USAF subj: "Fire Control System for the Revised XB-52 Heavy Bomber"

4. As a matter of information it is observed that the Air Materiel Command has been unable to date to develop a turret to fire accurately through a 220° arc. While the nose turret for the XP-87 and XP-89 airplanes approaches this more closely than any other turret, it is considered unsuitable for a bombardment airplane because of an inherent inability to fire effectively in a 30° cone about the longitudinal axis.

FOR THE COMMANDING GENERAL:

WMM
WILLIAM M. MORGAN
Brigadier General, USAF
Chief, Engineering Operations
Engineering Division

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Basic Comm: Ltr fr Hq AMC to DCAF, subj. "Heavy Bombardment Aircraft", dtd 26 January 1948

1st Ind. AFDRD-3E

Headquarters, United States Air Force, Washington 25, D. C., 17 Mar 1948

To: Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio

1. This headquarters has considered the changes to Heavy Bomber Military Characteristics, dated 8 December 1947, as recommended in paragraph 8 of basic letter. The decisions as to the recommended changes listed in basic letter paragraph 8 a through 8 d are:

8a. Approved.

8b. The range must not be reduced even if an error in conversion exists. Six thousand nine hundred fifty-six (6,956) nautical miles approved by USAF Aircraft and Weapons Board must be retained as a minimum figure.

8c. Approved.

8d. This change is approved with the understanding that the four (4) forward crew members will be in a pressurized compartment with the tail gunner in a separate pressurized compartment. Access between the two compartments will be attainable only when the aircraft is unpressurized.

2. It is requested that the Heavy Bombardment Military Characteristics with the above approved changes be reproduced and twenty (20) copies returned to this office.

BY COMMAND OF THE CHIEF OF STAFF:

L. C. CRAIGIE
Major General, U. S. Air Force
Director, Research and Development
Office, Deputy Chief of Staff, Materiel

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B/L fr Hq, USAF, dtd 15 Dec 47, subj: "Fire Control System for the Revised XB-52 Heavy Bomber".

AFMRD-7B (65.302) 2nd Ind 25 March 1948
Department of the Air Force, Hq. U. S. Air Force,
Washington 25, D. C.

TO: Commanding General, Wright-Patterson Air Force Base, Dayton, Ohio.
ATTN: MCCP and MCRE.

1. The previous indorsement has been carefully reviewed by this Headquarters, and it is agreed that immediate action is required to have a suitable fire control system available to meet this important aircraft.

2. It is noted that the development of the fire control system required to meet the stated military characteristics is estimated by your Command to be on the order of five (5) years. In view of this undesirable time factor, it appears that no alternative exists but to develop an interim fire control system to meet the aircraft production schedule until the fire control system which meets the military characteristics becomes available for installation in the production line.

3. It is further noted that paragraph 3 makes continuous reference to the fact that the arc of fire and weight and drag penalties are of considerable moment and are far from optimum. Consequently, other solutions other than the twin .50 caliber gun turret installation should be considered at this time. For example - to insure that the armament installed contains the maximum fire power at the longest possible ranges, it may be indicated that 20 mm guns are superior. It is reiterated that any fire control system to be installed in the B-52 airplane must, in all elements, be equal to or greater than any comparable system now in existance.

4. In view of the above, it is recommended that further investigation be made of other methods of providing a suitable interim fire control system possessing a minimum of unknowns. This study should include a brief description of the various possible solutions together with the arc of fire, estimated weight and drag, approximate cost and development time required, and a comparison of the relative performance of each. In addition, it may be desirable to include in the above study a brief of possible solutions required to provide the optimum installation anticipated by the five (5) year development.

See Basic ltr dtd 12/15/47

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1ST IND dtd 3/12/48
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B/L fr Hq, USAF, dtd 15 Dec 47, subj: "Fire Control System for the Revised XB-52 Heavy Bomber", (continued), 2nd Ind. dtd 25 Mar 48.

5. It is requested that the results of the recommended study be furnished this Headquarters at the earliest date for evaluation and comment.

BY COMMAND OF THE CHIEF OF STAFF:

/s/ L. C. CRAIGIE
Major General, U. S. Air Force
Director of Research & Development
Office, Deputy Chief of Staff, Materiel.

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BOEING AIRPLANE COMPANY

SEATTLE DIVISION
SEATTLE 14, WASHINGTON

AAFPR
File No. 15065

MAR 31 1948
IN REPLY REFER TO REFERENCE NO.
E753-230

CONFIDENTIAL

NO COMMENT ☐
CONCURRED IN ☐
J. G. Mucklow
J. G. MUCKLOW
Lt. Col., USAF
USAF Plant Representative

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCREOA-2

Through: Air Force Plant Representative
Boeing Airplane Company
Seattle Division
Seattle 14, Washington

Subject: Contract W33-038 ac-15065, Project No. MX-839
Model XB-52 Airplane
Engine Accessory Gear Box Drive Installation

Reference: Boeing letter to MCREOA-2, Ref. E753-210
dated 4 March 1948, same subject

1. At the AMC engine mockup conference held at Wright Aeronautical Corporation in Wood-Ridge, New Jersey the effect on nacelle length of the engine accessory gear box drive installation was discussed. For the assistance of AMC personnel the following information is submitted.

2. By paragraph 4 of the reference letter, Contractor advised AMC that "if it is essential that the angular motion of the spherical spline be kept to 2°, then it will be necessary to lengthen the nacelle approximately 26 inches, with a subsequent penalty in speed, range, and other performance".

3. Contractor estimates that the penalty of increasing the length of all four nacelles by 26 inches, considering only the direct increase in weight and the accompanying increase in drag, would amount to a decrease in range of 355 miles and decrease in speed of 3 MPH at the cruise speed for maximum range and of 2 MPH in the high speed region. These figures do not include allowance for weight increases which may result from impaired propeller clearances due to longer nacelles.

4. Contractor requests that additional study of the subject drive be instituted by Wright Aeronautical Corporation to determine means of retaining the shorter drive installation.

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CONTRACT FILES
W33-038 ac/15065
XB-52 S/A

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Commanding General, AMC
Page Two

Reference
E753-230

5. Pending receipt of further data from Air Materiel Command, Contractor will continue studies to effect an installation which will not require a long nacelle.

6. Contractor is assuming that the short nacelle will be accomplished as a result of the studies indicated in paragraph 4. above, or possibly paragraph 5., and is continuing to reflect the short nacelle in performance figures and in the Detail Specification.

BOEING AIRPLANE COMPANY
SEATTLE DIVISION

A. G. Carlsen
A. G. Carlsen
Chief Project Engineer

cc: WAC, Wood-Ridge, N.J.

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HqAMC Form No. 10-514 (Rev 10 Sept 46)

WF-L-2 OCT 46 300M

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HEADQUARTERS

AIR MATERIEL COMMAND
Wright-Patterson Air Force Base
Dayton, Ohio

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL, AIR MATERIEL COMMAND, ATTENTION FOLLOWING OFFICE SYMBOL:

MCREOA2

MCREOA2/JAB/emh
~~WRIGHT FIELD, DAYTON, OHIO~~
6 April 1948

SUBJECT: XB-52 Landing Gear

TO: Chief of Staff
United States Air Force
Washington 25, D. C.
ATTN: ASMRD, Deputy Chief of Staff
Materiel, Captain Strathy

1. Reference is made to telephone conversation between Captain Strathy, ASMRD, Hq, USAF, and J. A. Boykin, Engineering Division, Air Materiel Command, 29 March 1948, subject as above.

2. Attached hereto is dimensional sketch showing spacing and size of the landing gear arrangement for the X-52.

3. It is emphasized that these data are tentative and subject to change; however, it does appear that a bicycle type landing gear will be selected for this airplane. Studies are being made to select an arrangement which will be adaptable to the idea of dropping half the main gear. If this can be accomplished, it will provide an appreciable weight saving, as well as additional space, for increased fuel capacity.

FOR THE COMMANDING GENERAL:

George F. Smith

GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

1 Incl.
Ldg. Gear Arrange.
Sketch for XB-52

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P.1 P.P. Lab. Comments
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Bomb. Br., Eng. Div.

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XT-35-W-3 Engines

WCREXP-7 WCR50A-5 7 Apr 48 1.
Power Plant Laboratory
ATTN: Mr. Marvin Bennett

1. Boeing Airplane Company will require a mockup of the XT-35-W-3 Engine with dual rotation propellers gearing by January, 1950 for the XB-52 Airplane.

2. The matter of obtaining a mockup by the above date was discussed with Mr. Marvin Bennett on 30 March 1948 at a meeting held in the Aircraft Projects Section. It was understood that terms of the contract on which subject engine will be supplied calls for a mockup, however, it was further understood from Mr. Bennett that Wright Aeronautical Corporation may be reluctant to part with this mockup.

3. It is believed that delivery of the mockup to Boeing later than January, 1950, would be reflected in completion of the XB-52 program, and on this basis delivery of the mockup by the above date should be of prime consideration.

4. It is therefore requested that the Power Plant Laboratory take the necessary action to secure the desired W-3 mockup engine by the required date. The Equipment Branch, Aircraft Projects Section, will aid wherever possible, especially in the movement of the mockup from Wright Aeronautical to Boeing Airplane Company, Seattle 14, Washington. Aircraft Projects Section, Engineering Division, wished to be advised of the results obtained after the problem has been presented to Wright Aeronautical Corporation.

GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

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ARMY AIR FORCES
AIR MATERIEL COMMAND
ENGINEERING DIVISION

No. of Pages 8
RLK/jrb

MEMORANDUM REPORT ON

DATE 7 April 1948

SUBJECT: XB-52 Airplane Mock-Up Inspection

OFFICE: Aero-Medical Laboratory

SERIAL NO: MCREXD-426-112 EXPEDITING ORDER NO. 426-253

A. PURPOSE:

1. To report on Mock Up-Inspection of the XB-52 airplane at the Boeing Airplane Company, Seattle, Washington, on 26 through 30 January 1948.

B. FACTUAL DATA:

2. The XB-52 mock-up inspection team, together with the reviewing board and Boeing engineers, convened at Boeing Airplane Company on 26 January 1948. Prior to the start of the inspection, Mr. J. A. Boykin, Assistant Chief, Bombardment Branch, Aircraft Projects Section, Engineering Division, stated that, due to recent requirement changes, the XB-52 configuration would be changed considerably, necessitating a complete new mock-up and, consequently, none of the five different mock-ups to be inspected would be chosen as the XB-52 airplane. However, Aircraft Projects Section wished to conduct the subject inspection in an effort to evaluate the mock-ups and provide Boeing with a guide in designing the XB-52 airplane from the new requirements.

3. In view of the new requirements and recommendations of Strategic Air Command, the trend of design, toward the tandem cockpit similar to Boeing's configuration No. 7, except that it will consist of a seven man crew with the pilot, co-pilot, and radio operator in tandem. The cockpit would be moved forward as far as possible consistent with the required cockpit length. The bubble canopy would be faired flush with top of the fuselage. The two 1037 operators would be located side by side in the cabin aft of the cockpit together with the auxiliary crew member. The tail gunner would be located in the tail.

4. The new mock-up is expected to be ready for inspection in approximately four months.

5. The comments as listed in Appendix 1 were submitted to Mr. G. W. Bollinger, Bombardment Branch, Aircraft Projects Section, Engineering Division, project engineer on the XB-52 airplane, for conference with Boeing Airplane Company engineers.

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7 April 1948

6. Representing the Aero-Medical Laboratory at subject inspection was Mr. Robert L. King.

C. CONCLUSIONS:

7. The XB-52 mock-ups should be modified in accordance with comments as listed in Appendix 1 in the event one is chosen as the final configuration of that airplane.

D. RECOMMENDATIONS:

8. That the comments as listed in Appendix 1 should be used as a guide in the redesign of the XB-52 airplane.

/s/ R. L. King
Prepared by ROBERT L. KING
/s/ Fred W. Berner
Approved by FRED W. BERNER
/s/ A. P. GAGGE
Approved by A. P. GAGGE, Lt. Colonel, MSC
Chief, Aero Medical Operations
Approved by EDWARDS J. KETTRICKS, Colonel, M.C.
Chief, Aero Medical Laboratory

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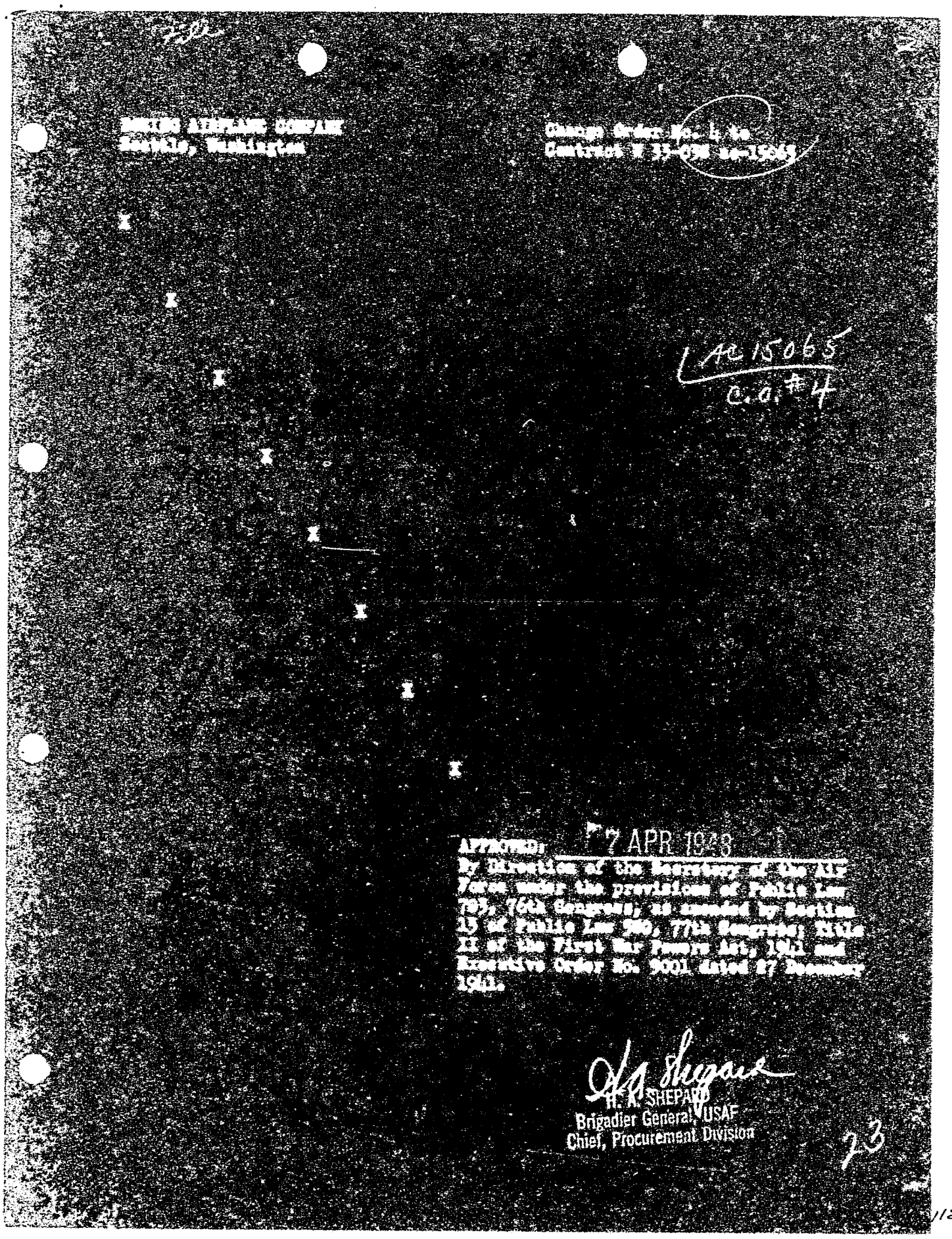

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AMCF Form No. 71-34A
(Rev 11 Jun 48)

Execute in triplicate
C— 35761
Class— 01-A

CHANGE ORDER
Restricted
UNITED STATES AIR FORCE
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Date 4 March 1948
Change Order No. 4 to
Contract No. W33-038ac-15065
as amended

To: Boeing Airplane Company, Seattle 14, Washington

SUBJECT: Phase I Design Studies of Long Range Bombardment Airplane (Item 7)

WHEREAS, the Government and the Contractor have heretofore entered into Contract W 33-038 ac-15065, dated 24 January 1947, the contract as heretofore amended, provides for the furnishing to the Government by the Contractor preliminary design studies of a long range bombardment airplane; and

WHEREAS, the Government desires and the Contractor has agreed to perform additional work under Article 5 - CHANGES - of said Contract W 33-038 ac-15065;

NOW, THEREFORE, in consideration of the premises and the mutual covenants and agreements herein contained and for other good and valuable considerations, the parties hereto hereby agree as follows:

1. Contract W 33-038 ac-15065, as amended, is hereby further amended, as follows:

(a) By adding Item 7 to paragraph (a), Article 1, thereof:

"Item 7:- The Contractor shall conduct Phase I design studies of a long range bombardment airplane described in AMC Report entitled 'Design Requirments for Heavy Bombardment Airplanes' dated 6 January 1948, in accordance with Contractor's Document No. D-8852 entitled 'Specification for Phase I Design Development of Heavy Bombardment Airplane - Model 464-35-0' dated 14 January 1948, hereby made a part hereof by reference. Performance of the work called for in this Item 7 shall be evidenced by delivery and acceptance of the design data, engineering data, drawings, test reports, mock-up and photographs called for in Contractor's Document D-8852, dated 14 January 1948, referred to herein."

(b) By adding in Article 2 thereof under the headings "Item" and "Estimated Cost", respectively, the following:

"7 $529,377.00"

and change the total estimated cost to read "$2,229,545.00".

Restricted

Copy Received: Sufficient Funds Have Been Obligated To Cover The Maximum Amount of Money Which The Government is Obligated To Pay Under This Contract
BUDGET AND CONTROL DIVISION
By [illegible] 30 MAR 1948

This change order has been (authorized/negotiated pursuant to) Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 18, Title II of the First War Powers Act, 1941, and Executive Order No. 9001 of 17 December 1941.

1-b

Sheet 1

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(c) By deleting the first sentence of paragraph (a) of Article 3, thereof, and substituting the following therefor:

"The Government will pay the Contractor upon satisfactory delivery of all items specified in this contract, subject to reimbursement for cost, as outlined in Article 6 hereof, the cost, plus (1) a fixed fee of Eighty-five thousand eight dollars ($85,008.00) being five percent (5%) of the total estimated cost of One million seven hundred thousand one hundred sixty-eight dollars ($1,700,168.00) and (2) a fixed fee of Thirty-four thousand four hundred nine dollars and fifty cents ($34,409.50) being six and one-half percent (6½%) of the total estimated cost of Five hundred twenty-nine thousand three hundred seventy-seven dollars ($529,377.00)."

(d) By adding in paragraph (a), Article 4, thereof, under the headings "Item No." and "Time of Delivery", respectively, the following:

"7	The design data, engineering data, drawings, and test reports shall be delivered within thirty (30) days after completion and/or release of tests or data insofar as practicable but not later than 1 December 1948. The mock-up will be ready for inspection and acceptance at Contractor's plant not later than 1 October 1948. Photographs shall be prepared and furnished to the Air Materiel Command not later than thirty (30) days after final inspection and acceptance of the mock-up."

(e) By inserting the word "photographs," after the word "The" in paragraph (b), Article 4, thereof.

(f) By changing the word "mock-up" to the word "mock-ups" in all places in which it appears in paragraphs (c) and (e), Article 4, thereof.

(g) By increasing the total sum allotted for this contract, referred to in paragraph (c), Article 6, thereof, by $563,786.50.

(h) By inserting the word "photographs," after the word "all" in the third line of paragraph (a), Article 36, thereof.

(i) By deleting paragraph (b), Article 36, thereof, and subsituting the following therefor:

"(b) The plant of the Contractor at Seattle, Washington, is designated as the point for final inspection and acceptance by the Government of the mock-ups called for under Items 5 and 7 of Article 1 hereof."

2. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

3. This change order consists of Sheets 1, 1A and 2.

CHANGE ORDER NO. 4 TO CONTRACT W 33-038 ac-15065 SHEET 1A

25

Restricted

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AFM Form No. 71-26C
(21 DEC 45)

Total increase in estimated cost $529,377.00

fixed fee @ 6½% $ 34,409.50

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

This Change Order shall be subject to the written approval of the Secretary of the Air Force or such individual as said Secretary shall designate and shall not be binding until so approved. The date of such approval shall be deemed to be the true date for the purpose of determining all times of performance.

UNITED STATES OF AMERICA

BY: T. P. Gerrity
Contracting Officer
T. P. GERRITY
Lt. Colonel, USAF

1ST INDORSEMENT

TO: CONTRACTING OFFICER:

1. Contractor hereby accepts the above Change Order. Dayton, Ohio. (Place) March 30, 1948 (Date)

BOEING AIRPLANE COMPANY (SEAL)
(Contractor)

BY: M. P. Crews
(Signature of Official with Office held)
M.P.Crews - Dayton Representative

AFP No.: 63002

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Debit: 2180705, 802-7001 P 611-07 S 33-038

Approved: 1948
By Direction of the Secretary of War under the Provisions of Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order 9001, 27 December, 1941.

Restricted

Change Order No. 4 to Contract No. W 33-038 ac-15065

3-b Sheet 2

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AMC Form No. 13-3
Rev 29 Jul 47

CONFIDENTIAL

ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

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Place initials of dictator and typist, telephone number and location to right of signature.

Number all communications consecutively.

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Use entire width of sheet, both sides.

Separate comments by horizontal lines and identify.

SUBJECT: Reallocation of 1947 Fiscal Year Funds for Engine Deliveries Extending Beyond June 1948

TO: MCPPA
Attn: Mr. Donnelly

FROM: MCPPAS, Mr. Walsh

DATE: 8 Apr 48

COMMEN No. 1

1. Advice is desired as to whether or not a contractor can be reassured that funds will be available for the delivery of engines after June 30, 1948, if they are now on a Contract Supplement providing for [illegible] Fiscal Year funds, in effect all details of the pricing [illegible] follows:

a. Supplement No. [illegible], Contract [illegible] requires that [illegible] engines to Air Force [illegible] 1948, [illegible] engines as 24-hour test engines, and deliver [illegible] June 1948.

b. Delivery of [illegible] engine was made contingent by the Contract Supplement [illegible] contract for the additional testing might [illegible] engines as 24-hour engines was not met by the prior to [illegible] Government, [illegible] engines as 24-hour engines. Supplement No. 7, which [illegible] November 1947, although the [illegible] June 1948.

c. Delivery of the [illegible] engine was made contingent upon the [illegible] later than 1 June 1948. The agreement will be subject to [illegible] August of 1948. The requirement under which the propeller is to be furnished is not specified in the contract, [illegible] engineering [illegible] the contractor and the Engineering Division, [illegible] with the procedure under which propellers have previously been furnished for testing the "T-" engine.

d. In order to obtain 24-hour test engines as used by the Engineering Division, will require [illegible] either extension of delivery dates beyond June of 1948, after which the [illegible] expire, or increase [illegible] at the present contract to cover overtime [illegible] manufacturing costs [illegible] June 1948, or to at which the [illegible], etc., must be [illegible] extension [illegible] June 1948 [illegible] contract price.

e. Possible [illegible]

a. [illegible] engines [illegible] delivery dates per cent.

The [illegible] engine for flight purposes. However, this type [illegible]

Add'l Com #1 dtd 3 May 48 to EXP 18 to MCPPAE 43

CONTINUE ON OTHER SIDE

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TO 18-(W-2 (PP) | FROM | DATE | COMMENT NO.

b. Extend the delivery dates for the eight (8) engines beyond June 1949 at no change in contract cost.

The contractor will accept such a change, provided he has assurance that funds will be made available at the proposed delivery dates.

This arrangement is acceptable to the Engineering Divison; however, they advise in Paragraph 8 of the attached R&R that the Engineering Division will not be in a position to reallocate 1949 Fiscal Year Funds for this purpose if this action is required.

Present Schedule	Proposed Schedule
2 March 1949	2 June 1949
2 additional April 1949	2 additional October 1949
2 additional May 1949	2 additional November 1949
2 additional June 1949	2 additional December 1949

c. Increase the money value of the present contract to cover the added cost that the contractor will incur due to the lateness of receiving the propeller and the 50-hour test contract so that 50-hour engines may be delivered by June 1949. Engineering Division advises, however, that they do not have funds to increase the present contract to obtain the engines prior to June 1949, and further, that a delay in deliveries beyond June 1949 will not retard the development program for the XB-52 airplane.

3. Attached hereto is a copy of an R&R received from the Engineering Division, a portion of which deals with the eight (8) engines covered herein. Paragraph 8 of the attached R&R, which caused the writing of this communication, is quoted below:

"The extension of delivery dates of the eight (8) engines under Item 1 of Exhibit 3D will extend the delivery past the date which 1947 Fiscal Year Funds are available. It is recommended that the necessary action be taken to make these funds available to cover this procurement, as Engineering Division will not be in a position to reallocate 1949 Fiscal Year Funds for this purpose. The amount necessary to cover this procurement is $2,979,904.00."

1 Incl: Cy R&R fr Eng. Div. dtd 3/11/48

/s/ STANLEY C. PACE
Major, USAF
Chief, Power Plant Branch

CFS/ghs
Ext. 2-8175
Bldg. 15, Rm 102

Comm # 3, 5/12
" # 4, 5/25
" # 2, 4/26
" # 1, 3/11
" # 2, 4/16

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AIR MATERIEL COMMAND

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Place in line of initiator and typist designations number and location to right of signature

Separate comments by horizontal lines across page

SUBJECT Contract [illegible], [illegible] - - Interceptor Armament

TO [illegible] FROM [illegible] DATE [illegible] COMMENT NO 1

[illegible]:

. [illegible]

. [illegible] letter report "Aircraft" dated 8 December 1[illegible].

. [illegible] 1[illegible], subject: "Transfer of [illegible]".

. [illegible], Chief's action on [illegible].

. [illegible], subject: "Fire [illegible] dated 17 March [illegible], and the [illegible] thereto.

. From the Armament Projects Section to the [illegible] immediately initiate a [illegible], as required by the instructions of ref-[illegible].

. [illegible] conference estimated [illegible] system for the [illegible] of the subject [illegible] the [illegible]:

[illegible] the ex- [illegible] the use of [illegible] armament system meeting [illegible] characteristics. [illegible] system.

[illegible] the production airplanes by June [illegible] characteristics.

[illegible] number, type or caliber of the armament [illegible] that all armament duty is required and that [illegible] equivalent to, or greater than, any comparable [illegible]. It is suggested that the Armament Laboratory investigate

Ltr/Contract dtd 5/6/48

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FORM 18 MAR 48 2 M [illegible]

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AMC Form No. 10-3 (Rev 29 Jan 48)

ROUTING AND RECORD SHEET

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Separate comments by horizontal lines across page.

SUBJECT Contract W33-038-ac-15065, XB-52 Airplane - - Defensive Armament (Cont'd)

TO MCREXG FROM MCREOA-2 DATE 13 Apr 48 COMMENT NO. 1

ATTN: Colonel R. E. Jarmon

all existing armament equipment that may be modified to meet the requirements and recommend a suitable interim armament system for the subject airplane in accordance with the request of paragraph 4. of 2nd Indorsement of reference d. The Laboratory's recommendation should include the number, type and caliber of the guns as well as the proposed control system. From an airplane standpoint, a system utilizing two deck type, 50 caliber, two gun turrets located vertically opposite each other in the tail of the airplane and controlled by one gunner by AN/APG-3 radar and a double ended periscopic sight appear very attractive from a weight standpoint and it provides coverage in excess of the 220°. The maximum depression of the guns is required for such an installation.

5. The Laboratory's recommendations and detailed programs for the interim and long range program are requested by 20 April 1948. Special consideration should be given to answering the points raised by Headquarters, USAF in 2nd Indorsement, reference paragraph 1.d. dated 25 March 1948.

3 Incls:
1. Cy AFMRD-7B ltr dtd 15 Dec 1947
2. Cy 1st Ind dtd 12 Mar 1948
3. Cy 2nd Ind dtd 25 Mar 1948

filed 2.2

GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

GWB/rh
25282
Bldg. 14

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for 2nd.

HqATSC Form No. 80-507 (20 Jan 45)
(Old AAFMC-268)

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USAF

~~AAF AIR FORCES~~

~~AIR TECHNICAL SERVICE COMMAND~~

AIR MATERIEL COMMAND

MCREQA-2/GWB/rh

MEMORANDUM REPORT ON

Date 16 April 1948

SUBJECT: Conference on Crew Arrangement
XB-52 Airplane

OFFICE Aircraft Projects Section

Contract or Order No. W33-038-AC-15065

SERIAL No. MCREQA-2-1115

Expenditure Order No. 426-253

SECRET

A. PURPOSE:

1. To report the results of a conference held at the Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio, on 18 and 19 March 1948 among the Air Materiel Command, Hqs, USAF, Strategic Air Command, Hqs, USAF, Deputy Chief of Staff, Materiel, Hqs, USAF, Deputy Chief of Staff, Operations, and Boeing Airplane Company personnel, to evolve a crew arrangement for a Pilot, Co-Pilot-Engineer, and two Bombardier-Navigators for the subject airplane. The required gunner was assumed to be located in the tail of the airplane.

B. FACTUAL DATA:

2. The following personnel were in attendance:

Colonel Stewart P. Wright, Hqs, USAF, Strategic Air Command
Lt. Colonel Willard W. Wilson, Hqs, USAF, Strategic Air Command
Lt. Colonel C. A. Thorpe, Hqs, USAF, Deputy Chief of Staff, Operations
Lt. Colonel C. C. McPherson, Hqs, USAF, Deputy Chief of Staff, Operations
✓ Major W. D. Brady, Hqs, USAF, Deputy Chief of Staff, Materiel

Air Materiel Command Personnel

Colonel R. E. Jarmon, Armament Laboratory, Engineering Divn.
Lt. Colonel H. L. Brownwell, Aircraft Laboratory, Engineering Divn.
Major W. C. Williams, Armament Laboratory, Engineering Divn.
Major Frank L. Thomas, Aircraft Projects Section, Engrg. Divn.
Mr. R. C. Johnson, Aircraft Laboratory, Engineering Divn.
Mr. H. W. Sprague, Components & Systems Lab., Engrg. Divn.
Mr. J. E. Scott, Components & Systems Lab., Engrg. Divn.
Mr. D. A. Peebles, Components & Systems Lab., Engrg. Divn.

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Air Materiel Command Personnel - Con'td

Mr. W. E. Ford, Components & Systems Laboratory, Engrg. Divn.
Mr. J. M. Christensen, Aero Medical Laboratory, Engrg. Divn.
Mr. W. C. Biel, Aero Medical Laboratory, Engineering Division
Mr. R. C. King, Aero Medical Laboratory, Engineering Division
Mr. H. T. E. Hertzberg, Aero Medical Laboratory, Engrg. Divn.
Mr. H. E. Savely, Aero Medical Laboratory, Engineering Divn.
Mr. R. L. Dingle, Equipment Laboratory, Engineering Division
Mr. J. E. Rowland, Equipment Laboratory, Engineering Division
Mr. J. L. Randack, Equipment Laboratory, Engineering Division
Mr. O. P. Morgensen, Equipment Laboratory, Engineering Division
Mr. M. A. Bennett, Power Plant Laboratory, Engineering Division
Mr. J. G. Barrett, Power Plant Laboratory, Engineering Division
Mr. I. F. Littman, Power Plant Laboratory, Engineering Division
Mr. R. E. Hoffman, Power Plant Laboratory, Engineering Division
Mr. R. Bodemuller, Power Plant Laboratory, Engineering Division
Mr. W. E. Lamar, Aircraft Projects Section, Engineering Division
Mr. K. F. Fromuth, Aircraft Projects Sect., Engineering Division
Mr. J. A. Boykin, Aircraft Projects Section, Engineering Division
Mr. G. W. Bollinger, Aircraft Projects Sect., Engineering Division

Boeing Airplane Company

Mr. A. G. Carlsen
Mr. R. A. Shepherd

3. In January 1948, a Mock-up Inspection was conducted on an airplane designed by Boeing Airplane Company in accordance with "Military Characteristics for Heavy Bombardment Type Aircraft" dated 23 November 1945, revised 8 October 1946. This airplane at a gross weight of 480,000 pounds and powered by four T-35-3 engines could attain a maximum range of 12,500 statute miles at an average cruising speed of 420 MPH. "Military Characteristics for Heavy Bombardment Type Aircraft" dated 8 December 1947, received just prior to the mock-up, were issued because it was considered that the existing characteristics dated 23 November 1945 provided for an airplane too large from an economic standpoint and too slow from a vulnerability standpoint. Thus, the new characteristics define an airplane with a range of 8000 statute miles, an average cruising speed of 500 MPH, and a minimum tactical operating altitude of 35,000 feet, and reduces the defensive armament required in order to keep the size of the airplane to a minimum. The Contractor has determined that these characteristics can be obtained with four T-35-3 engines at a gross weight of approximately 280,000 pounds. This is predicated on the airplane having a basic weight (gross weight less bombs and fuel) of approximately 137,500 pounds. If the gross weight is increased above 280,000 pounds, the cruising speed of 500 MPH at a minimum operating altitude of 35,000 feet cannot be achieved without installing more and/or larger engines. If the gross weight is held constant at 280,000 pounds, and the basic weight increased above 137,500 pounds, the range of 8000 statute miles cannot be achieved with

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the required bomb load. In order to attain a basic weight of not more than 137,500 pounds, it is necessary that the crew and equipment be reduced to the bare minimum consistant with the accomplishment of the basic mission of the airplane. The performance requirements for the subject airplane are considered to be absolutely essential and no compromises in either speed or range may be considered in arriving at an acceptable crew arrangement or in determining future engineering compromises on this project. The crew requirements as defined by "Military Characteristics for Heavy Bombardment Type Aircraft" dated 8 December 1947, are as follows:

a. Pilot

b. Co-Pilot-Engineer-Radio-Operator

c. Bombardier-Navigator

d. Bombardier-Navigator-Weaponeer

e. Gunner

4. As a result of numerous crew arrangement studies on the old configuration of the subject airplane, three basic arrangements were selected to be mocked up for the January 1948 mock-up inspection and were available for further inspection at the time of the subject conference. These crew arrangements were based on fuselage diameters of approximately 135 inches and it was noted that vision is very limited and a very crowded condition exists with any arrangement when two bombardier-navigators are located in the nose of the airplane. Subsequent studies by the Contractor have indicated that the fuselage diameter can be reduced to approximately 126 inches on the new configuration if diameter is dictated only by bomb bay and fuel requirements rather than crew requirements.

5. At the time of the January 1948 Mock-up Inspection, drawings of several modifications to each of the basic mock-ups were made proposing crew arrangements for an airplane meeting the performance requirements of the new military characteristics (see Appendix I). These drawings were presented to the using agencies (the 28th Wing, 92nd Wing, 93rd Wing and 301st Wing of the 15th Air Force, and the 7th Wing, 43rd Wing, and 519th Wing of the 8th Air Force) in order to obtain an indication of preference. This survey indicated a general preference for a tandem arrangement of the Pilot and Co-pilot with the two Bombardier-Navigators stationed aft in a location permitting them to be positioned side by side so that they may operate as a team. A general dislike was noted for an arrangement where the two Bombardier-Navigators were separated; that is, one in the nose and one aft.

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6. The operation or surveillance of equipment essential for flight has been delegated as follows:

a. Pilot

(1) Engine controls

(a) Power lever (one per engine)

(b) Condition lever (one per engine)

(2) Engine Instruments

(a) Tachometer (one per engine)

(b) Torquemeter (one per engine)

(3) Flight Instruments

b. Co-pilot Engineer

(1) Engine Controls

(a) Power lever (one per engine)

(b) Condition lever (one per engine)

(2) Engine Instruments

(a) Tachometer(one per engine)

(b) Torquemeter (one per engine)

(3) Limited Flight Instruments

(4) Electrical System

(5) Fuel System

(6) Cabin Pressure System

(7) Hydraulic System

7. The operation of the tactical equipment considered essential to permit the airplane to accomplish the basic mission has been assigned as follows:

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a. Pilot and Co-pilot.

(1) Instrument approach and VHF Navigation Receiver (AN/ARN-5A and AN/ARN-14)

(2) Marker Beacon (AN/ARN-12)

(3) Radio Compass (AN/ARN-6)

(4) Command Radio (AN/ARC-19)

* (5) Liaison Radio (AN/ARC-21)

b. Bombardier-Navigator-Weaponeer

(1) Radio Compass (ARN-6)

(2) Bombing System (AN/APQ-31)

(3) Position finding equipment (AN/APN-9 and AN/APN-34)

(4) Weaponeer's Box

C. CONCLUSIONS:

5. The following conclusions were arrived at and concurred in by the conference group consisting of representation from Headquarters, USAF, Headquarters, Strategic Air Command, and the Air Materiel Command:

a. In view of the limited equipment requiring the services of a crew member for the basic operation of the airplane, the delegation of a Co-Pilot-Engineer, as stated in the current Military Characteristics, is concurred in.

b. The Pilot and Co-Pilot-Engineer should be stationed in tandem because of the superior vision available and due to the speed potential of the configuration which it permits. (See drawing, Appendix II).

c. The Co-Pilot-Engineer should be provided with sufficient flight controls to enable him to perform all normal flying functions as well as accept a refused landing.

d. The Bombardier-Navigator-Weaponeers should be stationed together, preferably side by side, so that they may assist each other as much as possible and so that their associated equipment may be used mutually.

* NOTE: During the subject conference it was considered that the operation of the Liaison Radio AN/ARC-21 should be delegated to the tail gunner. However, subsequent study has indicated that such an installation is not consistant with efforts to keep the airplane basic weight to a minimum due to the necessity of providing the pilot or co-pilot with duplicate controls.

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e. In order to station the two Bombardier-Navigator-Weaponeers together, they should be located aft so that they may be provided sufficient room to work in with the least weight and drag penalty to the airplane. (See drawing, Appendix II).

f. Sufficient windows should be provided in the Bombardier-Navigator-Weaponeer's compartment to provide them with the maximum auxiliary vision possible consistant with weight penalty.

g. An astrodome should be provided in a location readily accessible to the Bombardier-Navigator-Weaponeers.

h. The Weaponeer's box should be located accessible to one Bombardier-Navigator-Weaponeer and in the range of vision of the other.

i. Both Bombardier-Navigator-Weaponeers should have ready access to the bomb bay.

D. RECOMMENDATIONS:

9. It is recommended that action be initiated by Bombardment Branch, Aircraft Projects Section, Engineering Division, Air Materiel Command to request concurrence of Headquarters, USAF, of the Conclusions outlined under paragraph C.

Distribution:

Prepared by G. W. BOLLINGER
(Name)

Approved by H. E. WARDEN, Lt. Colonel, USAF
Chief, Bombardment Branch

Approved by for GEORGE F. SMITH, Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

Concurrence:

.....

.....

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To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: Col. [illegible] Gardner

Through: Air Force [illegible]
[illegible]

Subject: [illegible]

References: [illegible]

1. [illegible] Contractor's personnel [illegible] the receipt of the [illegible] for the [illegible]. Complying further with the requirements [illegible], the Contractor submits herewith a proposal for the [illegible] design, development, construction and [illegible] type airplane designated as [illegible]. This proposal includes all of the items covered by [illegible] reference letter and, upon acceptance [illegible], will provide the commitments proposed [illegible].

2. This proposal [illegible] airplanes as described in Contractor's [illegible] which have been previously [illegible] with XT35-W-1 engines installed. [illegible] construction of an engine ground test [illegible] installation, test run of one engine [illegible] construction of two ring cowls and [illegible] and [illegible].

3. This proposal is subject to the following qualifications and conditions:

(a) [illegible]

[illegible] of Flight Operations and Maintenance Handbooks prepared in accordance with Contract's Specification [illegible], dated 20 February 1948, will be furnished.

Maintenance Parts List, Bill of Materials, Service Bulletins and service of Field Technicians are not included as it is not contemplated that these items will be required.

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[redacted]

[redacted] for expedi-
[redacted] be permitted,
[redacted] representative
and [redacted] records of all substi-
[redacted] additional weight to fit into each
[redacted] commercial substitutions.

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To: Commanding General,
Ref: MX-130

(3) The development [illegible] will be [illegible] as well as [illegible] on our [illegible] of this airplane [illegible] earlier [illegible]

(4) The quantity [illegible] included [illegible] later that are [illegible] the [illegible] size of the [illegible]

(5) Contractor [illegible] for [illegible] XB-52 airplane [illegible] are the costs [illegible] flight test [illegible] engine.

4. For [illegible] construction of the [illegible] Seattle, Washington, flying [illegible] for the following [illegible]

Engineering labor = 1,[illegible] hrs. @ $[illegible]/hr.	$[illegible]
Engineering [illegible]	[illegible]
Tooling labor = [illegible] hrs. @ $[illegible]/hr.	[illegible]
Tool labor = 54,000 hrs. @ $[illegible]/hr.	[illegible]
Experimental Production Labor = [illegible] hrs. @ $[illegible]/hr.	[illegible]
Overhead @ [illegible]	[illegible]
Developmental Material	[illegible]
Tool material	[illegible]
Experimental Production Material	[illegible]
Outside Production	[illegible]
Purchased Equipment	[illegible]
Additional costs of [illegible]	[illegible]
New or Special Tooling	$21,938.00
Direct Charges	[illegible]
Estimated Cost	[illegible]
Fixed Fee	[illegible]
Total Cost Plus Fixed Fee	[illegible]

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To: Commanding General, AMC
Ref: OR6-180

In addition to the foregoing estimate, the Contractor proposes to supply spare parts, of the Contractor's selection, at an estimated cost of not to exceed $1,000,000.00 plus a fixed fee of $70,000.00.

5. The Contractor will use its best efforts to complete the first airplane, set up and ready for flight, within 25 months from date of authorization to proceed and the second airplane, set up and ready for flight, within 6 months thereafter, and to deliver both airplanes within 33 months from date of authorization to proceed. This delivery program is predicated on commitment by AMC on the complete program by approximately 1 July 1948. The delivery schedule also assumes the Government-furnished property will be available to the Contractor in accordance with its requirements and that necessary replacements of Government-furnished property will be available to the Contractor as may be required to complete flight testing and delivery of the aircraft.

6. It is the understanding of the Contractor that it may be necessary for AMC, because of the problem of availability of funds, to authorize the performance under this complete Phase II Program in steps, or on what may be considered a percentage basis. If such procedure is found necessary, it is recommended that the complete program be accepted and that funds in the amount of 60% of the total estimated cost plus fixed fee be made available for the first 12 months period.

BOEING AIRPLANE COMPANY
SEATTLE DIVISION

William M. Allen
President

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AMC Form No. 13
Rev 29 Jul 47

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SUBJECT

TO	FROM	DATE	COMMENT NO

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See Form Ltr 1, 8, 15

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" # 2
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MCREOA-5/JMV/kfh
28 April 1948

Strategic Reconnaissance Version of XB-52

Boeing Airplane Company
Seattle, Washington

1. Reference is made to the recent conference between Mr. R. E. Hage of Boeing Airplane Company and AMC personnel regarding the possibility of converting the XB-52 type airplane to a strategic reconnaissance airplane.

2. At the time of Mr. Hage's visit the AMC was unable to outline the equipment to be accommodated by the reconnaissance airplane. However, since that time, equipment requirements have become more definite and the AMC is now able to inform Boeing Airplane Company of tentative size and weight of the reconnaissance equipment.

3. Appendix I entitled "Photographic Reconnaissance Equipment Requirements" and Appendix II entitled "Electronic Reconnaissance Equipment Requirements", both of which are inclosed herewith, indicate the desired equipment to be carried.

4. The crew should consist of the following:

a. Pilot (one)

b. Co-pilot (one)

c. Photo-Radar Navigator (two)

d. Photographers (two)

e. RCM Operator (four)

5. The equipment listed in Appendix I with the pertinent operating personnel should be located in approximately the same area of the airplane. Although it is probable that the airplane fuselage diameter will allow more than one K-40 camera to be located in the same plane of the

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					Non-Record	

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COPY

28 April 1948

Subject: Strategic Reconnaissance Version of XB-52

fuselage, it is desirable to have working space between the cameras which will probably leave room for only two K-40 cameras in one plane. An inverted "T" fuselage cross section would allow the installation of three cameras in the same plane. It is estimated that a fuselage length of 20 feet will be required for photo equipment, 14 of which will be required for the installation of the seven K-40 cameras with the spacing two feet apart. Placing more than one camera in the same plane will decrease the required fuselage length accordingly. All cameras must be operated in a pressurized area and must be accessible.

6. It is estimated that 10 feet of fuselage length will be required to house electronic personnel and their equipment. This space should provide a comparable working area for two operators facing the forward bulkhead and two facing the rear bulkhead with sufficient clearance between. This space should also be sufficient to house equipment listed in Appendix II.

7. The night photographic equipment listed in Appendix I as Item 4, camera, control box and bombs, may be deleted for daylight missions. The seven K-40 cameras may be deleted for night missions. It would be highly desirable to have the K-40 camera and bombs interchangeable. With this arrangement, it may be possible to carry a greater number of bombs (25 is the minimum).

8. It is requested that the Boeing Airplane Company make a study of the XB-52 airplane in its present configuration to determine if the space and arrangement is obtainable to accommodate the listed reconnaissance equipment. If it is found that the present configuration is not suitable for the installation of the required equipment, it is requested that a study be made which will alter the present design to accommodate the required equipment, by using as many of the presently proposed XB-52 major parts as is practicable.

9. It is desired to have performance curves showing the flight plan of the reconnaissance configuration include a plot of altitude and cruise speed against range.

FOR THE COMMANDING GENERAL:

GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

Copy to:
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13 MAY 1948

Director of Procurement & Industrial Planning
Deputy Chief of Staff, Materiel

Under Secretary of the Air Force

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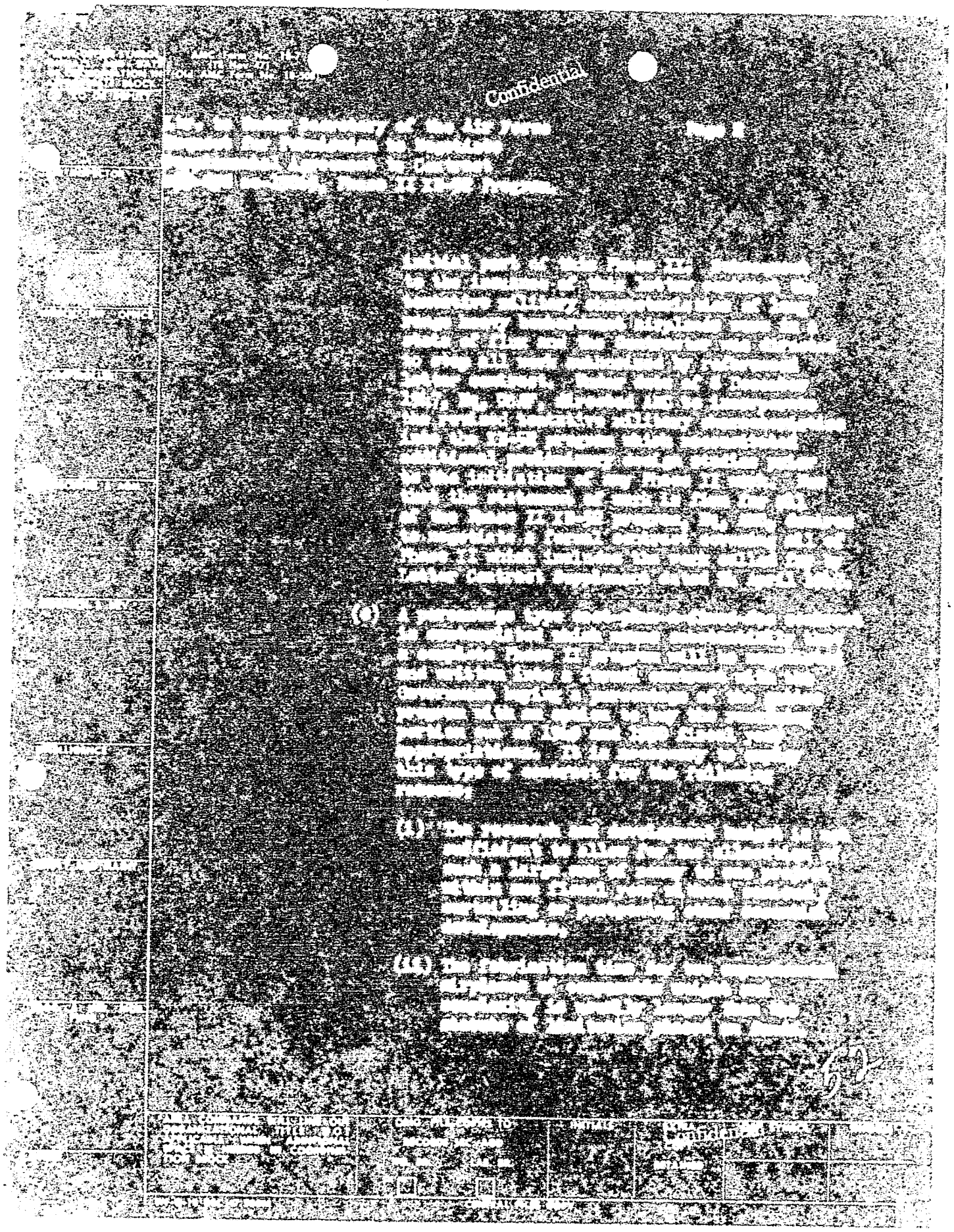
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(1) [illegible]

(2) [illegible]

(3) [illegible]

5. Subsection of Section I. The Douglas Aircraft Company has been advised by ARDC endorsement dated [illegible] of the urgency of this project, [illegible] designation.

6. This procurement is necessary in order to continue the development of the long range heavy bombardment airplane, [illegible].

7. The research to be conducted as a result of this procurement will be accomplished by Project [illegible] on the approved Technical Development Planning, and are within the scope of Joint Procurement Regulation No. 1.

FOR THE COMMANDING GENERAL:

H. A. SHEPARD
Brig. General, USAF
Chief, Procurement Division

Incl:
Subcontract

APPROVAL RECOMMENDED:

K. B. WOLFE
Major General, USAF
Director, Procurement and
Industrial Mobilization Planning

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AIR INSPECTOR
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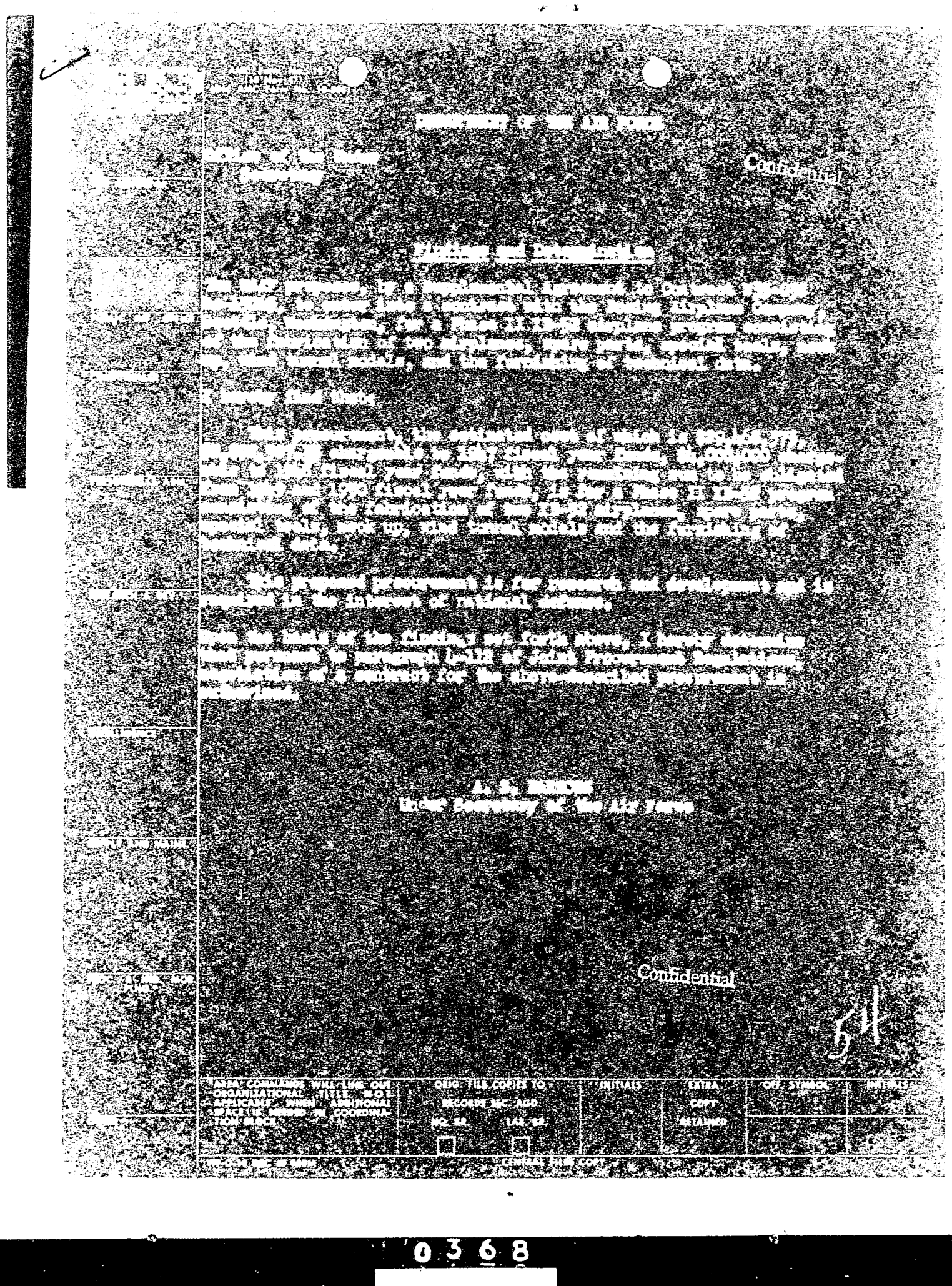

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Request for Reevaluation to Negotiate
Supplemental Agreement to Contract
W33-038 ac-15065 / Phase II XB-52 Program

3 cc's to Chairman of VB

TO: Chief of Staff
United States Air Force
Washington 25, D. C.

ATTN: Director of Procurement & Industrial Planning,
Mr. Riley, Deputy Chief of Staff, Materiel

Thru: Under Secretary of the Air Force
Washington 25, D. C.

1. a. Pursuant to Armed Services Procurement Regulation [illegible] Reference is made to a proposed supplemental agreement to the captioned contract and determination and findings executed by the undersigned Contracting Officer, Air Force Plant Representative Office, Seattle, Washington.

b. Description: Boeing Airplane Company, Seattle 24, Washington

Phase II XB-52 Program - two (2) XB-52 long range bombardment aircraft, spare parts, special tools, engineering, wind tunnel models, and technical data.

c. Prices: Estimated cost of initial procurement - $29,168,379.01.

Additional estimated cost to complete the program, (engineering design changes and installation of technical engineering) - $ 4,685,000.00.

d. Funds: Fiscal year 1947 - $ 2,852,807.39
Fiscal year 1948 - 4,000,000.00 with the remaining sum to be obligated during 1950 and [illegible] appropriations where said appropriations are made available. It is contemplated that the total amount of $6,852,807.39 obligated end of 1947 and 1948 fiscal year appropriations will be sufficient to maintain the planned continuity of the Phase II, XB-52 development.

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through 15 July 1949. Assuming the availability of 1950 fiscal year funds on 1 July 1949 in the amount of $15,000,000, continuity of the program can be maintained through fiscal year 1950. Continuation and final completion of the project will require approximately $6,900,000 from each of the fiscal year appropriations of 1951 and 1952. This budget planning includes approximately $4,485,000 to cover all anticipated engineering design changes found necessary during the development of the program and the installation of tactical equipment in at least one of the two airplanes.

6. Additional Information:

(1)

(a) This is a research and development procurement covering Phase II of the XB-52 program.

(b) A Letter Contract Supplement to Contract W33-038 ac-15065 dated 26 April 1947 in the amount of $2,958,307.77, 1947 fiscal year funds was given the Contractor covering the initial part of this Phase II. Subsequent to the issuance of this Letter contract the tentative military characteristics of long range heavy bombardment airplanes were in a state of flux and the Contractor was directed to stop all work authorized by referenced letter contract. Under date of 3 December 1947, the USAF, directed AMC to incorporate the revised tentative military characteristics into the XB-52 program which necessitated additional preliminary design studies prior to the initiation of any Phase II work. Now that the statement of work is firm for all of the Phase II XB-52 program, AMC desires to negotiate a formal contract covering all of the Phase II which includes the work called for by Letter Contract Supplement dated 26 April 1947.

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(c) A percentage type cost-plus-a-fixed-fee contract is contemplated which means substantially that a complete Phase II program will be negotiated and written into a formal contract with the Government buying a percentage of the entire program with an option to buy the remaining portion out of 1950 and subsequent fiscal year appropriations. It is necessary to employ this type of contract for the following reasons:

(1) The research and development budget is not sufficient to allow for the allocation of such a large sum of money to one project within one fiscal year without seriously curtailing or postponing other essential developments.

(ii) The fabrication time for two experimental airplanes of comparable weight and complexity is usually longer than the statute of limitation placed on funds.

(2) There has been invested to date $2,345,962.50 on the Phase I program of the XB-52 model.

(3) It is expected that the amount of $29,465,375 will be sufficient to cover the initial services called for herein, excluding engineering design changes and installation of tactical equipment.

(4) No progress has been made on Phase II development. Phase I development is nearing completion.

f. Selection of Source: The Boeing Airplane Company has been designated by T.I.No. 2167, Addendum No. 20 dated 31 May 1946 as the designer of the USAF model XB-52 airplane.

g. This procurement is necessary in order to continue the design and development of the long range heavy bombardment airplane, USAF Model XB-52.

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K. B. WOLFE
Major General, USAF
Director, Procurement and
Industrial Mobilization Planning

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ARMY AIR FORCES
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AIR MATERIEL COMMAND

MCRPDA-2/GWB/rh
Ext. 2-5282

MEMORANDUM REPORT ON

Date 8 June 1948

SUBJECT: Conference on Propellers for the XB-52 Airplane.

No. of pages - 3

OFFICE AIRCRAFT PROJECTS SECTION Contract or Order No. W33-038-ac-15065

SERIAL No. MCRPDA-2-1LC Expenditure Order No. 426-253

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A. PURPOSE:

1. To report the results of a conference held at the Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio on 11 and 12 May 1948 among Air Materiel Command, Boeing Airplane Company, Wright Aeronautical Corporation, Aero Products Corporation, Hamilton-Standard Corporation, and Curtiss-Wright Propeller personnel to discuss the engine and propeller program on the XB-52 airplane.

B. FACTUAL DATA:

2. The following personnel were in attendance:

Mr. J. A. Boyd in, Aircraft Projects Section, Engineering Division, AMC
Mr. G. W. Bellinger, Aircraft Projects Section, Engineering Division, AMC
Mr. K. F. Fromuth, Aircraft Projects Section, Engineering Division, AMC
Mr. A. F. Dernback, Propeller Laboratory, Engineering Division, AMC
Mr. W. T. Grady, Propeller Laboratory, Engineering Division, AMC
Mr. J. T. Locke, Propeller Laboratory, Engineering Division, AMC
Mr. F. M. Blair, Propeller Laboratory, Engineering Division, AMC
Mr. M. A. Bennett, Power Plant Laboratory, Engineering Division, AMC
Mr. R. H. Retz, Power Plant Laboratory, Engineering Division, AMC
Mr. G. Schairer, Boeing Airplane Company
Mr. A. G. Carlsen, Boeing Airplane Company
Mr. E. V. Mock, Boeing Airplane Company
Mr. V. Blumenthal, Boeing Airplane Company
Mr. E. C. Farrar, Wright Aeronautical Corporation
Mr. S. E. Nelson, Wright Aeronautical Corporation
Mr. H. N. St. John, Hamilton-Standard Corporation
Mr. G. Rosen, Hamilton-Standard Corporation
Mr. W. F. Chappel, Hamilton-Standard Corporation
Mr. J. M. Morgen, Curtiss-Wright Corporation

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19.2 Prop. Research
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dated 8 June 43

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Mr. G. P. Knapp, Curtiss-Wright Corporation
Mr. L. H. Enss, Curtiss-Wright Corporation
Mr. D. D. Bowe, Aero Products Corporation
Mr. R. C. Treseder, Aero Products Corporation

3. The normal design operation of the airplane after take-off will be a continuous climb at 220 knots IAS to an altitude of 35,000 feet, high speed of approximately 260 knots at 35,000 feet during the target run, then resume continuous climb to 53,000 feet at 220 knots IAS. The complete flight plan is based on continuous operation of the engines at 7080 RPM and 2160°R. This flight plan is representative of the flight plan for the maximum range of 8000 miles. Take-off will be accomplished with the engine operating in the "Landing and Take-off" regime at 7200 RPM. It is estimated that 22,000 pounds static thrust and/or 19,500 pounds thrust at 100 mph will be required for take-off.

4. A gear ratio of 10:1 was selected by the Air Materiel Command several months prior to the subject conference in order that the engine manufacturer might proceed with the design of the propeller gearing. This selection was based on an 18 foot, 8 blade propeller with an activity factor of 135. This propeller was estimated to have an efficiency of 83% at both cruising speed (463 mph) and maximum speed (500 mph) at 35,000 foot altitude. The airframe contractor pointed out that maximum efficiency must be obtained from the propeller in that 1% loss in efficiency represented 2 miles per hour loss in high speed and 1% loss in range. Thus, the primary objective of the propeller design should be to obtain the highest possible propeller efficiency at cruising and high speed.

5. The propeller manufacturers suggested that while the propeller gear ratio was based on an 18 foot, 8 blade propeller which appeared very good, it may be possible to improve the efficiency of the propeller by using a slightly different propeller diameter and a different number of blades, and requested that they not be limited to an 18 foot, 8 blade propeller, but that the maximum diameter be restricted by the airplane limits only, and the number of blades be optional. The basic objective of the propeller design being to obtain the highest possible efficiency at cruising and high speed. The airplane limits for purposes of propeller design were defined as 19 foot centerline to centerline of the nacelle, 9 feet 7-1/2 inches centerline of nacelle to ground, and 17 foot centerline of nacelle to fuselage. A 70-90 propeller shaft size was previously selected for the subject installation; however, propeller spacing has never been defined. The propeller manufacturers indicated that a 70L90 shaft in accordance with SAE Specification No. ARP-375 would provide satisfactory propeller spacing. For airplane design purposes, it was considered that airplane performance should be based on dimensionless propeller curves to be provided by the Air Materiel Command and based on an 18 foot diameter propeller with an efficiency of 83% at the cruise and maximum speed condition. The direction of rotation of the engine, the 90 spline shaft and the 70 spline shaft when viewed from the anti-propeller end

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of the engine will be counter-clockwise, counter-clockwise and clockwise respectively.

6. Mr. [illegible] of Boeing Airplane Company presented a summary of the results of tests run on the "E" and "F" type cowl. The results of Boeing's testing of the various configurations of these cowls indicate that the "E" type cowl is superior to, and less susceptible to losses due to fabrication irregularities than, the "F" type cowl. Boeing Airplane Company therefore strongly recommended that the "E" type cowl be used on the subject airplane. Due to the variations in the designs of the various propeller manufacturers, it was considered necessary that the propeller manufacturers establish the lines of the internal cowls and that the airplane contractor establish the external lines of the cowl and coordinate the development of the "E" type cowl with all of the propeller manufacturers concerned.

7. Insufficient data was available to determine whether a electrical or hot air propeller anti-icing system will be the most desirable for the subject airplane. It was the consensus that if some design studies indicate that an electrical intermittent type anti-icing system is the most desirable, approximately 25 KVA's per airplane would be required. The propeller manufacturers agreed a decision in this regard should be made, if possible. This, it will be necessary, in the light of the latter system, which is a 3 phase, electrical system, to determine the possibility of tapping off single phase power [illegible] and this system for anti-icing. In the event that these future tests indicate that a hot air system will be the most desirable, it was estimated that approximately 2 pounds per second of air would be required for each propeller and spinner. Wright Aeronautical Corporation pointed out that the present design of the engine does not permit the ducting of hot air around the cowl, spinner, and propeller anti-icing duct, a study will be necessary to determine the possibility of ducting the required hot air.

8. It was specifically applicable to the subject airplane that the extent of anti-icing required is not at all available. Theoretical [illegible] indicate that the "E" type cowl should be anti-iced as follows:

a. [illegible] of all internal propeller fairings.

b. [illegible] the entire edge of the first propeller [illegible].

c. [illegible] the outer [illegible] the chord on the inner surface of the outer [illegible] of the [illegible] propeller [illegible].

In view of the lack of [illegible] anti-icing requirements, it was recommended that the anti-icing system be designed in accordance with the theoretical. However, in the interest of saving weight in the airplane an

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establishing design parameters for future designs, it was further recommended that the Air Material Command initiate an anti-icing test program with the XP-77 to establish design requirements of an anti-icing system for an "E" type cowl.

9. The propeller fan[illegible] motor is designed for operation off of the airplane electrical system. The power requirements for each propeller were estimated by each propeller manufacturer as follows:

a. Hamilton Standard Prop.	4 KVA	208 Volts	3 Phase
b. [illegible] Prop.	3.5 KVA	208 Volts	3 Phase
c. Curtiss-Wright Corp.	1 KW	30 Volts	3 Phase

All of the propeller manufacturers reported that the propeller cone would be contained within the contour of the propeller dome.

10. Considerable concern was expressed by the propeller manufacturers regarding flow over propeller struts. The propeller manufacturers stated that a small change of inflow angle induced a marked increase in first order propeller stresses. Flow field tests are scheduled to be conducted by the airframe contractor to [illegible] a final airplane configuration can be established, and it was estimated that these tests will be started by August 1945. In order that the propeller manufacturers might assist in establishing the best nacelle angle, it was recommended that the airframe contractor transmit directly to the propeller manufacturers the necessary data for them to establish a best estimate for the nacelle angle which they will then submit to the Air Materiel Command who will establish a common angle to which the airplane contractor may base the final flow tests. The propeller manufacturers were invited by the airplane contractor to observe the tests and assist in the selection of a final nacelle angle. It was [illegible] that the propeller stress data collected [illegible] be of little practical importance in so far as showing the propeller [illegible]. It was indicated that it may be possible to the design [illegible] by the trailing edge of the inboard blade shown in sketch "A". However, in the meanwhile information indicated that a change in the trailing edge of the propeller beam and the inner shaft, which is the [illegible] of the transmission of the Hamilton propeller shaft, to determine if any improvement is possible on the T35-1 propeller shaft was in order.

11. In view of the selection of an "E" type cowl for the T35-3 engine installation, and since the T35-1 installation would be the first to fly, it was considered advisable that an "E" type cowl be developed for the T35-1 engine installation first so that any [illegible] could be gained with the "E" type cowl. The airframe contractor will [illegible] the cowl contours based on Curtiss-Wright Corporation T35-1 propeller hub drawings and furnish them to Curtiss-Wright Corporation for their use in the design of the cowl. It was noted by the Curtiss-Wright Corporation that the propeller blade to be used on the T35-1 engine installation, which consisted of the T35-1 hub provided with 13 foot 3 inch propeller blades which will result in approximately zero propeller ground clearance. It was recommended that the Curtiss-Wright Corporation

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investigate the feasibility of pulling in the blade tips so that the required ground clearance of three inches might be obtained. Otherwise, it will be necessary to cut off the end of the blade.

12. A review of the engine and propeller program revealed the following estimated schedule:

October 1948	-	Completion of design study for -3 dual propeller and spinner.
June 1949	-	Delivery of first -1 engine for use on airplane.
January 1950	-	First -3 test engine at Wright Aeronautical Corporation.
March 1950	-	Completion of engineering and fabrication of -3 dual propeller and spinner.
January 1951	-	Completion of ground test of -3 dual propeller and spinner.
January 1951	-	Flight test of -3 engine in nacelle either on XB-32 airplane or a B-17 airplane.
June 1951	-	Completion of four -3 flight propellers and spinners.
December 1951	-	Completion of four -3 50-hour flight engines.

13. The design of the subject airplane is based on the availability of reverse thrust which is not now available in the control for the T35-1 engine. Wright Aeronautical Corporation was requested to review the control schedule for the -1 engine and advise the Air Material Command if it will be possible to obtain reverse thrust provisions in the -1 engine control in time to meet the initial flight date of the airplane.

14. Wright Aeronautical Corporation stated that they will require 3 single rotation propellers which should be delivered prior to August 1948 for use in development testing of the -3 engine and control. Wright Aeronautical Corporation also requires three dual rotation propellers or test clubs with characteristics similar to the flight propeller by November 1949 for use in the development testing of the dual rotation gear box and engine control. A review of the propeller program indicated that single rotation propellers would be available as required and that a dual rotation test club with characteristics similar to the flight propeller would be available in June 1949.

7. CONCLUSIONS:

15. In view of the possibility of improving propeller efficiency, the propeller diameter should be restricted by the airplane limitations only and the number of blades should be optional to the propeller manufacturer, the

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dated 8 June 1948

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the primary objective of the propeller design being to obtain the highest possible efficiency at cruising and high speed (463 mph and 500 mph at 35,000 feet).

16. Propeller spacing shall be based on a 70L90 shaft size in accordance with SAE Specification No. ARP-375.

17. For airplane design purposes, the airplane performance shall be based on dimensionless propeller curves to be provided by the Air Materiel Command.

18. In view of the superiority of the "E" type cowl over the "D" type cowl, as evidenced by the results of tests conducted by Boeing Airplane Company, the design of an "E" type cowl should be pursued for the T35-3 engine installation.

19. In view of insufficient data to establish whether an electrical or hot air propeller and "E" type cowl anti-icing system would be the most desirable for the subject airplane, the selection of the propeller and cowl anti-icing system shall be based on an analysis of future design studies.

20. The "E" type cowl anti-icing system should be designed to anti-ice the following areas:

a. 25% of the chord of all internal propeller fairings.

b. Inner spinner back to the leading edges of first propeller blades.

c. 15% of the chord on the outer surface and 25% of the chord on the inner surface of the outer spinner (the chord being defined as the distance from the leading edge of the spinner to the first break between rotating elements).

21. A program with the NACA should be initiated to establish design parameters for an anti-icing system for "E" type cowl installations.

22. The airplane contractor field flow test should be based on the nacelle angle furnished by the Air Materiel Command. This angle will be the result of a compromise of the best estimates on nacelle angle by the propeller manufacturers.

23. In view of the selection of an "E" type cowl for the T35-3 engine installation, an "E" type cowl should be developed for the T35-1 engine installation in order that experience may be gained on an "E" type cowl prior to flight of the T35-3.

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dated 8 June 1942

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2. RECOMMENDATIONS:

It is recommended that the following actions be taken by the organizations indicated:

a. [illegible] Company

(1) Establish and transmit to the Air Material Command for distribution to the propeller manufacturers the external lines of the T3-3 type "C" cowl.

(2) Investigate the possibility of providing single phase power for propeller and spinner anti-icing.

(3) Conduct flight tests to establish the compromise nacelle angle to be established by the Air Material Command.

(4) Transmit required data as requested by the Air Material Command to the propeller manufacturers for use in establishing their best estimate of nacelle angle.

(5) Establish and transmit to the Air Material Command the requirements for the T3-1 type "" cowl.

(6) Complete development of T3-1 and T3-3 "" type cowl with the necessary data for propeller manufacturers.

b. [illegible] Material Command

(1) Study a means of extracting and routing approximately 2 pounds of air per second from the engine for use in propeller and "B" type cowl anti-icing system.

(2) Study a means of preventing the pulling action between the propeller bearing and the [illegible] propeller shaft caused by the breakdown of LP material into the sheet.

(3) Advise the Air Material Command as to the availability of reverse thrust provisions in the T3-1 engine control. Reverse thrust is required for the initial flight of the airplane.

c. Propeller manufacturers

(1) Establish the internal lines for the T3-3 "B" type cowl and compile to design of the cowl with Boeing Airplane Company.

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M.R. #MCR-2-1429 dtd Jun 44

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(2) Submit to the Air Materiel Command a best estimate for a nacelle angle as based on data to be supplied by Boeing Airplane Company.

(3) Study a means of anti-icing the propeller and "E" type cowl.

(4) Study a means of designing the propeller hub to prevent transmission of IF moment into the propeller shaft.

(5) Curtiss-Wright Corporation to investigate a means of [illegible] tips of the propeller blades for use with [illegible] installation in order to provide adequate ground clearance.

d. Air Materiel Command

(1) Propeller Laboratory to initiate a program with NACA to establish design parameters for an anti-icing system for an "E" type cowl.

(2) Propeller Laboratory to arrive at a compromise nacelle angle from the best estimates as submitted by the propeller manufacturers for use in the field flow test to be conducted by Boeing Airplane Company.

(3) Transmit dimensionless propeller curves to Boeing Airplane Company on which they can base airplane performance.

Prepared by G. W. BOLLINGER (Name)

Approved by H. E. WARDEN, Lt. Colonel, USAF, Bombardment Branch (Chief.)

Approved by GEORGE F. SMITH, Colonel, USAF, Chief, Aircraft Projects Section, Engineering Division

Concurrence: [illegible], Colonel, [illegible]

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Propeller Lab., [illegible] Div.

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FINDINGS AND DETERMINATIONS

1. The USAF proposes, under Purchase Requests Nos. 45720 and 63026, to enter into a Contract (Supplemental Agreement to Contract W33-038 ac-15065 with the Boeing Airplane Company, Seattle, Washington), for the fabrication of two (2) XB-52 airplanes, spare parts, special tools, wind tunnel models, and technical data.

2. I hereby find that:

a. This procurement, the estimated cost of which is $29,468,373 of which $2,892,587.33 chargeable to 1947 fiscal year funds, $24,000,000 chargeable to 1948 fiscal year funds and the remaining sum to be obligated from 1950 and subsequent fiscal year appropriations (if and when said appropriations are made available), is for the fabrication of two (2) XB-52 airplanes, spare parts, special tools, wind tunnel models, and technical data.

b. Due to the complexity and experimental nature of the work and the long fabrication time necessary, it is impractical to secure supplies of this kind without the use of a cost-plus-a-fixed-fee contract.

3. Upon the basis of the findings set forth in paragraph 2 above, I hereby determine that pursuant to Section 4(b), Public Law 413, 80th Congress, use of a cost-plus-a-fixed-fee contract for the above-described procurement is authorized.

K. B. WOLFE,
Major General, USAF
Director, Procurement and
Industrial Mobilization Planning

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AFCRL/B Col Holroyde/js/6328

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JUN 14 1946

MEMORANDUM FOR GENERAL ARNOLD:

SUBJECT: New Medium Bomber and B-52 Armament

1. After the war, we initiated the development of a new medium bomber to replace the B-50 series. Military Characteristics were set up asking for a high speed of 500 mph plus for 15 minutes at the tactical operating altitude of 35,000 feet, 2500 statute miles radius of action, with a desired over-all cruise speed of 500 mph and 475 mph required average speed. All-around defensive armament was required, and an over-all weight limitation of 200,000 lbs. was imposed. This was sent to Wright Field for preliminary study and was also included in the agenda for the First Meeting of the USAF Aircraft and Weapons Board.

2. Wright Field, on the basis of their study, came back with the distressing news that it was impossible to build such an airplane within the 200,000 lb. limitation. Their estimates ranged from 300,000 lbs. to infinity. As a result of this analysis, when the Weapons Board convened in August 1947, the Medium Bomber Subcommittee discussed the Wright Field thoughts on the matter. Several possibilities existed for reduction in performance in order to stay within the 200,000 lb. weight limitation. These included reduction in speed, range, radius of action, operating altitude, bomb load, armament, etc. The Bombardment Subcommittee recommended that the most practical solution was to eliminate all armament except tail guns.

3. The Weapons Board was violently opposed to this suggestion and all the General Officers present agreed that all-around armament was mandatory. (Reference attached Comments by Gen. Leahy at the Weapons Board Meeting.) The solution which was approved by the Weapons Board was that Wright Field felt was feasible was to reduce the radius of action from 2500 to 2000 miles and reduce the operating speed from 475 mph required to 360 knots (~420 mph). The present medium bombardment proposals are being evaluated as a result of these characteristics.

4. The August session of the Aircraft and Weapons Board decided to continue the B-52 development program contingent on the result of a board study to determine the optimum method of delivering the atomic bomb. A Board conference cast serious doubt as to whether the B-52 would be an efficient method of delivering the atomic bomb from North American bases. As a result, Colonel Perkins and a board of officers from the various commands convened to study the whole B-52 program.

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Holroyde

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Their recommendations included the following: Development of air-to-air refueling methods to enable the current B-47 bomber to obtain intercontinental range, a minimum crew, a speed of 500 knots, 4,000 nautical miles, [illegible] refueling provisions for bomber or tanker only.

[illegible] the Board's findings, it was felt that it was the best solution to providing a weapon that could utilize North American bases to carry out the atomic warfare attack. The conclusions of the Perkins Board were approved by Headquarters, USAF, and were sent to members of the Aircraft and Weapons Board as well; concurrence was received from Strategic Air Command.

[illegible] at the same meeting on the 4th January, [illegible] B-47 characteristics were discussed. In these discussions, Strategic Air Command reversed its stand [illegible] and favored [illegible] B-47. When a vote was taken to reconfirm the B-47, all votes were favorable with the exception of General [illegible] and General Stratemeyer. General Stratemeyer's non-concurrence, as stated, was not based on the aircraft, but on the belief that B-[illegible] should be started in favor of a fast reconnaissance aircraft.

[illegible]
Colonel, USAF

[illegible]
Brigadier General, USAF
Chief, Requirements Division
Directorate of Training &
Requirements

1 Incl:
Memorandum, Deputy's Comments
[illegible]

[illegible]

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Director of [illegible] Development 1 JUN 1964

Director of [illegible] 3.1 el [illegible]ts/js/73045

1. [illegible] ... mirror ... [illegible] ... meetings, and ... [illegible] ... P-3 Program ... [illegible] ... meetings, ... [illegible] ... development ... [illegible] ... P-3 ... [illegible] ... [illegible] ... [illegible]

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B-2 Program

Director of Strategic Studies 15 JUN 1948

Director of Publications Colonel Tibbets/js/73045

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E. E. PARKER, Lt. Col., United States Air Force

Director, Publications Division

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Contr. W33-038 ac-15065
Corres., Vol. 2
Contr. Files -B

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MCPPOA-2/GWB/rh

15 June 1948

Contract W33-038 ac-15065
XB-52 Airplane
Range Extension

Boeing Airplane Company
Seattle 14, Washington

1. It appears that it may be possible to incorporate structural provisions, not now contemplated for the XB-52 airplane, which will permit future range extension under an overload condition by the use of external wing fuel cells with a minor weight penalty to the basic airplane, and will permit flight with or without the external fuel cells attached.

2. In order that the desirability of incorporating such provisions in the subject airplane may be determined, information regarding the possible range extension, the weight penalty for the basic airplane, and the performance available under the overload condition for various capacity external fuel cells, together with the Contractor's comments and recommendations thereon, are requested.

FOR THE COMMANDING GENERAL:

KN.Scholes
for GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

cc:
USAF Plant Rep.
Boeing - Dayton

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BOEING AIRPLANE COMPANY

SEATTLE, WASHINGTON

JUN 22 1948

CONFIDENTIAL

In Reply Refer
To Reference No.
E751-1340

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCRECA-5

Through: AF Plant Representative
Boeing Airplane Company
Seattle Division
Seattle 14, Washington

Subject: Strategic (Reconnaissance) Version of XB-52

Reference: (a) Air Materiel Command letter MCRECA-5/
JMV/kfh dated 28 April 1948.

1. In accordance with reference (a), studies relating to the possibility of converting XB-52 type aircraft to strategic reconnaissance airplanes have been going forward. However, all of the information necessary for completion of this investigation has not heretofore been available. Such information has now been received through the contractor's Dayton office, and it now appears that this study may be completed and forwarded to the Air Materiel Command during the month of July. The contractor will make every effort to furnish these data at the earliest possible date.

BOEING AIRPLANE COMPANY
SEATTLE DIVISION

/s/ George C. Martin
George C. Martin
Chief, Preliminary Design

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AAS [illegible]
Rev [illegible]

ROUTING AND RECO[illegible] SHEET

AIR [illegible] COMMAND

For [illegible] form [illegible]
within headquarters

Number [illegible]

For [illegible]

SUBJECT

TO [illegible] FROM [illegible] BUILDING

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[illegible] Hq USAF

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WRIGHT-PATTERSON AFB OHIO CONTINUED ON OTHER SIDE

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CONFIDENTIAL 33

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON

AMLL-3 30 June 1948

SUBJECT: Xb-52 Configuration

TO: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCLSA-1

1. The United States Air Force Aircraft Characteristics Summary (T-28234) 15 May 1948, prepared by Air Materiel Command, shows the take-off weight of the B-52 as 360,000 pounds.

2. On 14 February 1948, Mr. Wells of Boeing, presented to this Headquarters, a finalized proposal on the Xb-52, indicating that the aircraft would weigh from 285,000 to 300,000 pounds.

3. It is requested that this Headquarters be advised regarding the validity of the Xb-52 Characteristics as presented in T-28234.

BY COMMAND OF THE CHIEF OF STAFF:

L. C. CRAIGIE
Major General, U. S. Air Force
Director of Research & Development
Office, Deputy Chief of Staff, Materiel

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No. 19-7

WRITE OFFICE SYMBOL AND FULL SIGNATURE IN APPROPRIATE BLOCK

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AIR INSPECTOR

PUBLIC INF. OFFICE

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PERSONNEL & ADM.

RESEARCH & DEV.

INTELLIGENCE

SUPPLY AND MAINT.

PROC. & MIL. MOB. PLNS.

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(Basic ltr fm Hq, USAF, AFMPC-2A dtd 6-24-48 TO CG, AMC, Attn: MCPC, Subject: Authority to Negotiate Supplemental Agreement to Contract W33-038 ac-15065 with Boeing Airplane Company).

MCPC 1st. Ind. HWB/ris

Hq, AMC, Wright-Patterson AF Base, Dayton, Ohio. 7 July 1948.

TO: Chief of Staff, United States Air Force, Washington 25, D. C.
Attn: Director of Procurement & Industrial Planning,
Office, Deputy Chief of Staff, Material.

TO: Under Secretary of the Air Force, Washington 25, D. C.

1. Forwarded herewith for approval by the Under Secretary of the Air Force is revised Findings and Determination authorizing negotiation of a Supplemental Agreement to Contract W33-038 ac-15065 with the Boeing Airplane Company, Seattle, Washington, covering the procurement of a percentage of Phase II of the XB-52 airplane program. Revised Findings and Determination is necessary since the sum of $4,000,998.97 of 1949 Fiscal Year Appropriations has been committed on Purchase Request No. 63026, Expenditure Order No. L26-853, Project No. 611-09. The commitment of 1949 Fiscal Year Funds to this project was necessary since 1948 Fiscal Year Appropriations for research and development were 100% obligated prior to the time this procurement could be formalized.

2. Returned herewith is the Findings and Determination previously approved by the Under Secretary of the Air Force.

FOR THE COMMANDING GENERAL:

H. A. SHEPARD
Brig. General, USAF
Chief, Procurement Division

2 Incls.
Incl. 1 - Findings & Determination dated 6-24-48 (in dup.)
Incl. 2 - Findings & Determination undated (in sextuple)

APPROVAL RECOMMENDED

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DEPARTMENT OF THE AIR FORCE
WASHINGTON

OFFICE OF THE UNDER SECRETARY

14 JUL 1948

FINDINGS AND DETERMINATION

The USAF proposes, by a Supplemental Agreement to Contract W33-038 ac-15065, to enter into a contract with the Boeing Airplane Company, Seattle, Washington, for a percentage of a Phase II XB-52 airplane program, consisting of the development and fabrication of two (2) airplanes, spare parts, special tools, mock-ups, wind tunnel models and the furnishing of technical data.

I hereby find that:

(a) This procurement, consisting of $2,892,587.33 chargeable to 1947 Fiscal Year Funds (heretofore obligated for this project by Letter Contract dated 24 April 1947), and $4,000,938.97 chargeable to 1949 Fiscal Year Funds, is for a percentage of a Phase II XB-52 Program, consisting of the development and fabrication of two (2) XB-52 airplanes, spare parts, special tools, mock-ups, wind tunnel models and the furnishing of technical data.

(b) The proposed procurement is for research and development and is required in the interest of National Defense.

Upon the basis of the findings set forth above, I hereby determine that pursuant to Section 2(c)(11), Public Law 413, 80th Congress, negotiation of a contract for the above-described procurement is authorized, upon the following conditions:

(a) Fiscal Year 1947 and 1949 Funds limited to the amount of $6,893,526.30, representing the estimated cost and fixed fee allocable to approximately 23 1/2% of the total work, may be obligated by said contract;

(b) Nothing contained herein or in any contract resulting herefrom shall be construed as committing, or creating an obligation to commit any funds to this project for additional work in excess of said 23 1/2% which may hereafter be appropriated, and no funds other than those heretofore appropriated as set forth in (a) above shall be committed or obligated to this project for additional work in excess of said 23 1/2% without the express prior approval of the Under Secretary of the Air Force. Provided, however, that nothing herein can be construed as preventing the commitment or obligation of appropriated funds that may be required for changes in work authorized herein or for increases in cost of said work over and above the estimated cost.

A. S. BARROWS
Under Secretary of the Air Force

Fund + Work Supp. 5

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Subject: XB-52 Configuration

To: intuflite
WDB

1st Ind MCREOA-2/GWB/mn

Hq AMC, Wright-Patterson Air Force Base, Dayton, Ohio, 19 July 1948

TO: Chief of Staff, United States Air Force, Washington 25, D. C.,
ATTN: Director, Research & Development, Deputy Chief of Staff, Materiel

1. The XB-52 configuration presented in "U.S. Air Force Aircraft Characteristics Summary" (T-28234) dated 15 May 1948, was inadvertantly based on data for an alternate configuration presented by the contractor in conjunction with the data for the basic airplane.

2. The "U.S. Air Force Aircraft Characteristics Summary" (T-28234) is currently being revised to present the subject airplane as it is defined by "Military Characteristics for Heavy Bombardment Aircraft" dated 8 December 1947, as revised 17 March 1948, and as approved by The Aircraft and Weapons Board. This airplane has a gross weight of approximately 280,000 pounds.

FOR THE COMMANDING GENERAL:

for M Klein Col USAF
GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

45-21 Navy Bureau Nos

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JUL 28 1948

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E70-902

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base

ATTENTION: MCREOA-2

Through: Air Force Plant Representative
c/o Boeing Airplane Company
Seattle Division
Seattle 14, Washington

Subject: Contract W33-038 ac-15065 - EX-839
Model XB-52 Variant Studies - Range Extension

Reference: (a) AMC letter MCREOA-2/O.B/rh, Subject: Range Extension, dated 15 June 1948.
(b) BAC secret Document D-8973.
(c) BAC secret Document D-9220.
(d) BAC secret Document D-9224 (jet refuel).
(e) BAC secret Document D-9225 (prop. refuel).
(f) BAC letter E70-835, Subject: Design Objectives, dated 23 July 1948.

1. In conversations during May 1948 between Lt. Col. H. E. Warden of A.M.C. and Mr. G. S. Schairer of Boeing Airplane Company, the Contractor was requested to expand a preliminary study of the performance of the subject airplane equipped with Westinghouse J-40 engines and to perform studies of range extension made possible by overweight refueling on both the propeller and jet airplanes. Reference (a), which further requested the Contractor's comments on the data supplied, confirmed a portion of the above request. Accordingly, three copies each of references (b), (c), (d) and (e) are enclosed herewith under shipment notice No. 6467, and the following comments are offered.

2. The enclosed reports are intended to present an organized survey of the performance possibilities of the XB-52 configuration variants. These include a basic jet airplane incorporating minimum changes from the basic propeller airplane with external tanks sufficient only for a gross weight of 280,000 lbs (which is the weight of the basic turbo-prop airplane) and variants of the turbo-prop and jet airplanes to provide for refueling to weights greater than takeoff weight permitting future range extension. For

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convenience, a brief comparative performance summary of the four configurations follows:

		Basic Prop. Airplane	Basic Jet Airplane	Refuel Prop.	Refuel Jet
Boeing Model No.		464-35	464-40	464-35	464-40
Boeing Report No.		D-8973	D-9220	D-9225	D-9224
Range w/15,000# bombs & high speed run 4000 mi in target region	Stat. Mi	8,000	6,750	13,300	10,350
High Speed @ 35,000 ft @ target weight	MPH	500	536	498	535
Cruise Speed for Max. Range, 35,000 ft Alt & Above	MPH	464	483	464	483
Service Ceiling @ target weight	FT	42,000	45,200	40,700	44,700
Weight of external fuel & tankage	LBS	0	13,000	170,000	183,000
Gross Weight after refueling	LBS	280,000	280,000	450,000	450,000

It should be noted that provision for the overweight tankage will add to the weight empty of the basic airplanes at the rate of approximately 60 lb per 10,000 lb of additional gross weight provided for. However, approximately 60,000 lb of overweight tankage provisions can be added with no increase in basic weight empty, by substituting external tank provisions for the 660 gal of internal tankage now provided in the 464-35 airplane to permit refueling to 280,000 lbs gross weight after the Nos. 2 and 3 landing gears have been dropped.

3. The basic turbo-prop airplane, D-8973, was designed to fulfill the Air Force requirements specified in the "Design Requirements for Heavy Bombardment Airplane" dated 6 January 1948, and in accordance with the Design Objective Flight Pattern therefor forwarded with reference (f).

4. It will be noted that the basic jet airplane, Boeing Model 464-40 (D-9220), compares quite favorably with the Model 464-35 (D-8973) and with the Air Force requirements. As could be expected in changing to jet power plants and higher powers, the available speeds have been increased and the range has been reduced. However, the resulting reduction in range appears

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quite reasonable in view of the higher performance available in climb, ceiling, and cruising and maximum speeds. Takeoff distances are somewhat extended and RATO installations which were not needed because of the exceptional takeoff performance of the jet airplane may be considered desirable on the jet airplanes. In choosing to accept only the maximum range cruising condition of the jet airplane in such that cruising power is approximately 65% of normal rated power and effective wing loading is relatively low. The Model 464-40 basic jet airplane therefore appears to be a desirable tactical airplane, combining excellent speed-range characteristics.

The jet airplane entails very little compromise in the basic turbo-prop airplane to permit the same basic airplane to be used for both jet and turbo-prop power plant installations. Necessary structural modifications are outlined in D-9220.

5. The ranges attainable with overweight refueling after takeoff are gratifying and in the Contractor's opinion justify a modified concept of the refueling mission. In order to use the attainable ranges from point of completion of refueling and to [redacted] it would appear desirable to consider refueling immediately after takeoff and climb to a suitable refueling altitude in order to eliminate the difficulties of [redacted] rendezvous, which need not be elaborated here.

The data in references (d) and (e) may be used to determine "all out" ranges for varying amounts of external fuel added after takeoff and also for ranges with given amounts of reserve fuel. All the range figures shown are predicated on a mission dropping 25,000 lbs of bombs at one-half range, with the 2000 miles on each side of the target flown at approximately 500 mph. Flight paths are, in general, slight climbs to permit flight at constant values of effective wing loading, so as to achieve maximum range flight for a given constant cruising speed, except that the speed runs for the turbo-prop airplane are made at a constant altitude of 35,000 ft in order to achieve the desired high speed in the target region.

6. It will be noted from an examination of the performance available curves of the basic jet airplane that it is limited in speed at the lower altitudes by structural considerations and at the upper altitudes by compressibility buffet. Cutoff lines are shown at values of $\frac{W}{\delta} = 1{,}300{,}000$ which is equivalent to an effective wing loading of 500. This is the value at which the reserve C_L in level flight would permit the application of a maneuver load of 1.25 at cruising Mach No. for the jet airplane and 1.30 at cruising Mach No. for the turbo-prop airplane. These values are arbitrarily selected, and while the exact values chosen may be subject to review, it is evident that for tactical flight some margin for maneuver must be available and some corresponding limitation on effective wing loading observed. The value of $\frac{W}{\delta S} = 500$ lbs is, in the Contractor's opinion, a reasonable compromise between necessary maneuver margin and performance. Such an arbitrary limitation does not mean that the airplane cannot be flown beyond the limit, but that flight at higher values of $\frac{W}{\delta S}$ can be made only with reduced margins of maneuver factor available.

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7. Since the preparation of the power available and fuel consumption curves on which the enclosed data are based, the Contractor has received [illegible] of a revised engine specification covering the XJ40-WE-6 engine which is being reviewed and may result in minor modifications to the data already supplied, but it appears that final data based on this new specification will be closely comparable to that already obtained.

BOEING AIRPLANE COMPANY
SEATTLE DIVISION

A. G. Carlson
Chief Project Engineer

Encl.
Shipment Notice
No. 6467

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Weight Reduction
Bomb. Sect., Airc. Br.,
DCS/M

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AIR STAFF SUMMARY SHEET

			DCS/O, D/T&R, Requirements Division
DCS/O	2	Approval	
DCS/M	3	"	
Asst for Programming	1	"	Colonel Tibbets 6328
Chief of Staff	4	"	

Oct 6 1948

SUBJECT: Weight Reduction and Simplification of the B-52 Airplane.

SUMMARY

1. Attached as TAB A is a recommendation for the weight reduction and simplification of the B-52 airplane.

2. Present indications are that the B-52, as proposed by the heavy bombardment committee in late 1947, will prove to be too large an aircraft. Incorporation of the recommendations included in the attached TAB should reduce the size of the airplane and simplify its operation.

3. A weight reduction of 9,028 pounds is indicated as a result of this study. In all probability further weight reduction will be realized over and above those indicated by the attached TAB.

4. Two (2) significant recommendations have been made to the effect that the B-52 will be equipped to carry conventional bombs; whereas, previously, it has been envisioned as an Atomic Bomb carrier only. Secondly, it is recommended that the design of the airplane incorporate the requirement that the bomb load shall be 10,000 pounds for its maximum range in lieu of the 15,000 pound load, now proposed. This is in keeping with other aircraft of the medium and heavy bombardment class.

5. The committee which considered these weight reductions was as follows:

Major General E. M. Powers, Asst. Deputy Chief of Staff, Materiel
Brig. General R. C. Coupland, Director of Armament, DCS/Materiel
Brig. General D. W. Hutchison, Asst. Chief of Staff, A-3, Strategic Air Command
Brig. General C. A. Brandt, Chief, Requirements Division, D, T&R, DCS/Operations
Colonel Ben I Funk, Procurement Division, Aircraft Section, AFC

The committee was unanimous in its vote of all items listed.

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TC-72
Weight Reduction
Bomb. Sect., Airc.
Br., DCS/M

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Air Staff Summary Sheet, 6 Oct. 1948

Subj: Weight Reduction and Simplification of the B-52 Airplane.

It is recommended that the proposed weight reduction and simplification of the B-52, as proposed, be approved and the Air Materiel Command be directed to initiate necessary action.

/s/ K. P. McNaughton

K. P. McNAUGHTON
Brigadier General, USAF
Acting Director
Training and Requirements

[List not attached]

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15 XB-52 Vacuum Insc. 23
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Bomb. Br., Eng. Div.

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10/15/48

E C WELLS TO M P. CREWS QTEX 15 OCT 48 12-30 PM

E 757-455 ... MANAGEMENT CONFERENCES WITH GENERAL WOLFE AND MR. JANSE OF AMC REVEALED IN NEED FOR ADDITIONAL SPACE TO EXPEDITE THE IMMEDIATE PRODUCTION OF B-50D AND D AIRPLANES. THIS REQUIRES IMMEDIATE TRANSFER OF MX-820 MOCK-UP TO RENTON PLANT WHICH WILL DELAY MOCK-UP INSPECTION DATE UNTIL APPROXIMATELY NOVEMBER 28. WILL ADVISE FIRM DATE AS SOON AS CAN BE ESTABLISHED. PLEASE INFORM COLONEL WARDEN.

LAST NAME IN FIRST LINE SHD BE "FOR JANSEN"

END DG

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XB-52
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Vol. 2, 1948
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AFWD/GenPutt/ee/71500
AFMDC-2/ColBogard/vh/3154

16 OCT 1948

MEMORANDUM FOR GENERAL NORSTAD

SUBJECT: XB-52 Long Range Bombardment Airplane

1. The XB-52 is designed to supersede the B-36 as a long range strategic bomber. Its combination of aerodynamic refinement and turbo-propeller engines are the only presently known means of achieving characteristics of both long range and high speed.

2. Due to the difficult performance requirements which had to be met by the B-52, aerodynamic and structural margins, though still adequate, have been stretched farther than has been the case in past designs. Therefore, growth through a series of models similar to that of the B-29 is not visualized. Some improvement in range, with changes in engine installations, will occur with improvement in fuel economy as power plant development progresses. Range extension by flight refueling techniques is, of course, applicable to the B-52.

3. It is visualized that large improvement in this class of aircraft will come with radical developments which will require completely new airframe developments. It is also believed that unless supersonic propellers become a reality, future aircraft of this class will be powered by turbo-jet engines. However, neither of these developments are sufficiently near at hand that the turbo-prop step can be eliminated.

4. An urgent requirement exists for the B-52 in its present configuration to insure against the eventuality that foreign bases from which shorter-range aircraft can operate are denied to us.

5. An extract of details of the XB-52 from "U. S. Air Forces Aircraft Characteristics Summary," is attached, TAB A.

Signed:

H. A. CRAIG
Lieutenant General, USAF
Deputy Chief

AFMDC
Bogart

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AAF Form No 1r-228
(Rev 27 Feb 48)

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Project No.

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Supplemental Agreement No. 5 (S-19420)
to Contract No. W 33-038 ac-15065 (16412)

Classification 01
Exp. Ord. No. 426-253
PR 63026
AFP 445720
Initiator: G. M. Bollinger (MCREOA-2)
T. P. Savage, 1st Lt., USAF
(MCREOA-2)

-1- 8

SUPPLEMENTAL AGREEMENT
TO
COST-PLUS-A-FIXED-FEE CONTRACT
for
SUPPLIES

H. A. SHEPARD
Brigadier General, USAF
In the absence of

K. B. WOLFE
Major General, USAF
Director, Procurement and
Industrial Planning

OCT 1 DEPARTMENT OF THE AIR FORCE

(UNITED STATES AIR FORCE)

HSB:rb

CONTRACTOR: BOEING AIRPLANE COMPANY

SUPPLEMENTAL AGREEMENT FOR: Partial Phase II Program, XB-52 Airplane

CHANGE IN ESTIMATED COST: $6,472,794.65

CHANGE IN FIXED FEE: 420,731.65

Payments to be made by the Finance Officer, U. S. Air Force, Building 120, Area "C", Wright-Patterson Air Force Base, Dayton, Ohio.

The supplies and services, if any, to be obtained by this instrument are authorized by, are for the purpose set forth in, and are chargeable to the allotments below enumerated under the heading "Debit", the available balances of which are sufficient to cover the cost thereof. The reduction, if any, in estimated cost and fixed fee under this instrument will result in credits to the allotments below enumerated under the heading "Credit"

	Debit
5790200 702-7004 P 611-09 S 33-038	$4,000,938.97
2170705 702-7004 P 611-09 S 33-038	$2,892,587.33

The USAF Plant Representative at Boeing Airplane Company, Seattle, Washington, is hereby designated as the officer having overall administrative responsibility for this Supplemental Agreement.

This Supplemental Agreement supersedes Supplement Letter Contract W 33-038 ac-15065, dated 24 April 1947, as amended.

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This Supplemental Agreement has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941, and Public Law 413, 80th Congress, Section 2 (c) (11).

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SUPPLEMENTAL AGREEMENT
TO
COST-PLUS-A-FIXED-FEE CONTRACT
FOR SUPPLIES

CONFIDENTIAL

THIS SUPPLEMENTAL AGREEMENT NO. 5 (S-19420) to Contract W33-038 ac-15065 (16412), entered into this tenth day of November, 1948, by and between THE UNITED STATES OF AMERICA, hereinafter called the "Government", represented by the Contracting Officer executing this Supplemental Agreement, and BOEING AIRPLANE COMPANY, hereinafter called the "Contractor", organized and existing under the laws of the State of Delaware, of the City of Seattle, in the State of Washington.

W I T N E S S E T H

WHEREAS, the Government and the Contractor have heretofore entered into Contract No. W 33-038 ac-15065 (16412), which contract is hereinafter referred to as the "Supplies Contract", and

WHEREAS, the Government desires and the Contractor has agreed to perform additional work;

NOW, THEREFORE, in consideration of the premises and of the mutual covenants and agreements herein contained and for other good and valuable considerations, the parties hereto agree as follows:

First: Paragraph (a) of Article 1 of the Supplies Contract is hereby amended by providing that the Contractor shall perform 23-1/2% of the total of the following additional items of work:

"Item 8 - Complete the design of, and construct two (2) airplanes, long range heavy bombardment experimental, being Contractor's Model 464-35-0 and likewise designated as USAF Model XB-52 complete and conforming to Contractor's Detail Model Specification No. D-8986, dated 1 March 1948, except that said airplanes shall be designed for the XT-35-W-5 model gas turbine with a minimum of substitutions required to permit initial flying with XT-35-W-1 gas turbines and the airplanes shall not have installed any tactical equipment other than communications equipment necessary for flight test of the airplanes. However, complete engineering shall be made for the tactical equipment.

"Item 9 - Maintenance spare parts for the airplanes called for under Item 8 above. The items and quantities of such spare parts and the respective unit and total estimated cost thereof shall be determined in accordance with the provisions of Appendix I entitled 'Spare Parts and Special Tools Provisioning Appendix for Use in Connection with Contracts for Experimental Aircraft' attached hereto and hereby made a part hereof.

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(b) Such additional models as may be determined necessary to satisfactorily accomplish the items set forth in paragraph (2) of this item.

(2) Conduct wind tunnel tests in Contractor's high speed wind tunnel, establishing at least the following:

(a) Rudder and elevator hinge moments.

(b) Full span flaps, leading edge slots, and/or other devices to insure satisfactory stalling and lateral control characteristics.

(c) Radome, pilot's canopy, and other external protuberances found necessary during development of the airplane.

(d) Satisfactory flutter characteristics of the airplane.

"Item 13 - Alter the mock-up called for under Item 7 above as may be required for the continued development of this project. Said mock-up shall be made available to the Contractor for this purpose. In addition, two (2) copies of photographs, showing all altered installations shall be furnished.

"Item 14 - Design and construct an engine ground test rig, test nacelle and provisions for and installation of a Government-furnished power plant. Conduct test run of an XT-35-W-1 engine in the test rig for not to exceed 20 hours for the purpose of obtaining at least the following data:

(1) Functional check of all items of equipment installed in the nacelle.

(2) Vibration characteristics.

(3) Cooling characteristics.

The items of equipment that are furnished by the Government to the Contractor under this contract for the airplanes called for in Item 8 above and that are required for the tests called for under this item shall also be furnished by the Government to the extent required.

"Item 15 - Design and construct a ring cowl and design and furnish an exhaust system suitable for use on the ground test nacelle called for in Item 14 above.

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"Item 16 - Conduct the following developmental investigations and/or tests to develop the design of at least the following listed airplane components and systems:

(1) Self-sealing ~~Leakproof~~ fuel tanks for body and wing fixed fuel.

(2) Control surface boost systems.

(3) High voltage electrical system and equipment.

(4) Hydraulic and pneumatic systems.

(5) Structural panels and fittings, including empennage structure, rudder, elevators and required tabs as necessary to substantiate stress analysis.

(6) Fuel system and components.

(7) Typical sections of lateral control and stall improvement devices, including actuating mechanisms.

(8) Refrigeration system.

(9) Landing gear and retracting mechanisms.

(10) Engine air intake provisions.

(11) Crew compartment, supercharging and air conditioning system.

(12) Miscellaneous developmental investigations and/or tests.

Deletions and/or additions to the foregoing list of developmental studies and tests shall be made as indicated by the design progress, subject to the approval of the Government.

"Item 17 - Revisions to the technical data called for under Item 7 above shall be furnished to the Government in such form as is required under said Item 7 to the extent necessary to maintain such data up to date throughout the development of the airplanes called for under Item 8 above until their acceptance by the Government, and in addition thereto, the following data shall be furnished for the airplanes called for under said Item 8:

(1) Drawing indexes:

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(a) Two (2) clearly reproduced copies of a master drawing index of all drawings prepared in the design and construction of the airplanes called for under Item 8 above. This index shall be in book form and shall be prepared on pages 8 1/2 x 11 inches in size.

(b) Two (2) clearly reproduced copies of an assembly drawing index listing main assembly and important sub-assembly drawings and shop illustrations used in the fabrication of the airplanes called for under Item 8 above. This index shall be prepared on pages 8 1/2 x 11 inches in size.

(2) Reports. Three (3) clearly reproduced copies of the following:

(a) Monthly weight status reports on ATSC Form 6-506A dated 18 May 1945 hereby made a part hereof by reference.

(b) Report describing and analysing each flight test performed by the Contractor.

(c) Reports describing and presenting results of the tests conducted pursuant to Item 16 above.

(d) Stress analysis report in accordance with AAF Specification No. C-1803-E, dated 2 April 1946, and Amendment No. 1 dated 3 May 1946.

(e) Report containing computations of dynamic coefficients and quantative description of aerodynamic and structural balances for all movable control surfaces.

(f) Report containing computations of wing critical flutter speed and divergence speed.

(g) Analysis reports and data of wind tunnel tests conducted pursuant to Item 12 above.

(h) Analysis reports and data of the work performed pursuant to Item 14 above.

(3) Drawings:

Two (2) clearly reproduced copies of drawings listed in the assembly drawing index specified in subparagraph (b) of paragraph (1) of Item 17.

TSB Form No. 71-22C
(29 Oct 45)

CONFIDENTIAL

IN WITNESS WHEREOF, the parties hereto have executed this Supplemental Agreement as of the day and year first above written.

NOTE: Type or print names under all signatures

THE UNITED STATES OF AMERICA

By: Byron K. Boettcher
BYRON K. BOETTCHER
Contracting Officer
(Official Title)

Two Witnesses:

Howard W. Neffner
HOWARD W. NEFFNER

James E. Prince
JAMES E. PRINCE

BOEING AIRPLANE COMPANY
(Contractor)

By: M. P. Crews
M. P. CREWS
Dayton Representative
(Title)

Seattle 14, Washington
(Business Address)

I, , certify that I am the

of the Corporation named as Contractor herein; that

who signed this Supplemental Agreement on behalf of the Contractor, was then

of said Corporation; that said Supplemental Agreement was duly signed for and on behalf of said Corporation by authority of its governing body, and is within the scope of its corporate powers

(Corporate Seal)

I hereby certify that, to the best of my knowledge and belief, based upon observation and inquiry, M. P. CREWS who signed this Supplemental Agreement for BOEING AIRPLANE COMPANY, had authority to execute the same, and is the individual who signs similar agreements on behalf of this Corporation with the public generally.

Byron K. Boettcher
BYRON K. BOETTCHER
(Contracting Officer)

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CASE HISTORY OF

THE XF-87 ALL-WEATHER FIGHTER AIRPLANE

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TO BE RETURNED
TO THE ARCHIVES
OF THE AAF
PIC... UNIT
MAR 45 - Jun 1949
1-11
44-1202

FOR OFFICIAL USE ONLY
(AFR ...)

CASE HISTORY OF

THE XF-87 ALL-WEATHER FIGHTER AIRPLANE

UN...
Classification changed to ...
by authority of 4th AFLC (McKH) 10 Jun 64
by E Ru... date 24 Jun 64

[redacted]

Auth: CG, AMC
Initials: MCS
Date: 12-23-49

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CASE HISTORY OF

THE XF-87 ALL-WEATHER FIGHTER AIRPLANE

Prepared by
Historical Office
Executive Secretariat
Air Materiel Command
Wright-Patterson Air Force Base
January 1950

[redacted]

CG, AMC
MRL
12-23-49

By

Helen W. Schulz
Historian

Prepared under provisions of AF Regulation No. 210-3 as a part of the USAF Historical Program.

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18 U.S.C., Sections 793 and 794. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

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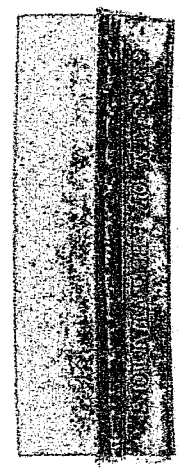

GLOSSARY OF ABBREVIATIONS

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GLOSSARY OF ABBREVIATIONS

AA Base	Army Air Base
AA Field	Army Air Field
AAF	Army Air Forces
AAFPFO	Army Air Forces Procurement Field Office
AAG	Air Adjutant General
AC/AS	Assistant Chief of Air Staff
Accept.	Acceptance
Actg. Asst.	Acting Assistant
Actg. Asst. Deputy C/S	Acting Assistant Deputy Chief of Staff
Actg. Chief	Acting Chief
Add.	Addendum
Admin.	Administration
AF	Air Forces
AFPFO	Air Force Procurement Field Office
AF Secy.	Air Force Secretary
AI	Air Inspector
Airc.	Aircraft
Airc. Br.	Aircraft Branch
Airc. Comm.	Aircraft Committee
Airc. Lab.	Aircraft Laboratory
Airc. & Missiles Sect.	Aircraft and Missiles Section
Airc. Proj. Br.	Aircraft Projects Branch
Airc. Proj. Sect.	Aircraft Projects Section
Airc. Weapons & Munitions Bd.	Aircraft Weapons and Munitions Board
airp.	airplane
AMC	Air Materiel Command
Amend.	Amendment
APG	Air Proving Ground
Asst. for Tech. Matters	Assistant for Technical Matters
ATSC	Air Technical Service Command
Bd.	Board
Br.	Branch
Brig. Gen.	Brigadier General
C	Confidential
Capt.	Captain
C/AS	Chief of Air Staff
CCN	Contract Change Notification
CF-A	Central Files, Area A
CF-B	Central Files, Area B
cg	Center of Gravity
CG	Commanding General
Chg. O.	Change Order
Col.	Colonel
Conf.	Conference

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Contr.	Contract
Contr. Officer	Contracting Officer
Contr., Proc. Div.	Contract Files, Procurement Division
CPFF	cost-plus-a-fixed-fee
C/S	Chief of Staff
Dept.	Department
Dir., Proc. & Indust. Mobil. Plan.	Director, Procurement and Industrial Mobilization Planning
Dir. of Tng. & Req.	Director of Training and Requirements
Div.	Division
Doc.	Document
dtd.	dated
Eng. Accept. Insp.	Engineering Acceptance Inspection
Eng. Div.	Engineering Division
Eng. Ops.	Engineering Operations
Eng. Stds.	Engineering Standards
Eng. Stds. Sect.	Engineering Standards Section
Engr.	Engineer
Engr. Liaison Sect.	Engineering Liaison Section
Equip. Br.	Equipment Branch
Exec.	Executive
Fire Cont. Br.	Fire Control Branch
Flt. Test Div.	Flight Test Division
FP	fixed-price
FY	Fiscal Year
Gen.	General
GSUSA	General Staff United States Army
Hist. Office	Historical Office
Hq. AAF	Headquarters, Army Air Forces
Hq. USAF	Headquarters, United States Air Force
IAS	Indicated Airspeed
IDM	Inter-Desk Memorandum
IG	Inspector General
Ind.	Indorsement
inf.	information
in. lbs.	inches-pounds
Insp.	Inspection
Inspr.	Inspector
inst.	installation
IOM	Inter-Office Memorandum
Lab.	Laboratory
Lt. Gen.	Lieutenant General

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Ltr.	Letter
Ltr. Supp.	Letter Supplement
MAC	Mean Aerodynamic Chord
Maj.	Major
Maj. Gen.	Major General
Mat.	Materiel
Mat. Div.	Materiel Division
Memo.	Memorandum
Memo. Rpt.	Memorandum Report
mm.	millimeter
Mod.	Modification
mph	miles per hour
M&S	Materiel and Services
NACA	National Advisory Committee for Aeronautics
Natl. Mil. Estab.	National Military Establishment
OAC/AS	Office, Assistant Chief of Air Staff
OC&R	Operations, Commitments, and Requirements
Ops.	Operations
OSAF	Office, Secretary of the Air Force
Photo. Lab.	Photographic Laboratory
Photo. Recon. Mod.	Photographic Reconnaissance Modification
Proc. Dir.	Procurement Directive
Proc. & Indust. Plan. Div.	Procurement and Industrial Planning Division
Prod. Div.	Production Division
Prog. Rpt.	Progress Report
Proj.	Project
Propul. & Access. Sub-Div.	Propulsion and Accessories Sub-Division
Propul. & Equip. Br.	Propulsion and Equipment Branch
R	Restricted
R&D	Research & Development
Readj. Sect.	Readjustment Section
Req. Div.	Requirements Division
Res. & Eng. Div.	Research and Engineering Division
rpm	revolutions per minute
Rpt.	Report
R&R	Routing and Record
S	Secret
Secy. War	Secretary of War
Servs. Eng. Subdiv.	Services Engineering Subdivision
Servs. Sect.	Services Section

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Servs. Supply & Proc. Div.	Services Supply and Procurement Division
S. L.	sea level
Supp.	Supplement
Supp. Agree.	Supplemental Agreement
Supp. to Ltr. Contr.	Supplement to Letter Contract
TAS	True Airspeed
TI	Technical Instructions
TIG	The Inspector General
TT	Teletype
U	Unclassified
Under Secy. of AF	Under Secretary of the Air Force
USAFPFO	United States Air Force Procurement Field Office
WDGS	War Department General Staff
W-PAFB	Wright-Patterson Air Force Base

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SUMMARY

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XF-87 ALL-WEATHER FIGHTER AIRPLANE

Description

The XF-87 all-weather fighter airplane, named the Blackhawk, was a two-place, side-by-side, mid-wing, high performance, night and inclement weather fighter. It was propelled by four Westinghouse (two J34-WE-7 and two J34-WE-9) jet engine units located in two nacelles underneath wings of 600 square feet area.** Each engine unit was capable of giving a static thrust of 3,000 pounds. Normal design gross weight, with full internal fuel load, was 39,200 pounds; with full tip tanks attached, 42,200 pounds. Total fuel capacity was approximately 2,600 gallons. Maximum speed of the airplane at 12,500 rpm, with a gross weight of 39,200 pounds, was 507 knots (584 mph) at sea level. The crew consisted of the pilot and the radar observer. The airplane was 62 feet, 10 inches long; it had a 60-foot spread and a height of 17 feet.

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The mission of the all-weather fighter was "the execution of night fighter and intruder missions during periods of darkness and during periods of inclement weather." Originally, the airplane was to operate in all weather conditions; that is, good as well as bad. Subsequent clarification from Washington, however, interpreted "all weather" to mean night and/or inclement weather conditions only.

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The XF-87 all-weather airplane was the result of the combined efforts of the Air Technical Service Command (ATSC) and the Curtiss-Wright Corporation to produce a jet fighter capable of seeking out and destroying enemy aircraft and ground targets in all weather conditions. Military characteristics for all-weather fighters were adopted 29 November 1949. In formulating all-weather fighter characteristics, the prime consideration had been to prevent a "recurrence of the 'Battle of the Bulge,' during which tactical air support for ground troops was lost due to weather conditions."

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Early in 1949, ATSC had submitted to Headquarters, Army Air Forces (Hq. AAF) a Curtiss-Wright proposal covering a single place, twin-jet propelled all-weather fighter airplane, at an estimated cost of $7,684,000. The Curtiss-Wright design gross weight was estimated at 25,000 pounds as compared with the ATSC

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* The numbers placed in the margin refer to the documents found in the Document File attached.

** R&R-C, Chief, Airc. Proj. Sect., Engr. Div., to Hist. Office, AMC, W-PAFB, 19 Dec. 1949, W-PAFB, Hist. Office.

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caculated gross weight of 26,[illegible]00 pounds. The most interesting features incorporated in the design were tandem main wheels and dive brakes mounted on engine nacelles.

At the time the Curtiss-Wright proposal was submitted, the ATSC was of the opinion the proposed airplane was too heavy and too large for a fighter type. Both ATSC and Curtiss-Wright agreed, however, that the proposed size was necessary in order to comply with existing day fighter military characteristics if jet propulsion units were to be constructed. The ATSC also felt that military characteristics required a little more power than could be obtained with a single TG-180 type propulsion unit. Therefore, the price quoted was believed to be excessive considering the slight increase in range, speed, and equipment proposed by the Curtiss-Wright twin-jet design.

The Command did not favor going ahead with the actual construction of the Curtiss-Wright twin-engine jet fighter as proposed, even though it believed the design typical of what could be expected if efforts were made to meet existing military requirements with available power plants. An attempt to combine the exceptional speed of jet-propelled aircraft with requirements for long ranges and large quantities of equipment did not appear practicable. On 26 April 1945, the Materiel Division at Hq. AAF directed the ATSC to discontinue consideration of the Curtiss-Wright twin-engine proposal because a requirement did not exist for this type of aircraft.

Meanwhile, Hq. AAF had set up new tentative military characteristics for aircraft required for the post-war Air Forces. Curtiss-Wright modified its original twin-engine jet design to comply with these tentative requirements and in November 1945 submitted a modified proposal which ATSC considered satisfactory. On 26 December 1945, Hq. AAF approved the procurement of the proposed YP-87 [redesignated XF-87 under AAF Reg. 65-60, 11 June 1947] all-weather fighter. Unexpended funds on an existing Curtiss-Wright contract, No. W33-038 ac-6266, covering a discontinued XA-43 airplane project, were to be used.

The high speed of the modified XF-87 airplane at sea level was 56 mph ([illegible].6 knots) higher than that required by new, tentative military characteristics. The 1,000-mile radius of action requirement at 35,000 feet had been met. The required radius at 10,000 feet could not be met, however, without increasing the amount of internal fuel carried, which, in turn, would increase the airplane's weight and size.

The tentative military characteristics, finally approved by the Office of the Chief of Air Staff on 23 November 1945,

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included the following performance requirements: high speed at 35,000 feet, 525 mph /455.91 knots/; high speed at sea level, 550 mph /477.62 knots/; time to climb to 35,000 feet, 12 minutes; combat radius of action at 10,000 feet, 600 miles /521.01 nautical miles/ and at best operational altitude, 1,000 miles
12 /868 nautical miles/.

Apparently, at that time considerable confusion existed regarding the all-weather fighter type of airplane. The ATSC had regarded the all-weather fighter as a "World War II night (and bad weather) fighter with certain improvements such as AGL
33 turrets, fore and aft, blind landing equipment; and a substantial increase in performance," but two schools of thought had developed. One group maintained that the all-weather fighter should be built as a fighter intended to take off, fight, and land at night and/or in bad weather. The other group believed that it should be an "all-purpose" airplane to operate as a night and/or bad weather fighter, as an escort fighter, or as ground support aircraft delivering support by fire from the front and rear turrets and
33 by dive bombing. The ATSC had recommended changing the term "all-weather fighter" to "night fighter" and building the airplane according to the first school of thought--as a fighter intended to take off, fight, and land at night and/or in bad
33 weather.

Military characteristics of all weather fighters were revised periodically (1) to establish this type of aircraft as a high performance night and inclement weather fighter, (2) to utilize new technical developments, and (3) to line up performance requirements with operational requirements. These revisions to military characteristics dated 23 November 1945 were approved
42, 54 16 July 1946 and 8 October 1946. By these revisions, this class of aircraft was approved as high performance night and inclement weather fighters. The design of the XF-87 all weather fighter, currently being procured from Curtiss-Wright, was based on the revised military characteristics.

In August 1946, Major General Curtis E. LeMay, Deputy Chief of Air Staff for Research and Development, described the all-weather fighter as follows:

> The all-weather fighter is an out-growth of the night fighter which will also be capable of operation in all types of inclement weather. It is not intended that this fighter be capable of competing, under clear weather conditions, with small interceptor type fighters. For the next two or three years the P-82 will be utilized as an interim all-weather fighter.

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He also stated that two proposals made under existing military characteristics--the Curtiss-Wright XF-87 and the Northrop
48 P-89--had been selected for investigation.

Ultimately, flight tests of the XF-87, conducted on a comparative basis with other aircraft, proved the XF-87 to be
215A inferior to the XF-89. These airplanes were compared on the basis of interceptor requirements developed after 8 October 1946. The new requirements for the all-weather interceptor fighter had become the paramount consideration of the tactical units that were to operate this type of aircraft. Consequently, production
230 of F-87 aircraft was terminated in October 1948.

Development, Testing, and Modification

The XF-87 all-weather fighter development program involved two experimental airplanes constructed under Contracts W33-038 ac-6266 and W33-038 ac-19837. In October 1945, Curtiss-Wright presented a proposal covering the design and construction of one XF-87 all-weather fighter airplane, one mock-up, and wind
10 tunnel models at an estimated cost of $5,054,040. Funds for the XF-87 project were to be provided by utilizing unexpended funds remaining on the existing Cost-Plus-a-Fixed-Fee (CPFF) Contract No. W33-038 ac-6266 covering the XA-43 project which
7, 8, 9 the ATSC had discontinued.

On 26 December 1945, Hq. AAF approved the conversion of CPFF Contract W33-038 ac-6266 to a fixed-price (FP) contract and the utilization of unexpended funds to provide for the pro-
16 curement of XF-87 aircraft. Subsequently, on 4 January 1946, following the issuance of Technical Instructions (TI) 2087, Contract W33-038 ac-6266 was amended to cover the procurement
17, 19 of one XF-87 all-weather fighter. The contractor was not authorized to expend nor to obligate more than $5,419,865.52 in performance of the contract.

The second XF-87 all-weather fighter was provided for by the ATSC, which had tentatively allocated to the project approxi-
17A, 18 mately $3,000,000 from 1946 Research and Development funds. Hq. AAF approved the procurement of the second article on
18A 31 January 1946. Amendment No. 9, issued on 22 March 1946,
25 provided for two AAF Model XF-87 aircraft and wind tunnel models.

In March, Curtiss-Wright submitted a formal contract price of $8,729,044.52 covering the construction of two XF-87
26 airplanes on a fixed-price basis. However, on 27 September 1946

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the contractor, in agreeing to the terms and conditions relative to the conversion of basic contract W33-038 ac-6266 from a CPFF basis to an FP basis, accepted a price of $[illegible],092,080.32 for the design and fabrication of the airplanes.

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Supplemental Agreement No. 1 to Contract W33-038 ac-6266, approved on 9 October 1947, provided for the procurement of two XF-87's, one complete mock-up, and various wind tunnel models, at a cost of $9,107,080.32; this price included $75,000 for spares. Delivery of the first XF-87 was anticipated for May 1948, and the second airplane for July 1948. Delivery of wind tunnel models was anticipated for September 1948. No flight demonstrations were included in the price.

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As development of the XF-87 project continued, a series of conferences were held to discuss engineering changes required to accomplish certain design features; these discussions concerned armament, fuel system, fire control system, and a power nose turret installation. The tail turret and periscopic sighting mechanism originally proposed were eliminated when the mission of the XF-87 was limited by new military characteristics to operate during periods of darkness and/or inclement weather.

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Concerning armor protection, the Air Engineering Division had recommended an amendment to military requirements on the basis that "the best defense for a truly high speed fighter [was] its speed, maneuverability, and elusiveness (which characteristics would be materially affected by having to carry around a substantial amount of unnecessary armor protection)."

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Armament requirements calling for .50 caliber armor protection had resulted in excessive weight carried by the aircraft. Subsequently, Headquarters, United States Air Force (Hq. USAF) approved a reduction in the thickness of front armor glass and in the thickness of armor plate, effecting a weight saving of approximately 300 pounds. The fire control system, designed and manufactured by the Glenn L. Martin Company, consisted of a four-gun 20mm. nose turret controlled either manually or through automatic gun-laying radar equipment. The Martin turret, however, was not immediately available; hence, Headquarters, Air Materiel Command (Hq. AMC) installed a temporary four fixed-20mm. gun arrangement in an alternate nose installation on the second XF-87 airplane until the permanent turret and fire control system could become available.

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Type JP-3 fuel had been adopted by the Air Forces as standard for all jet aircraft. Therefore, Curtiss-Wright

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proposed to design a fuel system for the XF-87 airplane incorporating the use of JP-2 fuel and naming 100/130 octane fuel as an alternate. Hq. AMC approved this proposal in
40, 49, 230 September 1946.

In May 1946, after reviewing the cockpit mock-up of the XF-87 at the contractor's plant, Wright Field personnel were of the opinion that the cockpit was the best attainable within the requirements established by existing all-weather military characteristics. The contractor, therefore, was advised to duplicate the cockpit in the complete airplane mock-up. The
30 XF-87 mock-up was, at that time, approximately 75 per cent complete.

The mock-up inspection of the first XF-87 all-weather fighter was held at the contractor's plant 16-19 July 1946. The mock-up was complete, well constructed, and adequate for the purpose intended. Certain changes to improve the utility
45 and serviceability of the airplane were recommended. A representative of the Requirements Division, Office of Assistant Chief of Air Staff-3, who had participated in the mock-up inspection of the cockpit installation, had noted "with consternation" that the instrument panel of the aircraft was overshadowed by a wealth of instruments and dials that were of the same size and were similar in function, that needless duplication was apparent, and that the instrument panel seemed completely out
44 of proportion. The AMC and the contractor, therefore, were directed to replace all individual engine instruments with the dual indicating type on the airplane mock-up before the next
47 meeting of the Mock-Up Board. Dissatisfaction with the bomb bay
46 installation also was expressed.

On 6 October 1947 the 689 Engineering Acceptance Board
96 made an inspection of the No. 1 XF-87 airplane. The airplane was equipped with a dummy nose housing flight testing
84 instrumentation in lieu of the specified power turret. The second airplane, to be delivered three months later, was to be complete with all tactical equipment. A working mock-up turret, capable of being remotely controlled from the cockpit and fired from any position in the forward hemisphere, was to be provided on the second airplane. The Engineering Acceptance Board's inspection indicated that while the No. 1 aircraft was physically complete at the time of inspection, certain items involving tests and clean-up for ultimate shipping to Muroc for flight tests and essential changes to insure flying safety had
* to be accomplished before shipment.

The No. 1 XF-87 airplane was shipped from contractor's plant at Columbus, Ohio, on 9 November 1947, via convoy trailer

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102, 103 truck, destined for Muroc Army Air Field, California. An accident occurred a few miles west of Columbus which resulted in damage to the fin of the airplane. The convoy returned to the contractor's plant for inspection and repair, and again left the Curtiss-Wright plant on 10 November 1947. On 16 November, another accident occurred resulting in serious damage to the left hand panel of the
106 nacelle. The airplane was halted in Tulsa for two days. After an inspection determined repairs could be made in Muroc, the convoy proceeded on its way to Muroc. The No. 1 XF-87 arrived at Muroc
230 on 1 December 1947. Contract Change Notification No. 2 to Contract W33-038 ac-6866, issued 4 December 1947, authorized the contractor
110 to make all repairs to the XF-87, caused by highway accidents, either at Muroc or at the contractor's plant.

Phase I flight tests were performed by Curtiss-Wright at Muroc. The first flight of the No. 1 XF-87 was made on 1 March 1948 and proved successful. Total flight time was 57 minutes. Take-off was accomplished with a gross weight of 42,000 pounds and a cg of 20.1 per cent MAC. The airplane was flown at 360 mph true airspeed (TAS) at an altitude approximating 14,000 feet. Tail buffeting was experienced at about 1[illegible] mph. The flight was terminated by normal landing
127, 230 with a touchdown speed of 140 mph with flaps down.

On Flights 11, 12 and 13, made during the period 27 March to 12 April 1948, some elevator, rudder, and tuselage vibrations were
132 indicated. It was decided, therefore, that the remaining Phase I flight tests should be devoted almost entirely to buffeting investi-
143 gations. Flights 14 and 15 were made during the period 14-20 April 1948. On Flight 14, while airplane was descending, violent buffeting was experienced at 40,000 feet. Because buffeting occurred at 20,000 feet, it was decided to investigate the Mach number effect on the next flight. On Flight 15 the Mach number effect was investigated at altitudes of 7,500 feet to 8,500 feet and at various speeds from 350 to 470 mph indicated air speed (IAS). Buffeting in this test was similar to, but somewhat less than, that encountered in other tests. The conclusion was that buffeting remains a possible hazard at speeds in excess of 500 mph. On this flight the pilot made a low pass on the lake with all gears up, superficially damaging the underside of the fuselage. The landing gear did cycle satisfactorily, but while the pilot was attempting the first extension, the left main
161, 141, 143 gear would not extend. The contractor, in summarizing the flight test results, stated that since lift characteristics of the airplane had proven to be very close to calculated values during stall tests, the slow climb to would be a life indicator for the low weight tests. It was stated that until the airplane will be individually, either to determine actual [illegible], or until the
145 initial climb tests were completed.*

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* [illegible], C.J., Air. Prob. Rpt., Ex. to V., to Lt. Col. Wilson, AMC, [illegible]-PAFB, 15 Dec. 1948, Unclassified.

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Data on the XF-87 flight tests at Muroc, as compared to Curtiss-Wright specification values, indicated the following differences: a high speed of 531 mph at 30,000 feet was obtained in Muroc flights as compared with specification speed of 541 mph; take-off over a 50-foot obstacle was attained in Muroc flights at 4,245 feet as compared with specification
155 take-off at 4,300 feet over the same hurdle.

A high speed test was conducted on 16 June 1948 at Muroc. Duration of the flight was 1 hour, 17 minutes. High speed points obtained in stabilized level flight at 12,000 rpm were: at 29,300-foot altitude, 532 mph /461 knots/; at 17,600-foot altitude, 548 mph /475.8 knots/; at 8,500-foot altitude, 572
160 mph /496 knots/. These results were slightly less than contractor's estimate. The airplane was completely out of elevator trim at all high speed points and the pilot had to use forward control wheel to maintain level flight. All speed points were obtained with low thrust engines and excessive drag.

The contractor performed a total of 55 flights with a total flying time of 47 hours. Although a number of these flights were conducted primarily to investigate buffeting conditions, the contractor also obtained complete stability and control data up to approximately .78 Mach number where the tail section
230 became critical.

Following Flight 55, the XF-87 was prepared for AMC Phase II tests, which were scheduled to begin 20 September 1948. However, because the Phase II pilot was not available at that time, the
194 contractor performed Flight 56 on that date. Investigation was made of buffet boundary to 0.81 Mach number at 25,000 feet altitude. Check climb was made to 30,000 feet.

On 21 September the airplane was turned over to the Flight Test Division for the performance of instrumentation and thrust
204 calibration tests before Phase II flight tests were conducted. The Flight Test Division, AMC, completed 19 flight tests at Muroc under Phase II from 24 September 1948 to 2 October 1948, with a flying time of 12:58 hours. Flight 75, which completed Phase II flight testing, was made to measure maximum weight take-off distance and performance climb, at maximum weight, to 25,000 feet; also, level flight performance at 25,000 feet. The results were satisfactory. However, the airplane entered a premature buffeting condition before level high speed was reached. The tests showed that the contractor's climb performance guarantees were exceeded by the airplane, and that
204, 230 the high speed and take-off performance was marginal. On Flight 86, the XF-87 took off for Wright-Patterson Air Force

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Base on 13 October 1948 with a gross weight of 49,500 pounds and full fuel, including tip tanks. Landing was made at Tinker Field, Oklahoma, after a flight time of 3:01 hours. The crew and aircraft remained at Tinker Field overnight. The trip was resumed (Flight 87) the next day, and landing was made on the same day at Wright-Patterson Air Force Base. Total flying time for the 87 flights was 68:14 hours.

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A modification program involving engine changes, simulated turret installation, conversion to photographic reconnaissance, and new wing configuration was in effect during development of the No. 1 and No. 2 XF-87 airplanes. At the request of AMC, Curtiss-Wright had prepared a series of engine combination studies for the use of engines other than the J-34. After reviewing the studies, AMC believed the installation of two J-33 engine units, in lieu of the four Westinghouse J-34 units, appeared more desirable considering performance as well as simplicity of airplanes and availability of engines. AMC also believed that the change from J-34 to J-33 engines was feasible without any loss in performance of the XF-87 and could be made at a cost of approximately $650,000. Hq. AAF concurred with AMC and on 21 August 1947 approved the J-33 engine installation in the production version of the XF-87.

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Subsequently, tables of performance using the J-33 and the J-34 engines were prepared to show AMC evaluations as compared with Curtiss-Wright calculations, together with a summary of all-weather fighter military performance requirements. In this connection, Major General E. M. Powers, Assistant Chief of Air Staff-4, desired AMC action to effect installation of Allison J-33 engines in one XF-87 airplane. He stated that evaluation of flight performance of the two XF-87's would then provide a sound basis for a decision on engines to be incorporated in the production version. AMC initiated action on 9 October 1947 to provide for two J-33 engines in the No. 1 XF-87 airplane after Phase II of the flight test program had been completed and the airplane had been returned to the contractor for installation of the simulated turret. In the meantime, Curtiss-Wright had submitted a quotation of $520,316.15 covering engine change, on the assumption that the substitution of engines would be made on the first airplane. Subsequently, upon authorization from Hq. USAF, AMC and Curtiss-Wright executed Contract W33-038 ac-19567, approved 11 February 1948, covering modifications necessary to install the engines in the No. 1 XF-87 at a cost of $535,968.38. The airplane was redesignated the XF-87A.

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The new contract was more desirable because funds allocated under the basic contract, W33-038 ac-6260, were to expire before

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the scheduled delivery of the XF-87A airplane. Delivery of the modified airplane was anticipated within nine months from date of execution of the contract.

In August 1948 the contractor submitted a revised modification program which involved shifting the J-33 experimental engine installation from the No. 1 XF-87 to the No. 2 XF-87 and ultimately providing for the installation of J-33-23 production
177, 187 type engines. All engineering work and partial refabrication of the nacelles to receive the J-33 units were completed at the time the XF-87 production program was discontinued (October 1948).

Modification of the XF-87 also proposed a simulated turret in lieu of dummy nose or fixed-gun in order to check aerodynamic
65A effects on the No. 2 XF-87 airplane. The Curtiss-Wright proposal was predicated on 20mm. guns, gunchargers, and ammunition being provided as Government-furnished equipment (GFE). Curtiss-Wright considered the proposed turret installation one of the
100 outstanding features of the XF-87 airplane. In April 1946, AMC initiated action to cover the cost of installing the simulated turret; no funds had been budgeted in the fiscal year 1948 program
67 for this procurement. The simulated turret was never completed
230 because of the ultimate termination of the experimental contracts.

Also included in the modification program was the conversion of the second XF-87 aircraft to the photo reconnaissance type. Conversion of the No. 1 XF-87 to the photo reconnaissance type could not be made because of lack of funds; but the second article could be made available for photographic tests after tests had been conducted on radio and radar installations and the
69 installation of the simulated turret. The exploitation of the photographic reconnaissance potentialities of this airplane began in December 1946 when Hq. AAF directed AMC to initiate a study to determine the feasibility of modifying the XF-87, the XF-88,
57 and the XF-89 for reconnaissance purposes. The study, conducted by the Photographic Laboratory, AMC, indicated that of all types
68, 70, 116 inspected, the XF-87 airplane offered the best possibilities as a photographic reconnaissance airplane.

According to Hq. USAF, a definite requirement existed for full exploitation of the photographic possibilities of the XF-87. If current plans materialized, this aircraft would be adopted "as an all-purpose tactical reconnaissance aircraft (to include night photographic reconnaissance) that /would/ overlap
50 the mission of strategic reconnaissance." AMC was again directed to establish a project, with high priority, for studying the photographic potentialities of the XF-87, and to fabricate and test the aircraft.

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In compliance with this directive, a conference was held at the contractor's plant on 9 October 1947. The conference resulted in the conclusion that tactical reconnaissance requirements called for complete modification of the second XF-87 airplane. Consequently, Addendum 3 to Technical Instructions 2087 was issued on 28 October 1947 to initiate action for exploitation of the XF-87's photographic potentialities.

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Upon AMC's authorization, Curtiss-Wright submitted a quotation on 13 January 1948 to convert the second XF-87 to a photo reconnaissance type at a cost of $209,892.54. Approximately six months later, approval was given to Change Order No. 3 to Contract W33-038 ac-19837 (this contract had been approved 11 February 1948 to cover engine change modifications in the first airplane) to provide for photo reconnaissance modifications to the No. 2 XF-87 at a cost of $209,819.54, the prototype to be designated the XRF-87. The prototype was never completed because of the termination of XF-87 experimental contracts.

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A new wing configuration was considered at a conference held at AMC on 21 July 1948 in an effort "to reduce stalling speeds and improve maneuverability" of the XF-87 airplane. An increase in wing area from 600 square feet to 740 square feet was considered satisfactory, and Curtiss-Wright was authorized to go ahead on the design. Since, in the meantime, Letter Contract W33-038 ac-20450 had been executed to cover procurement of production airplanes, Amendment No. 3 was issued on 26 July 1948 to provide for the increased wing modification under this production contract.

Curtiss-Wright then included a price of $814,736 for the design and fabrication of the new wing in the total price quoted to accomplish the complete modification program on the No. 2 XF-87 airplane. AMC forwarded this quotation to the Under Secretary of the Air Force requesting authorization to negotiate with the contractor for the new procurement, the installation to be accomplished in conjunction with the J-33 engine installation in order to provide a complete prototype of the new wing assembly. The quotation of $816,936 was subsequently reduced to $814,356, not because the actual cost of accomplishing the modification had decreased but because the contractor was absorbing more of the cost. In October 1948 the enlarged wing version of the XRF-87 was designated XRF-87C.

Production Program

The production version of the XF-87 was tentatively scheduled in the fiscal year 1949 program. A basic estimate of

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available funds indicated that 15 FP-87's and 2[illegible] F-87's could be procured from the 1949 budget, and 14 FP-87's and 40 F-87's
108 from the supplemental 1949 budget, if approved. Hq. USAF granted AMC authority on 1 March 1[illegible], and again on 20 March, to negotiate procurement with Curtiss-Wright of production engineering and production tooling for F-87 aircraft. To implement the program, an amount of $7,500,000 of fiscal year
123, 132 1948 funds had been allocated.

Subsequently, on 29 March 1948, Letter Contract W33-038 ac-20450 was issued to place an order with Curtiss-Wright (at an expenditure of not more than $1,500,000) for the production engineering, planning, and special tool designing necessary to
135 produce 28 F-87A and 15 FP-87A airplanes. Delivery was scheduled to begin with one airplane in October 1949, to increase progressively month by month, and to end with seven articles in August 1950.

About a month later the contractor submitted a quotation of $55,013,667 covering the procurement of 58 F-87A and 30
146 FP-87A airplanes. Delivery was scheduled to begin with one F-87A airplane in January 1950 and to end with seven articles in January 1951; delivery of the FP-87A was scheduled to begin with one airplane in May 1950 and to end with five airplanes in
146 January 1951. On 24 May 1948 the Commanding General, AMC, requested Hq. USAF authorization to contract immediately for 58 F-87 airplanes at a total price of $52,200,000 and 30 RP-87A
149A, 149B airplanes at a total price of $2[illegible],020,000. Subsequently, on 1 June 1948, Hq. USAF issued Procurement Directives 49-12 and 49-17 granting AMC authority to negotiate immediately for the
152, 153 procurement of 30 RF-87 and 58 F-87 airplanes, respectively.

In support of the F-87 production procurement program, Major General Grandison Gardner, Office of Secretary of the Air Force, wrote The Honorable A. S. Barrows, Under Secretary of the Air Force, that the Office of the Deputy Chief of Staff felt the Air Force had "a definite and almost desperate requirement for a defensive fighter." Such a fighter had to have a radius of action of 700-800 nautical miles or more and had to be capable of operating day or night in any weather. The urgency of the need justified the gamble to start tooling for production of an airplane which had not been completely tested. Even though the P-89 might be more suitable than the F-87, all available capacity would have to be employed to meet increased Air Force requirements. General Gardner suggested that Materiel Command test pilots and a group of proving ground test
161 pilots be sent to Muroc to fly the prototype airplane for evaluation purposes.

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However, in October 1948, following an inspection of the Curtiss-Wright Corporation, the Field Air Inspector, Hq. USAF, recommended suspension of the production order for 88 F-87C and RF-87C airplanes until the No. 2 prototype had been modified to include the larger wing and two engines and had been satisfactorily
206 flight tested. The Field Air Inspector also recommended discontinuance of the practice of placing production orders in peacetime before delivery of a satisfactory prototype, because "there /was/ no assurance that the production model /would/ be satisfactory and /would/ not have many faults caused by the modifications." Also, considering that one airplane was known to be unsatisfactory and the performance of the remaining airplanes was problematical, it would be unwise to accomplish the
206 production order until at least one satisfactory prototype was delivered.

In reply to the Field Air Inspector's recommendations, Brigadier General N. B. Harbold, Inspector General, Hq. AMC, stated that the placement of production contracts prior to delivery of a satisfactory prototype was an Air Force and not an AMC policy, and the XF-87 production contracts had been
224 placed with full knowledge of the difficulities involved. Further, because of the rapid advance in aeronautical progress and length of development programs, aircraft became obsolescent before reaching the production stage unless production overlapped the development program to a reasonable degree. For that reason it was sometimes necessary to place production contracts before delivery of prototype aircraft in order to meet military requirements.

In the meantime, in order to complete a definite contract covering the production of F-87 and RF-87 airplanes, AMC requested authorization from the Under Secretary of the Air
171, 182 Force to proceed with procurement of F-87 aircraft. The Command stated that while certain undesirable flight characteristics had been noted during flight tests of the F-87 aircraft, these
171 could be eliminated by increasing the wing area. AMC considered the release of the F-87 procurement program mandatory because the contractual coverage under Letter Contract W33-038 ac-20450 no
182 longer allowed program continuity. Further, AMC was of the opinion that the F-87 logically should be one of two all-weather types to be procured for the 70-group program.

On 1 September 1948, Hq. USAF granted approval to AMC to proceed with the F-87 procurement program. Subsequently, AMC authorized the contractor to proceed with the fabrication of 5[redacted] F-87C and 30 RF-87C airplanes under Contract W33-038 ac-20450
185, 186 at a cost of $46,677,[redacted].

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A definitive production contract was never approved because the experimental and production F-87 programs were ordered terminated by Hq. USAF on 14 October 1948. Discontinuance of the project was based on results of comparative flight tests made at Muroc on 6-7 October 1948. These tests, conducted by qualified night fighter Air Force pilots on the XF-87, XF-88, and XF3D aircraft, proved the XF-88 superior to the other two. The Committee on Evaluation of the three aircraft, in conference at Muroc during these comparative flight tests, evaluated the reports received from pilots, observers, and maintenance personnel. The discussions resulted in a unanimous vote by all (11) voting members on the committee not to procure the XF-87 or XF3D airplanes.

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Also, in this connection, The Honorable W. S. Symington, Secretary of the Air Force, wrote The Honorable J. V. Forrestal, Secretary of Defense, that flight tests had indicated the F-88 to be superior over the XF-87, that the XF-87 would require major redesign to make it operationally acceptable, and that procurement of F-87 and RF-87 airplanes had been cancelled. Mr. Symington stated the Air Force proposed to use the $80,220,000 resulting from this cancellation of production F-87 and RF-87 airplane contracts to provide available funds for producing the F-88 and to procure a modified all-weather version of the F-80C as an interim measure.

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At the same time, Major General E. M. Powers, Assistant Deputy Chief of Staff, Materiel, wrote The Honorable A. S. Barrows, Under Secretary of the Air Force, that flight tests of F-87 aircraft had "proved it to be a very poor weapon from a performance standpoint and that it had many deficiencies aerodynamically." He said, further, that predicted performance of the XF-87, even with the new wing, did not compare favorably with that of new aircraft becoming available.

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Following up the decision of the Secretary of the Air Force and the Chief of Staff to discontinue further production of the F-87, Procurement Directives 49-17 and 49-18 were issued 15 October 1948 officially directing AMC to take immediate action to terminate procurement of 88 RF-87 and F-87 aircraft. Subsequently, on 19 October 1948, AMC instructed Curtiss-Wright to stop all work immediately, to terminate subcontracts and purchase orders, and to place no further orders in connection with Letter Contract W33-038 ac-20450. AMC issued the same instructions on 3 November 1948 in regard to Contract W33-038 ac-19837 and forwarded formal notice on 12 November 1948 confirming termination of this contract in its entirety.

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The experimental program, however, involved two experimental Contracts, Nos. W33-038 ac-6266 and W33-038

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ac-19837. Contract ac-6266 for two XF-87's was practically accomplished. The Engineering Division recommended its completion in order that two airplanes would be available for use in the development of the flexible turret and in the accomplishment of the all-weather research program. It was estimated a savings of $1,306,000 would result from completion
211 of this contract and the termination of Contract ac-19837. Nevertheless, on 5 November 1948, AMC requested the contractor
219 to stop all work immediately on the No. 2 airplane being procured under Contract ac-6266.

In closing out Contract W33-038 ac-6266, the contractor proposed that the first XF-87 be accepted in its existing condition at Wright-Patterson Air Force Base at a reduction in price of $87,990.79, and that airplane No. 2 be accepted in its existing condition at contractor's plant at a reduction in price of $112,941.33. Upon acceptance of the aircraft and reduction in price, the contractor was to be relieved of all further work, tests, liability, or obligations. Airplane No. 2 was to be disassembled for storage at the contractor's plant for a period not to exceed one year; at the end of that time the contractor and the Government were to determine disposition
217 of the article.

Accordingly, Change Order No. 18 to Contract W33-038 ac-6266 was issued 22 November 1948 to cover (1) acceptance of the No. 1 XF-87 airplane in its "as is" condition at Wright-Patterson Air Force Base, (2) stoppage of all work on the No. 2 XF-87 airplane, (3) acceptance by the Government of the No. 2 XF-87 in its "as is" condition, disassembly of the article and its storage for one year for use as a spare parts stock pile for the No. 1 XF-87 at no additional expense to the Government; (4) acceptance of balance of spare parts for both airplanes in an "as is" condition and storage of these spare parts by
222 contractor for one year at no change in contract price. The
230 Government accepted both airplanes on 14 December 1948.

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1. (S) Ltr., 15 Mar. 1945
Fr: Curtiss-Wright Corp., Buffalo, N. Y.
To: Brig. Gen. F. O. Carroll, Chief, Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

The Curtiss-Wright Corp. (Curtiss-Wright) proposed the design and fabrication of a mock-up, three flight test articles, and one static test article to fulfill the development of an all-weather fighter airplane. The airplane proposed was to be a single-place, twin-jet propelled fighter. The Curtiss-Wright basic proposal quoted a cost of $7,038,000 for the mock-up, three flight articles, and one static test article, and $90,175 for wind tunnel models. Delivery schedule: mock-up, six weeks after firm go-ahead; first flight article, nine months after mock-up approval; static test article, 10 months after mock-up approval; subsequent airplanes to follow at approximately two months intervals.

2. (U) Office Memo., 17 Mar. 1945
Fr: Brig. Gen. L. C. Craigie, Deputy Chief, Eng. Div.
To: Brig. Gen. F. O. Carroll, Chief, Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Gen. Craigie stated that the Curtiss-Wright design for a single-place, two TG-180 engine all-weather fighter airplane conformed to recent day-fighter military characteristics issued by Operations, Commitments and Requirements (OCR), Wash. The airplane would have a take-off gross weight of 32,000 lbs. The Eng. Div. military characteristics for this type of airplane, however, required a little more than could be obtained with a single TG-180 type. Air Technical Service Command (ATSC) would be paying an excessive price for the slight increase in range, speed, and equipment proposed by the Curtiss-Wright design. In this connection, Gen. Craigie pointed out that the Republic P-84, with its long-range configuration, probably would have a weight of approximately 16,000 lbs. Airc. Proj. Sect., therefore, had been asked to make a comparative study of the two-engine version and the Republic P-84 or P-81.

3. (S) Ltr., 9 Apr. 1945
Fr: Airc. Proj. Sect., Eng. Div.
To: Airc. Proj. Sect., AC/AS, M&S, Wash.
(File: Airc. Proj. Sect., Eng. Div.)

ATSC presented the Curtiss-Wright all-weather fighter proposal to Wash., together with a table giving a comparison of the Curtiss-Wright proposal on the all-weather fighter /XP-87/, the XP-81 airplane, and the Republic P-84. ATSC calculations in comparison with Curtiss-Wright calculations

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on the XP-67 were also quoted. Curtiss-Wright estimated a high speed of 592 mph /514 knots/ at sea level and 591 mph /513 knots/ at 25,000 ft. The ATSC estimated a high speed of 537 mph /466 knots/ at sea level and 549 mph /476.75 knots/ at 25,000 ft. Designer's performance was estimated at a gross weight of 25,480 lbs. except as noted. ATSC performance was calculated at a gross weight of 26,680 lbs., as this was the design gross weight with full internal fuel. ATSC did not favor going ahead with the actual construction of this airplane. However, it believed the design was typical of what could be expected if an effort were made to meet existing military characteristics with available power plants. With the jet units presently available, an attempt to combine the exceptional speed of the jet-propelled aircraft with requirements for long ranges and large quantities of equipment did not appear practicable. Further, for airplanes propelled by jet engines, a large twin-engine airplane was required to comply with day fighter military characteristics. /See Doc. 6./

(C) R&R-1, 16 Apr. 1945
Fr: Maj. J. K. Bussey,
Airc. Proj. Br.,
M&S, Mat. Div., AC/AS,
Wash.
To: CC&R, Req. Div., AC/AS,
Wash.
(File: Airc. Proj. Sect.,
Eng. Div.)

Maj. Bussey submitted the Curtiss-Wright twin-engine jet fighter airplane proposal for consideration. He called attention to the most interesting of the several novel features incorporated in this design: (1) the tandem main wheels, and (2) the dive brakes, which were mounted on the engine nacelles controlled by the ground brake foot pedals in flight.

5. (C) Memo. Rpt. TSESE-2-1178 /Servs. Eng. Subdiv., Eng. Div./ 23 Apr. 1945
Curtiss Twin-Engine Jet Fighter Proposals
(File: Airc. Proj. Sect., Eng. Div.)

This memo. rpt. presented additional comments on the Curtiss-Wright twin-engine jet fighter proposal. Based upon a Curtiss-Wright reduced version of this twin-engine design, ATSC recommended (1) that construction of this twin-engine fighter around two TG-180 units, with the same range capabilities and armament as the existing single engine fighters, should not be undertaken because performance gains would be very small; and

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(2) that construction of a twin-engine jet fighter should be considered at that time only if it were essential to construct a purely jet-propelled airplane having speeds of the existing single engine jet fighters and being capable of meeting all other current day fighter military characteristics. ATSC's opinion was that the proposed airplane was too large and too heavy for a fighter type.

6. (S) 1st Ind., 26 Apr. 1945
Fr: Brig. Gen. J. F. Phillips
Chief, Mat. Div., OAC/AS, M&S, Wash.
To: Fighter Br., Eng. Div., ATSC
(File: Airc. Proj. Sect., Eng. Div.)

Mat. Div., Wash., directed that consideration of the Curtiss-Wright twin-engine jet fighter airplane proposal be discontinued. A requirement did not exist for this aircraft because of its limitations. /See Doc. 3./

7. (R) Supply Contr. W33-038 ac-6266, 24 May 1945
(File: Contr., Proc. Div.)

This formal cost-plus-a-fixed-fee (CPFF) contract, entered into on the 26th day of April, 1945, by the U. S. Government and the Curtiss-Wright Corp., superseded letter contract, dated 14 Nov. 1944, as amended. The contract provided for engineering services, mock-up, wind tunnel model, and data with respect to the XA-43 airplane at an estimated cost of $352,984 plus a fixed fee of $13,307.

8. (R) Supp. to Ltr. Contr. W33-038 ac-6266, 25 May 1945
Curtiss-Wright Corp., Buffalo, N. Y.
(File: Contr., Proc. Div.)

This supplement placed an order with Curtiss-Wright for the following items:

1. AAF Model XA-43 airplanes
   a. One static test article
   b. Three flight test articles

2. Test models, as follows: nacelle model, 1/5-scale; isolated horizontal tail model, 1/4-scale; high speed tunnel model, approximately 1/8-scale; revised stability model, 1/10-scale; two-dimensional tunnel model of wing section (two required); isolated empennage model, to be tested at high speed; half span wing model; flutter model of wing; and flutter model of horizontal tail and aft portion of fuselage.

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3. One AAF Model TG-180 aircraft engine.

Contractor was not authorized to expend or obligate more than $2,919,865.52.

9. (R) Amend. No. 1 to Ltr. Supp. to Contr. W33-038 ac-6266 29 June 1945
(File: Contr., Proc. Div.)

This amendment increased the authorized amount of $2,919,865.52 to $5,[illegible],865.52. Items 1 and 3 were deleted from Contr. W33-038 ac-6266 to provide for the furnishing of one stripped flight article, one completely equipped flight article, and one AAF model TG-180 airc. engine; the engine was to be installed and ground tested in a ground testing installation.

10. (R) Ltr., 30 Oct. 1945
Fr: Curtiss-Wright Corp., Buffalo, N. Y.
To: CG, ATSC
(File: Contr., Proc. Div.)

Curtiss-Wright agreed to accept, subject to mutually satisfactory negotiations, a change in the specifications for the airplanes covered by Contr. W33-038 ac-6266, dated 25 May 1945, and at the same time to convert the contract from a CPFF to a Fixed Price (FP) basis. An amendment was requested to the letter supplement to provide for only one airplane, with related mock-up and wind tunnel models. The total amount of money allocated to this contract was as follows:

Basic Contract, Phase I	$ 366,791.00
Ltr. Supp. as Amended, Phase II	5,[illegible],365.00
Total Allocated	$5,[illegible],156.00

Of this amount, approximately $826,446 had already been expended; additional expenditures and change-over or termination costs would amount to an estimated additional $150,000. This would leave available an estimated total of $4,80[illegible],210. Curtiss-Wright estimated the cost of constructing one airplane, in accordance with revised specification, at $5,054,040. This price covered (1) the design and construction of one complete airplane; (2) the construction of one complete mock-up; and (3) the construction of five wind tunnel models. The quotation included 10 hours of preliminary functional flight testing at contractor's plant. Delivery of the airplane could be accomplished in 14 months after receipt of go-ahead.

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11. (U) Wire, 21 Nov. 1945
Fr: Eng. Div.
To: AC/AS-4, Wash.
(File: Res. & Eng. Div., AC/AS-4, Wash.)

ATSC requested approval of a firm commitment with Curtiss-Wright for the construction of the proposed all-weather fighter airplane and authorization to utilize the funds then allocated to the XA-43 contract (W33-038 ac-6266). The company was willing to accept a fixed price contract for one airplane, models, and data at no increase in price. ATSC advised that the design as modified by Curtiss-Wright was now considered satisfactory. The high speed at sea level was 56 mph [48.6 knots] higher than specified in tentative military characteristics. Radius of action requirement at best operation had been met, but the radius at 10,000 ft. was 150 miles [130.26 nautical miles] deficient. This deficiency, however, was not considered a serious detriment to the airplane's utility.

11A. (C) Memo., 23 Nov. 1945
Fr: Lt. Gen. H. S. Vandenberg, AC/AS-3, Wash.
To: Lt. Gen. I. C. Eaker, C/AS, Wash.
(File: AAG, Wash.)

This memorandum presented and discussed the problem of establishing military characteristics for types of aircraft required for the post-war Air Forces. New sets of characteristics had been issued for bombardment and fighter types of airplanes. Gen. Vandenberg recommended that the revised military characteristics be approved and returned to Asst. Chief of Air Staff (AC/AS)-3 for processing, and that, consistent with budgetary negotiations, a determination be made as to the characteristics which were to be activated for experimental contracts. Gen. Eaker approved these characteristics on 23 November 1945.

12. (C) Ltr., 23 Nov. 1945
Fr: Brig. Gen. A. R. Maxwell, Chief, Req. Div., OAC/AS-3, Wash.
To: AC/AS-4, Wash.
(File: AAG, Wash.)

Certain principal military characteristics of the all-weather fighter airplane were approved. Included were:

1. Class: High performance fighter, capable of diversified operations in all kinds of weather.

2. Mission: The destruction of enemy air forces and of tactical targets under all weather, day, and night conditions.

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3. Requirements:

High Speed at 35,000 ft.	525 mph /455.91 knots/
High Speed at sea level	550 mph /477.62 knots/
Climb to 35,000 ft.	12 min.
Combat radius of action at 10,000 ft.	600 mi. /521.04 nautical mi./
at best operational altitude	1000 mi. /868 nautical mi./

13. (U) Wire, 28 Nov. 1945
Fr: Airc. Proj. Sect., Eng. Div.
To: AC/AS-4, Wash.
(File: Contr., Proc. Div.)

ATSC transmitted supplementary information concerning the conversion of the Curtiss-Wright Contr. W33-038 ac-6266 from the XA-43 to the all-weather fighter. Eng. Div. did not desire to continue the XA-43 project because it was initiated with some compromise in range and bomb load. Subsequent information on windmilling drag of jet units and a correction in range calculation methods had further reduced the range to 500 /434 nautical miles/ miles below the Army Air Forces (AAF) minimum established in the 1944 military characteristics for attack airplanes; the range also was approximately 1,000 /868 nautical miles/ miles short of the 1945 characteristics. ATSC stated that in the light of the compromises and expenditures involved, it was not believed the XA-43 represented sufficient improvement in airplane design to warrant a continuation of its development. Completion of the XA-43 project would require approximately one-fourth of the remaining 1946 funds allocated for the development of bombardment type aircraft. ATSC stated that it was of definite financial advantage to the Research and Development (R&D) Program to amend the existing contract to call for an all-weather fighter airplane.

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14. (C) Memo., 4 Dec. 1945
Fr: Brig. Gen. A. P. Maxwell, Chief, Req. Div., OAC/AS-3, Wash.
To: AC/AS-4, Wash.
(File: AAG, Wash.)

Gen. Maxwell directed attention to the new classifications for aircraft as listed in the new military characteristics dated 23 Nov. 1945. The new classification for the all-weather fighter was given as follows: "A high performance fighter, capable of diversified operations in all kinds of weather."

15. (C) R&R-1, 6 Dec. 1945
Fr: Brig. Gen. A. R. Crawford, Chief, Res. & Eng. Div., OAC/AS-4, Wash.
To: Budget & Fiscal Office, Wash.
(File: Airc. Br., Res. & Eng. Div., AC/AS-4, Wash.)

Gen. Crawford requested approval of a new contract with Curtiss-Wright to procure the XF-87 all-weather fighter airplane and to utilize the unexpended portion of the 1945 funds allocated for the purchase of the XA-43. Gen. Crawford explained that conversion of these unexpended funds would save the Government the $700,000 already spent; also, this was the only method by which the all-weather fighter requirement could be fulfilled inasmuch as all funds in the 1946 budget already had been allocated.

15A. (C) R&R-2, 19 Dec. 1945
Fr: Col. E. H. White, Deputy Chief, Budget & Fiscal Office, Wash.
To: Res. & Eng. Div., AC/AS-4, Wash.
(File: Airc. Br., Res. & Eng. Div., AC/AS-4, Wash.)

Concurrence could not be granted by the Budget Office, War Dept., for the reallocation of funds on the XA-43 contract (W33-038 ac-6266) to the development of the XP-87 project. The cancellation of contracts involving prior years' funds and the utilization of unexpended balances for new contracts in the current fiscal year were contrary to War Dept. policy. A change order on the existing XA-43 contract was recommended to cover the all-weather fighter proposal.

16. (C) Wire, 26 Dec. 1945
Fr: Brig. Gen. A. R. Crawford, Chief, Res. & Eng. Div., AC/AS-4, Wash.
To: CG, ATSC
(File: Airc. Br., Res. & Eng. Div., AC/AS-4, Wash.)

Authorization was granted to utilize existing unspent funds of the XA-43 contract on the XP-87 project by change orders. This would make possible the procurement of one XP-87 in lieu of the XA-43 on XA-43 Contr. W33-038 ac-6266.

17. (R) TI-2087, 28 Dec. 1945
(File: CF-B)

These Technical Instructions (TI) initiated action to procure one XP-87 airplane by change order to existing XA-43 Contr. W33-038 ac-6266 and to utilize the funds expended on the contract for this procurement.

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17A. (U) Ltr., 16 Jan. 1946
Fr: Col. G. F. Smith,
Chief, Airc. Proj. Sect.,
Eng. Div.
To: AC/AS-4, Wash.
(File: Contr, Proc. Div.)

ATSC had made contractual arrangements for procurement of one XP-87 airplane in lieu of two XA-43 airplanes on Contr. W33-038 ac-6266 in accordance with TT WAR-90317 dated 27 Dec. 1945. /See Doc. 16.7 To insure against the possible loss of one airplane during the testing period, ATSC had tentatively allocated approximately $3,000,000 under the 1946 R&D program to cover the procurement of a second XP-87. ATSC requested approval of its action in this procurement. /See Doc. 18A.7

16. (R) IOM, 24 Jan. 1946
Fr: Maj. J. K. Bussey,
Airc. Br., M&S, Mat.
Div., Wash.
To: Brig. Gen. A. R. Crawford,
Chief, Res. & Eng. Div.,
OAC/AS-4, Wash.
(File: Airc. Br., Res. & Eng.
Div., AC/AS-4, Wash.)

Airc. Br., M&S, advised that funds totaling $8,500,000 were provided for in the XA-43 Ltr. Contr. W33-038 ac-6266, issued 25 May 1945, covering three flight articles and one static test article. Only $5,500,000, however, was available for this project from 1945 funds, and it was anticipated that the additional $3,000,000 would come from 1946 funds. A supplement to this letter contract subsequently reduced the $8,500,000 to $5,400,000 to cover two flight articles (one with complete equipment and one stripped). Of this latter amount $4,300,000 was still available to finance the XP-87 development, and it was planned to obtain one XP-87 with this money. In addition, an expenditure of $2,300,000 was anticipated for a second XP-87 airplane. This would make the total expenditure for two XP-87's $7,600,000. Maj. Bussey stated that 1946 funds for a second all-weather airplane set up $6,500,000 to obtain two flight articles in the XP-87 category. The reduced cost was partially explained by the fact that the XP-87 was to be the work horse, and the new ideas pertaining to the particular problems involved in this specialized airplane could be applied to the newer proposition.

16A. (R) 1st Ind., 31 Jan. 1946
Fr: Maj. Gen. E. M. Powers,
AC/AS-4, Wash.
To: Eng. Div., ATSC
(File: Contr, Proc. Div.)

Authority was granted to procure a second XP-87 airplane from 1946 R&D funds. Additional funds amounting to approximately $3,000,000 had been tentatively allocated to the 1946 funds for this procurement. /See Doc. 17A.7

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19. (R) Amend. No. 6 to Supp. to Ltr. Contr. W33-038 ac-6266, 31 Jan. 1946
(File: Contn, Proc. Div.)

This amendment provided for the placing of an order with Curtiss-Wright for the furnishing of one AAF Model XP-87 airplane, one complete mock-up, and wind tunnel models. Contractor was authorized to expend or obligate no more than $5,419,365.52 in the aggregate in the performance of this contract.

20. (U) Rpt., 7 Feb. 1946, Conf. on armament inst. in XP-87 airp., 5 Feb. 1946 Armament Lab., Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Representatives of the Airc. Proj. Sect., Radar Lab., Armament Lab., and Curtiss-Wright were present at this conference to discuss the armament installation in the XP-87 airplane. It was decided that (1) the APG-3 type radar would be used in the nose turret installation; (2) the nose turret would consist of four 20mm. guns traveling 60° in traverse and mounted in the conical turret; (3) the tail turret would probably consist of a small ball turret arrangement which would mount two .50 calibre type M-3 machine guns; (4) the cockpit installation of the periscopic sight would be arranged by Armament Lab. so that the periscope would be behind rather than in front of the radar observer; (5) the bomb installation was satisfactory except for minor changes in sway braces and bomb attachment points.

21. (C) Ltr., 8 Feb. 1946
Fr: Col. R. S. Garman, Chief, Fighter Br., Airc. Proj. Sect., Eng. Div.
To: AC/AS-4, Wash.
(File: AAG, Wash.)

Eng. Div. briefly described the Curtiss-Wright XP-87 all-weather fighter as a four-engine, jet-propelled fighter, designed to operate in all weather conditions. Power would be supplied by four Westinghouse 24C units, each giving a static thrust of 3,000 pounds. Airplane would be equipped with a four-gun 20mm. nose turret and a two-gun .50 calibre tail turret, both remotely controlled by a double-ended periscopic sight. Automatic gun-laying radar equipment was provided as a secondary method of firing. Total fuel capacity would be approximately 2,600 gallons. Calculated performance figures indicated a high speed at sea level of 600 mph (521 knots) and time to climb to 35,000 ft. of 13.8 min. The crew would consist of pilot and radar observer. The airplane would be 62 ft. 10 inches long, with 60 ft. spread, and a height of 19 ft.

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over the rudder. Design gross weight totaled 37,350 pounds with an alternate gross weight of 49,900 pounds, including 1,300 gallons of external fuel. Contract (W33-038 ac-6266) specified the completion date of the airplane as February 1947, the estimated first flight date as February 1947; and estimated delivery to Wright Field as March 1947.

22. (U) TI-2087, Add. 1, 18 Feb. 1946 (File: CF-B)

This addendum initiated action to amend TI-2087 to provide for the procurement of two XP-87 airplanes.

23. (U) Rpt., 6 Mar. 1946, Conf. on power install., 28 Feb. 1946 (File: Airc. Proj. Sect., Eng. Div.)

During this conference Power Plant Lab. could give no answers to most of the Curtiss-Wright questions concerning the 24C unit installation, as the Army had no actual installation of this type at that time. The type of fuel around which the airplane was to be designed was changed, however, from JP-1 to JP-2 because JP-2 fuel would ultimately become the Air Corps standard. This change would result in additional tankage of approximately 80 gal. and in a corresponding increase in weight of the airplane. No definite decisions were made as to the design of an emergency fuel system and as to the methods of preventing ice formations on the impeller blade tips.

24. (R) Memo. Rpt., TSEAC6-4302-55-1, /Airc. Lab., Eng. Div./ 12 Mar. 1946 Model Specification, Curtiss-Wright Aircraft Corporation, XP-87 Airplane (File: Airc. Proj. Sect., Eng. Div.)

This memo. rpt. presented the comments of Airc. Lab. on the design of the XP-87 airplane.

25. (U) Amend. No. 5 to Ltr. Contr. designated Supp. to Contr. W33-038 ac-6266, 22 Mar. 1946 (File: Contr., Proc. Div.)

This amendment substituted two AAF Model XP-87 airplanes and wind tunnel models for the one airplane specified in and made a part of Ltr. Contr. W33-038 ac-6266 by Amend. No. 6 dated 31 Jan. 1946. /See Doc. 9 and Doc. 14./

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25A. (U) Ltr., 22 Mar. 1946
Fr: R. C. Blaylock, Chief Engr., Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright submitted a list of the requirements for the Westinghouse 24C engines to be used in the XP-87 airplanes. This list specified that the engine must be designed to use JP-2 fuel. Further, two mock-up units of the engine would be required by May 1, and if the actual engines were delayed, two additional mock-ups would be required to expedite the engine installation.

26. (U) Ltr., 27 Mar. 1946
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Servs. Sect., Proc. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright submitted its formal quotation of $8,729,044.52 for the construction of two XP-87 airplanes on a fixed-price basis, under the original XA-43 Contr. W33-038 ac-6266. This quotation was broken down as follows:

Basic Contr., Phase I	$ 366,791.00
Ltr. Supp. as amended	$5,119,865.52
Total allocated	$5,786,656.52

Additional Funds Required:

Second airplane	$2,872,200.00
Instrumentation for first airp.	70,188.00
Total	$2,942,388.00
Total proposed contract price	$8,729,044.52

The price quoted did not include flight demonstration; it included only 10 hours of functional flight testing at contractor's plant. If initial flights were to be conducted at some airport other than the contractor's, these would be the subject of later negotiations.

27. (C) Ltr., 3 Apr. 1946
Fr: Airc. Proj. Sect., Eng. Div.
To: Req. Div., AC/AS-3, Wash.
(File: AAC, Wash.)

With reference to the new military characteristics for the all-weather fighter, Eng. Div. suggested that the requirement of a 30° angular coverage for the nose turret was inadequate and should be changed to require an included angle of at least 120°. An angular coverage of 120° for the tail turret was also suggested. These suggestions were made on the premise that guns were needed, which demanded that they be capable of moving through an angle large enough to be defensively effective.

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28. (C) R&R-1, 8 Apr. 1946,
Fr: Propul. & Equip. Br.,
Req. Div., AC/AS-3, Wash.
To: Res. & En.. Div.,
AC/AS-4, Wash.
(File: AAG, Wash.)

Propul. and Equip. Br., Req. Div., recommended that the angular coverage for the nose turret and for the tail turret on the all-weather fighter be changed from 30° to 120°.

29. (U) Ltr., 19 Apr. 1946
Fr: R. C. Blaylock, Chief Engr.,
Curtiss-Wright Corp.,
Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.,
ATSC
(File: Contr., Proc. Div.)

Curtiss-Wright submitted an estimate of the comparative performance of the XP-87 airplane at military thrust (12,000 rpm) with and without after-burning, as follows:

	Military Power	Military Power Plus After-burning
High speed at sea level, mph	600 (521 knots)	618 (536.67 knots)
Thrust at high speed at S.L., lbs.	10,700	15,060
Time to climb to 35,000 ft., min.	13.1	6.2
Fuel used in climb to 35,000 ft., lbs.	1,720	3,630
Take-off distance over 50 ft. obstacle, ft.	5,740	4,030

This estimate was given as the result of information received from Westinghouse that the addition of after-burning provisions on its model 24C jet engine would result in an increase in thrust of approximately 40%.

30. (U) R&R-1, 14 May 1946
Fr: Capt. C. E. Thornton,
Proj. Officer, Fighter Br.,
Airc. Proj. Sect., Eng. Div.
To: Chief, Airc. Proj. Sect.,
Eng. Div.
(File: Airc. Proj. Sect.,
Eng. Div.)

Comments were submitted on a preliminary inspection by Wright Field personnel of the cockpit mock-up of the XP-87 airplane. In the opinion of the project officer and the inspecting party, the cockpit, as revised during the course of inspection, represented the best compromise possible to attain consistent with existing military characteristics for an all-weather fighter. Accordingly, contractor was advised to duplicate the cockpit in its existing form in the complete

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airplane mock-up. The airplane mock-up was approximately 75 per cent complete at that time.

31. (U) R&R-2, 24 May 1946
Fr: Propul. & Access. Sub-Div., Eng. Div.
To: Fighter Br., Airc. Proj. Sect., Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Weight estimate covering the fire control system planned for the XP-87 airplane was transmitted to Fighter Br., Airc. Proj. Sect., with the comment that the estimate was computed from the weight of a system based on the Type S-9 sight. Gross weight of the fire control installation (less gunner) was estimated at 4,760 lbs.

32. (U) Rpt., 29 May 1946
By: Curtiss-Wright Corp., Columbus, Ohio
(File: Airc. Proj. Sect., Eng. Div.)

Curtiss-Wright presented the first, second, third, and fourth studies of the XP-87 all-weather fighter airplane and included the changes agreed upon at a Wright Field conference held on 15 May 1946 /Doc. 357. The studies covered configuration changes, weight summaries, performance summaries, and bomb provisions.

33. (C) Ltr., 7 June 1946
Fr: Brig. Gen. L. C. Craigie, Chief, Eng. Div.
To: Res. & Eng. Div., AC/AS-4, Wash.
(File: AAG, Wash.)

Gen. Craigie made several recommendations concerning the XP-87 all-weather fighter airplane. He stated that when the characteristics for the all-weather fighter were received, "Air Material Command regarded the aircraft as a World War II night (and bad weather) fighter with certain improvements such as AGL turrets, fore and aft; blind landing equipment; and a substantial increase in performance." Considerable confusion, however, existed regarding the all-weather fighter. Two schools of thought had developed: (1) that the all-weather fighter should be built as a fighter intended to take-off, fight and land at night and/or in bad weather; (2) that the all-weather fighter should be an "all purpose" airplane to operate as a night and/or bad weather fighter, as an escort fighter, or as a ground support aircraft which would deliver support by fire from the front and rear turrets and by dive bombing. Attention was directed to the Curtiss-Wright performance studies of the XP-87 airplane. Gen. Craigie recommended changing the term "All-Weather Fighter" to "Night Fighter," building the airplane in

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accordance with the first school of thought above outlined, eliminating rear turret from the military requirements, and reducing requirements for armor protection to the rear from .50 calibre protection to flak protection only.

34. (U) Amend. 10 to Ltr. Contr. W33-038 ac-6266 13 June 1946 (File: Contr., Proc. Div.)

Amend. 10 increased from $5,41[illegible],365.52 to $8,502,145.52, the amount contractor was authorized to expend or obligate. The Secy. of War approved this amendment on 13 June 1946.

35. (U) Memo. for File, 17 June 1946 Comments on Conf. at Curtiss-Wright Corp., Columbus, Ohio, 3 June 1946, on "Critical Design Problems of the XP-87 Airplane." (File: Airc. Proj. Sect., Eng. Div.)

Representatives of A-3, Washington, of AMC, and Curtiss-Wright attended the conference at contractor's plant and reviewed various studies of the XP-87 airplane which the contractor had prepared (see Doc. 32). Results of the conference were: (1) the Curtiss-Wright report would be used by Fighter Br., Eng. Div., in a subsequent Washington conference to clarify existing military characteristics for all-weather fighters, and (2) the mock-up on the XP-87 would be delayed until after Washington made a decision concerning armament and engine installations.

36. (C) Wire, 15 June 1946 Fr: Brig. Gen. A. R. Crawford, Chief, Res. & Eng. Div., CAC/AS-4, Wash. To: Eng. Div., AMC (File: Airc. Proj. Sect., Eng. Div.)

Gen. Crawford advised that Hq. AAF was taking action to revise the Military Characteristics of Aircraft (All-Weather Fighter), dated 23 Nov. 1945, so that this class of aircraft would be a high performance night and inclement weather fighter. The requirement for tail turret would be deleted, but rear armor protection would be retained as specified. The field of fire of the front armament installation would be increased, and while it appeared the requirement would be for a 90° forward cone, no definite decision had been made in this respect.

37. (U) Wire, 26 June 1946 Fr: Fighter Br., Airc. Proj. Sect., Eng. Div. To: Maj. J. K. Bussey, Res. & Eng. Div., AC/AS-4, Wash. (File: Contr., Proc. Div.)

Fighter Br., Airc. Proj. Sect., advised that the mock-up inspection of the Curtiss-Wright XP-87 night and inclement weather fighter had been set for 16 July 1946. Mock-up would be conducted in two phases: Phase I would be for observance of mock-up official observers and other personnel not directly concerned with

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detail changes; Phase II would be a detail engineering inspection, beginning on 17 July 1946 and running through 20 July 1946 or as long as necessary.

38. (C) R&R-2, 27 June 1946
Fr: Brig. Gen. A. F. Maxwell, Chief, Req. Div., AC/AS-3, Wash.
To: Res. & Eng. Div., AC/AS-4, Wash.
(File: AAG, Wash.)

Req. Div. requested the comments of the Res. & Eng. Div. and also of AMC concerning several unanswered questions as to how large a cone of fire the nose turret should possess. A statement was specifically requested of the optimum cone of fire plus any over-travel necessary to give the mechanism time to be tracking properly when the optimum point was reached. Until this information was furnished, the 30° cone fire already required would remain unchanged. The following amendments to Military Characteristics of Aircraft (All-Weather Fighter), dated 23 Nov. 1945, were approved:

Class: High Performance Night and Inclement Weather Fighter.

Mission: The execution of night fighter and intruder missions during periods of darkness and during periods of inclement weather.

Amendments regarding guns and ammunition were also approved. /See Docs. 27, 28, 33./

39. (U) Rpt., 27 June 1946
/Fighter Br., Airc. Proj. Sect., Eng. Div./
Conf. on Power Plant install. for XP-87 airp., 27 June 1946,
Curtiss-Wright Corp., Columbus, Ohio
(File: Airc. Proj. Sect., Eng. Div.)

During the discussions concerning the power plant installation for the XP-87 airplane, Westinghouse representatives advised that the first 10 engines probably would be J4 experimental engines and the remaining six would be production J4's; no mock-up engines would be available. Requirements for an emergency fuel system for the engine also were discussed. Question was asked whether or not such a system was necessary for a multi-engine airplane. Concerning the use of JP-2 fuel acquired by AMC for the XP-87 fuel system, Westinghouse representatives claimed they had no knowledge of this fuel and stated their engines were designed to operate on ANF-28 fuel only. AMC Project

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[redacted] Engineer said that action would be taken to eliminate this discrepancy.

40. (U) Rpt., 1 July 1946
/Curtiss-Wright Corp., Columbus, Ohio/
Conf. on turbo-jet engine install. on XP-87 airp., 27 June 1946
(File: Airc. Proj. Sect., Eng. Div.)

According to the Curtiss-Wright report, no one present at the conference was definitely sure of the engine models to be allocated to the XP-87. The AMC representative (Mr. R. I. Ahern) believed that all engines would be 24C-4B's and that the first five allocated to Curtiss-Wright would be experimental; the Westinghouse representative was of the opinion that 16 engines would be allocated to the XP-87, of which 10 were to be experimental and might include 24C-3A's; six were to be production 24C-4B's. Concerning the use of JP-2 fuel, Westinghouse had made no plans to use any other kind of fuel except gasoline. Curtiss-Wright, however, had designed the XP-87 fuel system for JP-2 fuel, and the present tankage would be insufficient for gasoline.

41. (C) 1st Ind., 12 July 1946
Fr: Brig. Gen. A. R. Crawford, Chief, Res. & Eng. Div., OAC/AS-4, Wash.
To: Eng. Div., AMC
(File: AAG, Wash.)

Res. & Eng. Div., Wash., notified the Eng. Div., AMC, that the tail turret requirement had been deleted from the military characteristics for the all-weather fighter. No decision would be made concerning the size of the forward cone of fire for the all-weather airplane until answers were received to questions concerning the optimum offset fighter position of fire to bomber fire, and the ability of the fighter to stay outside of the effective tail cone of a bomber. If it were reasonable to expect a fighter to stay outside of the effective tail cone of a bomber, could accurate fire be obtained with a turret having a forward cone of fire large enough to permit these tactics? If the fighter could not stay outside of the bomber's effective tail cone, would it be feasible or desirable to have the fighter's radar equipment control the airplane with fixed guns instead of a gun turret with the penalties that the turret presents in weight or drag? Eng. Div., AMC, was directed to forward its comments and answers as well as any reports of studies made in this connection. /See Docs. 33, 38.7

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42. (C) Ltr., 16 July 1946
Fr: Brig. Gen. A. R. Maxwell, Chief, Req. Div., OAC/AS-3, Wash.
To: AC/AS-4, Wash.
(File: AAG, Wash.)

Certain principal characteristics of the all-weather fighter were approved. Included were the following:

1. Class: High Performance Night and Inclement Weather Fighter.

2. Mission: The execution of night fighter and intruder missions during periods of darkness and during periods of inclement weather.

3. Requirements: Performance

High Speed at 35,000 ft.	525 mph (455.9 knots)
High Speed at Sea Level	550 mph (477.6 knots)
Climb to 35,000 ft.	12 minutes
Combat Radius of Action at 10,000 ft.	600 miles (521 nautical miles)
at best operational altitude	1000 miles (868 nautical miles)

Other characteristics approved concerned armament, gunsight, ground attack installations, armor, fuel, and equipment. The crew would consist of a pilot and a radar observer.

43. (C) Ltr., 16 July 1946
Fr: Brig. Gen. A. R. Crawford, Chief, Res. & Eng. Div. OAC/AS-4, Wash.
To: Eng. Div.
(File: AAG, Wash.)

Res. & Eng. Div., Office, AC/AS-4, transmitted the changes which had been approved in the military characteristics for the all-weather fighter, and advised that the recommendation /Doc. 337 for a reduction in rear armor plate protection from .50 caliber to flak protection only had been disapproved. Eng. Div. was requested to incorporate these changes into a revision of the military characteristics for all-weather aircraft dated 23 Nov. 1945.

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44. (C) R&R-1, 23 July 1946
Fr: Lt. Col. W. M. Mahurin, Req. Div., AC/AS-3, Wash.
To: Res. & Eng. Div., AC/AS-4, Wash.
(File: AAG, Wash.)

Req. Div. requested that Curtiss-Wright be directed to replace all individual engine instruments on the XP-87 airplane with the dual indicating type. Req. Div. stated that a representative of its office, who had participated in a mock-up inspection of the XP-87 cockpit installation at the contractor's plant, had noted "with consternation that the instrument panel of the P-87 was over-shadowed by a wealth of the same size and similar function instruments and dials," and that needless duplication was apparent; also, that the instrument panel seemed completely out of proportion.

45. (R) Memo. Rpt. TSESA-1299, /Airc. Proj. Sect., Eng. Div./, 30 July 1946
Mock-up inspection, 16 July 1946
(File: Airc. Proj. Sect., Eng. Div.)

Mock-up inspection of the Curtiss-Wright XP-87 airplane, two of which were being procured on Contr. W33-038 ac-6260, was held at the contractor's plant 16-19 July 1946. The mock-up was complete, well constructed, and adequate for the purpose intended. Changes in design to improve the utility and serviceability of the airplane were recommended and outlined in the report.

46. (C) R&R-1, 30 July 1946
Fr: Brig. Gen. A. R. Maxwell, Chief, Req. Div., AC/AS-3, Wash.
To: Res. & Eng. Div., AC/AS-4, Wash.
(File: AAG, Wash.)

Req. Div. requested AMC to direct contractor's attention to provisions outlined in all-weather fighter characteristics dtd. 23 Nov. 1945, particularly to the implication concerning the connection between external fuel tank provisions and bomb provisions. AMC was also to direct contractor to (1) delete bomb provisions in bomb bay, incorporating them into external carrying capacities, and (2) delete the liaison and Shoran radio sets. Dissatisfaction had been expressed by a Req. Div. member of the Mock-up Board and also by the Curtiss-Wright Engineering Staff with the bomb bay installation on the XP-87 airplane. Req. Div. stated that the XP-87 in its existing state was a very large and very heavy airplane. With the addition of an internal bomb bay, auxiliary devices had to be added to further increase the already

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critical weight. The two radio sets in the airplane were considered extraneous equipment.

47. (R) Ltr., 31 July 1946
Fr: Brig. Gen. A. R. Crawford, Chief, Res. & Eng. Div., OAC/AS-4, Wash.
To: Lt. Col. R. E. Greer, Asst. for Tech. Matters, Office, Chief of Admin.
(File: Contr., Proc. Div.)

With regard to the cockpit installation in the XP-67 all-weather fighter, Res. & Eng. Div., Office, AC/AS-4, directed AMC to instruct Curtiss-Wright to replace all individual engine instruments with the dual indicating type on the airplane mock-up before the next meeting of the Mock-Up Board.

48. (C) Ltr., 22 Aug. 1946
Fr: Maj. Gen. C. E. LeMay, Deputy C/AS for Res. & Dvlpmt., Wash.
To: Strategic Air Command, Bolling Field, D. C.
(File: AAG, Wash.)

The aid of the Strategic Air Command, other commands, and the Air University was enlisted in revising current military characteristics for service aircraft and in prescribing new requirements. A description of the all-weather fighter project was included in the requirements for military characteristics, as follows: "The all-weather fighter is an outgrowth of the night fighter which will also be capable of operation in all types of inclement weather. It is not intended that this fighter be capable of competing, under clear weather conditions, with small interceptor type fighters. For the next two or three years the P-82 will be utilized as an interim all-weather fighter. . . ." Two proposals had been selected for investigation, the Curtiss P-87 and the Northrop P-89. /Performance ratings of both airplanes are given in Tab "B" attached to this document./ Defensive armament requirements constituted one of the main problems to be considered in formulating new all-weather fighter characteristics. Comments were specifically requested upon the degree of flexibility, if any, the forward firing turret should have.

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49. (R) Ltr., 9 Sept. 1946
Fr: Capt. C. H. Thornton,
Proj. Officer, Fighter Br.,
Airc. Proj. Sect., Eng. Div.
To: Curtiss-Wright Corp.,
Columbus, Ohio
(File: Airc. Proj. Sect.,
Eng. Div.)

Information relative to the emergency fuel system and other engine problems was sent to the contractor for action. /See Doc. 39./ Fighter Br. considered the installation of an emergency fuel system in the "X" model airplane advisable because service experience was lacking on control systems for the Westinghouse Type 24C engines. Approval was given to the contractor's proposal to design a fuel system for JP-2 fuel, naming 100/130 octane fuel as an alternate, as Westinghouse had no data on engine performance using either JP-1 or JP-2 fuel. Contractor was also advised that initial research of gas turbine icing was in progress.

50. (R) R&R-1, 16 Sept. 1946
Fr: Col. G. F. Smith,
Chief, Airc. Proj. Sect.,
Eng. Div.
To: Airc. Lab., Eng. Div.,
(File: Airc. Proj. Sect.,
Eng. Div.)

During a conference in /Brig./ Gen. /L. C./ Craigie's office /Chief, Eng. Div./ Curtiss-Wright had expressed concern because no high speed wind tunnel program had been set up for the XP-87 airplane, and sufficient aerodynamic information at Mach numbers up to .85 was not available from the National Advisory Committee for Aeronautics (NACA) basic research program. To obtain the data necessary to settle problems of dive brake design, nacelle distortion, and other items, the contractor had suggested that Gen. Craigie consider the advisability of attempting to change NACA's attitude of not testing specific airplane models. Eng. Div., therefore, requested Airc. Lab. to initiate a short study of the XP-87 airplane to determine whether or not sufficient data were available to the contractor and to recommend a course of action either for or against the contractor's suggestion.

51. (R) R&R-2, 23 Sept. 1946
Fr: Col. C. K. Moore,
Chief, Airc. Lab.,
Eng. Div.
To: Airc. Proj. Sect.,
Eng. Div.
(File: Airc. Proj. Sect.,
Eng. Div.)

Airc. Lab. presented its comments concerning the XP-87 wind tunnel testing program. The contractor had contended that the existing high speed programs were not fully adequate for his needs and that specific wind tunnel tests had to be conducted on models of the XP-87 airplane. The laboratory felt that this contention should be considered, with

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the understanding that "the XP-87 was perhaps the most conventional fighter airplane now being designed under AMC contract." Any Curtiss-Wright argument in this connection could be matched or bettered by almost every other contractor with fighter aircraft under design. Aircraft under development were numerous and complex, and the facilities for aerodynamic tests were limited. Therefore, no contractor could look forward to the same wind tunnel support as before. Airc. Lab. recommended (1) that NACA not be asked to test high speed wind tunnel models of the XP-87 airplane, and (2) that test facilities at Wallops Island be utilized for specific tests of piloted and pilotless high speed design.

52. (U) Ltr., 27 Sept. 1946
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Servs. Sect., Proc. Div.
(File: Contr., Proc. Div., Eng. Div.)

Curtiss-Wright stated this letter constituted its acceptance of the terms and conditions agreed upon relative to the conversion of the original XA-43 CPFF contract (W33-038 ac-6266) to an FP contract. The contractor submitted a quotation of $5,032,020.32 to cover the design and manufacture of two XP-87 all-weather fighter airplanes, mock-up, and wind tunnel models. The cost of the first airplane totaled $5,283,362; the second article, $2,666,727; mock-up and wind tunnel models, $217,472. The remainder, $863,95[illegible].32 covered the articles and services completed under Phase I of the original XA-43 CPFF contract. In accepting the work on a fixed price basis, the contractor stated he would incur a loss of approximately $450,000.

53. (C) R&R-2, 4 Oct. 1946
Fr: Maj. E. B. Harwood, Propul. & Equip. Br., Res. & Eng. Div., AC/AS-4, Wash.
To: Req. Div., AC/AS-3, Wash.
(File: Res. & Eng. Div., AC/AS-4, Wash.)

Propul. & Equip. Br. recommended an amendment to the military requirements for armor protection for penetration and all-weather fighters, on the basis that "the best defense for a truly high speed fighter is its speed, maneuverability, and elusiveness (which characteristics would be materially affected by having to carry around a substantial amount of unnecessary armor protection)."

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54. (C) Ltr., 8 Oct. 1946
Fr: Brig. Gen. A. R. Maxwell, Chief, Req. Div., OAC/AS-3, Wash.
To: AC/AS-4, Wash.
(File: AAC, Wash.)

This communication transmitted the revised principal military characteristics of the all-weather fighter which were approved by Req. Div. /See Doc. 42.7

55. (U) Ltr., 15 Oct. 1946
Fr: Col. G. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Airc. Proj. Sect., Eng. Div.)

AMC had conducted a survey to determine the availability of a high speed tunnel in which to test a model of the XP-87 airplane. The results of these surveys indicated that it was not advisable to request the allocation of high speed tunnel time to the XP-87. Airc. Proj. Sect. recommended, however, that the contractor investigate NACA testing facilities at the Wallops Island Base.

56. (U) R&R-1, 17 Oct. 1946
Fr: Col. C. E. Schaetzel, Chief, Airc. Sect., Proc. Div.
To: Maj. L. H. Prugh, Dayton AAF PFO
(File: Contr., Proc. Div.)

Proc. Div. requested comments on, or approval of, the Curtiss-Wright quotations covering the procurement of the XP-87 airplane. Proc. Div. pointed out that the total cost of the proposed contract /FF basis/ was $9,032,020, that $8,655,000 had been allocated for this procurement, and that the Eng. Div. had been asked to advise whether additional funds could be allocated to cover the complete procurement or whether it would be necessary to curtail some of the items to be procured. Proc. Div. stated that a payment of $366,000 already had been made against the original CPFF contract /this contract covered procurement of the XA-43 airplane, and cost of work performed on this article, totaling $363,959.32, was included in the quotation of $9,032,020. See Doc. 52.7 The contractor was exceedingly reluctant to accept the figure of $9,032,020 because by doing so he claimed he would incur a half-million dollar loss on the contract.

57. (R) Ltr., 4 Nov. 1946
Fr: Col. G. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
To: AC/AS-4, Wash.
(File: Contr., Proc. Div.)

Eng. Div., advised that the contractor had been notified to install, temporarily, four fixed 20mm. guns in an alternate nose installation on the No. 2 XP-87 airplane. A permanent turret and fire control system would be installed when available. The temporary installation in the meantime

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would aid in making a functional and tactical evaluation of the No. 2 airplane. /See Doc. 58./

57A. (U) R&R-2, 13 Nov. 1946
Fr: Lt. Col. D. L. Strickland, Chief, Dayton AAF PFO
To: Airc. Sect., Proc. Div.
(File: Contr., Proc. Div.)

The Dayton AAF PFO outlined in detail the results of an investigation it had made of the Curtiss-Wright proposal and quotation covering the procurement of the XP-87 airplane under Contr. W33-038 ac-6266. The PFO particularly pointed out that its office did not intend "to question either the good faith or the accuracy of the methods used, nor the correctness of the figures in the negotiations under this proposed contract." However, the office did intend to point out certain pertinent items for consideration, such as the "use of high speed wing tunnel tests, the 'looseness' of contractor's guarantee and the indefinite nature of compliance 'with all the provisions of applicable specifications,' before entering into definitive contract."

58. (R) 1st Ind., 2 Dec. 1946
Fr: Col. H. G. Bunker, Res. & Eng. Div., AC/AS-4, Wash.
To: Airc. Proj. Sect., Eng. Div., Wash.
(File: Contr., Proc. Div.)

Hq. AAF concurred with AMC action taken 4 Nov. 1946 in notifying the contractor to install temporarily four fixed 20mm. guns in an alternate nose installation on the XP-87 airplane. /See Doc. 57./ Approval of this armament arrangement was granted only as a temporary installation on the No. 2 airplane. Hq. AAF urged that every effort be made to insure a permanent installation of a suitable turret and fire control system at the earliest possible date.

59. (C) Ltr., 3 Dec. 1946
Fr: Brig. Gen. A. R. Crawford, Chief, Res. & Eng. Div., AC/AS-4, Wash.
To: Brig. Gen. R. K. Taylor, Chief of Admin., AMC
(File: AAG, Wash.)

Hq. Wash. directed AMC to initiate a study to determine the feasibility of modifying the XP-87, the XP-88, and the XP-89 for reconnaissance purposes. This study was to include a comparative evaluation of the three aircraft from a reconnaissance viewpoint, and a general evaluation of the problems involved in converting each of the three airplanes to reconnaissance version.

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60. (R) Ltr., 4 Dec. 1946
Fr: Col. R. S. Garman, Airc. Proj. Sect., Eng. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

To conform with Hq. AAF policy, which required that all distances be expressed in nautical miles and all speeds of aircraft in knots, contractor was requested to submit all performance data in nautical miles and knots.

61. (U) Ltr., 13 Jan. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Servs. Sect., Proc. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright submitted a quotation of $46,101.07 to cover the cost of an X24C engine test nacelle structure under construction at that time. The nacelle structure included fuel, oil, and electrical and fire extinguisher systems, and embodied the installation of both jet engines. Contractor stated that it was advisable to test the two X24C jet engines before actual installation in the XP-87 airplane because of difficulities experienced with the TG-100 engine on other aircraft.

62. (U) Ltr., 23 Jan. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Servs. Sect., Proc. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright submitted a cost change summary on Contr. W33-038 ac-[illegible] covering the model XP-87 airplane. Price quoted in the summary totaled $257,385.49 for cost changes listed.

63. (R) Ltr., 23 Jan. 1947
Fr: Col. G. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

Eng. Div. disapproved contractor's quotation for an X24C engine test nacelle structure because higher authority had directed that no additional funds be allocated to the project of testing the engine installation.

64. (R) Ltr., 12 Feb. 1947
Fr: Col. G. F. Smith
Chief, Airc. Proj. Sect., Eng. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

Eng. Div. authorized the contractor to install one X24C-4A engine and one X24C-4B turbo-jet engine in a ground test stand and to conduct ground tests at no expense to the Government.

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65. (U) Ltr., 13 Feb. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Servs. Sect., Proc. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright submitted a revised XP-87 Cost Change Summary to Contr. W33-038 ac-6266. The revised cost change summary showed a reduction of $75,589.72 in the previous quotation, making the revised price total $182,205.77. /See Doc. 62./

65A. (U) Ltr., 17 Mar. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Servs. Sect., Proc. Div.
(File: Contr., Proc. Div.)

Contractor submitted a price of $63,036.17 for designing, fabricating, and installing a power nose turret in the No. 2 XP-87 airplane. This nose turret installation was proposed in lieu of a dummy nose or fixed gun installation and would incorporate a simulated turret designed to permit checks of the aerodynamic effect on the airplane and on the operation of the guns at high angles of deflection.

66. (C) R&R-1, 27 Mar. 1947
Fr: Brig. Gen. A. R. Maxwell, Chief, Req. Div., AC/AS-3, Wash.
To: Res. & Eng. Div., AC/AS-4, Wash.
(File: AAG, Wash.)

Req. Div. discussed the requirements for the degree of cone of fire turrets on all-weather fighters. Two all-weather fighters were then under development; one was to be equipped with a 180-degree cone of fire turret and the other was to have a 30-degree cone of fire turret. Until the flight testing of the XP-87 and the XP-89 indicated that the 180-degree cone of fire turret was practical and the 30-degree cone of fire turret was impractical, Req. Div. would not concur in changing the military characteristics for the all-weather fighter. /See Doc. 41./

67. (P) Ltr., 23 Apr. 1947
Fr: Capt. R. E. Mann, Proj. Officer, Airc. Proj. Sect., Eng. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

AMC had initiated action to cover the cost of installing a simulated turret on the second XP-87 airplane, No. 46-522. Funds for this procurement, however, would not be available until FY 1948. AMC advised the contractor that this notification was not to be considered a commitment but rather was to express the intent of AMC to install a simulated turret on the second XP-87.

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68. (U) R&R-1, 12 May 1947
Fr: Col. G. W. Goddard, Chief, Photo. Lab., Eng. Div.
To: Eng. Div.
(File: Contr., Proc. Div.)

After making an intensive study of the XP-87 airplane under construction at the Curtiss-Wright Columbus Plant, Photo. Lab. believed that this airplane offered the best possibilities as a photographic reconnaissance airplane of all the types inspected. The laboratory recommended that it be permitted to actually make a camera installation in an XP-87 in the interests of advancing the development of suitable reconnaissance type (jet type high-speed) aircraft.

69. (R) R&R-2, 20 May 1947
Fr: Col. G. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
To: Photo. Lab.
(File: Contr., Proc. Div.)

Airc. Proj. Sect., Eng. Div., concurred in the proposal that photo reconnaissance modification could be easily accomplished on an existing XP-87 airplane. Funds for this modification, however, were not presently available. Airc. Proj. Sect. stated that the No. 2 airplane, which was scheduled for delivery in September, could be made available for photographic tests after tests were conducted on the simulated turret and radar installations.

70. (U) Ltr., 20 May 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright submitted a quotation of $127,253.16 to conduct a 10-hour flight program on the XP-87 at Muroc Lake in place of the contractor's plant. This quotation increased the fixed price of Contr. W33-038 ac-6266 and was based on the assumption the proposed flight program would be considered complete at the end of 10 hours' flying time or three months from the date the airplane was shipped from the contractor's plant. Curtiss-Wright also submitted a copy of the proposed XP-87 Phase I Flight Test Program.

71. (R) Amend. 18, 20 May 1947, to Ltr. Contr. designated Supp. to Contr. W33-038 ac-6266, 22 May 1945
(File: Contr., Proc. Div.)

This amendment increased the amount authorized in Ltr. Contr. from $8,502,145.52 to $8,627,145.52. Amendment also authorized the contractor to disassemble the first XP-87 airplane at his Columbus plant and load it on railway cars for transportation to Muroc Army Air Field (AA Field), where it would be

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reassembled and prepared for flight. Ten hours of flight testing at Muroc were to be conducted by contractor on the first XP-87 airplane in accordance with a flight test program to be mutually agreed upon later.

72. (U) Amend. 19, 6 June 1947, to Ltr. Contr. designated Supp. to Contr. W33-038 ac-6266 (File: Contr., Proc. Div.)

This amendment increased the amount authorized in contract from $3,627,145.52 to $8,365,229.32, and added item to cover spare parts for the XP-87 airplane at a price not to exceed $75,000.

73. (R) Amend. 22, 13 June 1947, to Ltr. Contr. designated Supp. to Contr. W33-038 ac-6266 (File: Contr., Proc. Div.)

Amendment 22 increased the amount authorized in the contract from $8,365,229.32 to $8,971,113.04, and added item to cover certain changes in the design, development, and construction of two XP-87 airplanes.

74. (U) Ltr., 19 June 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Curtiss-Wright submitted an informal quotation of $72,024 for the fabrication of a photographic nose to be installed on the No. 2 XP-87 airplane, on the assumption that the airplane had been delivered previously to the Army. Installation of the entire photographic nose assembly could be made within one month after receipt of the No. 2 airplane at contractor's plant. Contractor did not submit a proposal for a complete new XP-87 airplane designed for photographic reconnaissance purposes only, pending AMC comments on the nose modification quotation.

75. (U) Record of Official Contact, 19 June 1947
(File: Airc. Proj. Sect., Eng. Div.)

The application of all-weather flying to all-weather fighter projects was discussed in an informal conference between Messrs. C. B. Thornton and J. M. Herald, project engineers on the XP-87 and XP-89, and personnel of the Eng. Staff, Clinton County Army Air Base (AA Base), Wilmington, Ohio. Two conclusions were reached: (1) a certain amount of liaison should be established with regard to existing all-weather fighter projects and future development of the all-weather fighters; (2) the XP-87 all-weather fighter airplane should be considered for-

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assignment to the All-Weather Flying Center, as this aircraft appeared to be the most logical for the study of high speed all-weather flying which the center had initiated.

76. (C) Ltr., 23 July 1947
Fr: Maj. Gen. L. C. Craigie, Chief, Eng. Div.
To: Req. Div., AC/AS-3, Wash.
(File: CF-B)

AMC requested information concerning the need for equipping one XP-87 airplane for photographic test and priority requirement. After fully studying new types of aircraft which could be adapted for photographic reconnaissance, AMC believed that the XP-87 offered the best possibilities considering the requirements of close and medium reconnaissance. This was particularly true for night photography, and for low and forward shooting high speed photography so essential for coverage of ground forces. /See Doc. 90./

77. (U) Ltr., 25 July 1947
Fr: Col. W. D. Eckert, Chief, Proc. & Indust. Plan. Div., OAC/AS-4, Wash.
To: Chief, Current Proc. Br., Proc. Group, WDGS, Wash.
(File: Contr., Proc. Div.)

Proc. & Indust. Plan. Div., Wash., submitted for approval Supp. Agree. 1 to Contr. W33-038 ac-6266. This supplemental agreement covered the procurement of two XP-87 airplanes, one complete XP-87 mock-up, various wind tunnel models, and one model TG-180 aircraft engine installed and ground tested in a ground testing installation. Total price quoted was $9,107,020.32, which included the $75,000 set up for spares. Price of the XP-87 models, the first and second airplanes, instrumentation of the second airplane, mock-up, and various wind tunnel models totaled $8,168,061, including a profit of $458,295. The cost of performing Phase I and a portion of Phase II on the XA-43 contract totaled $963,959.32; this included a fixed fee of $13,307 for Phase I work only. Deliveries anticipated were: wind tunnel models in September 1946; the first XP-87 in May 1947; and the second airplane in July 1947.

77A. (U) Wire, 4 Aug. 1947
Fr: Col. P. B. Klein, Chief, Fighter Br., Airc. Proj. Sect., Eng. Div.
To: AC/AS-4, Wash.
(File: CF-B)

AMC definitely recommended installation of the J-33 engines for the production version of the XP-87, but the change from the J-34 (24C) engines was not to be made unless production was definitely scheduled. AMC stated that the change in engines was

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feasible without any loss in performance. Actual cost of engine change was estimated at $650,000.

78. (R) R&R-1, 7 Aug. 1947
Fr: Col. M. G. Demler, Res. & Eng. Div., AC/AS-4, Wash.
To: Req. Div., AC/AS-3, Wash.
(File: R&D, Mat., Wash.)

Res. & Eng. Div., Wash., "definitely recommended that any production of P-87 airplanes be based upon the installation of two Allison J-33-06 engines." Res. & Eng. Div. believed that this change from the installation of four each 24C engines in the XP-87 was feasible without any loss in performance. In addition, the cost of engines per airplane would be reduced from approximately $650,000 to $150,000.

79. (R) Ltr., 21 Aug. 1947
Fr: Maj. Gen. E. M. Powers, AC/AS-4, Wash.
To: Eng. Div.
(File: AAG, Wash.)

AC/AS-4 approved AMC recommendation that J-33 engines be installed in the production version of the XP-87 airplane; and since production of the P-87 was tentatively scheduled in the FY 1949 program, action was desired to effect the J-33 engine installation in one XP-87 airplane. The change would involve no loss in performance and would reduce the cost of engines per airplane from approximately $650,000 to $150,000, based upon 150% spare engines. /See Doc. 81./

80. (U) Ltr., 25 Aug. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Sect., Proc. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright quoted a revised price of $141,263.33, which increased the fixed price of Contr. W33-038 ac-6266, to cover a 10-hour flight test program on the first XP-87 airplane at Muroc Lake. /See Doc. 70./ Reasons for the increase were given as follows: (1) preparatory costs at Columbus could be more accurately calculated since the work was more clearly outlined, which resulted in a cost estimate higher than that anticipated originally; (2) labor rates had changed from estimated average rates to actual rates; (3) overtime premium only for unloading, reassembling, ground testing, and first week of flight testing were included in the price; and (4) flying pay had been increased because actual bonuses for first flights were then known.

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81. (C) 1st Ind., 2 Sept. 1947
Fr: Brig. Gen. S. E. Brentnall, Chief, Eng. Ops., Eng. Div.
To: AC/AS-4, Wash.
(File: AAG, Wash.)

Eng. Ops. asked whether AC/AS-4 still desired action to effect the J-33 engine installation in one production XP-87 airplane, since Airc. Laboratory's evaluation of the engine change proposal had indicated some loss in performance. AMC's previous statement that no loss in performance would result if J-33 engines were installed in lieu of J-34 engines was based on Allison C-6 specifications. Eng. Ops. submitted a table giving the laboratory's evaluation and the contractor's performance figures based on Allison C-6 model specifications. A performance summary table was also submitted showing military requirements for all-weather fighters in comparison with the performance of the XF-87 with four 24C engines and the laboratory's calculated C-6 engine performance data. /See document for details. See also Doc. 73-7

82. (S) R&R-1, 4 Sept. 1947
Fr: Col. L. G. Fiegel, Exec., AC/AS-3, Wash.
To: AC/AS-4, Wash.
(File: AAG, Wash.)

AC/AS-3 requested that all future reference to fighter aircraft used at night or during inclement weather be "all-weather fighter" and that the name "night fighter" be dropped as a type of fighter aircraft.

83. (C) R&R-2, 5 Sept. 1947
Fr: Airc. Lab., Eng. Div.
To: Airc. Proj. Sect., Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Airc. Lab. submitted comparative performance data on the XP-87 airplane as calculated by it and as quoted by the contractor. The laboratory's range calculations were similar to those of the contractor except for the climb to 35,000 ft. Airc. Lab. found that the airplane could climb to 35,000 ft., but it would be flying at its absolute ceiling when on normal power. This was impractical; therefore, the entire flight to the target was calculated at 30,000 ft. Contractor, however, assumed that the airplane would climb to 30,000 ft. on military power and cruise part way to the target at 30,000 ft. on normal power, and that as soon as the weight was reduced sufficiently to permit a service ceiling of 35,000 ft., the airplane would be climbed to 35,000 ft. and the remainder of the flight made at this altitude. Airc. Lab. stated that if the airplane were flown at maximum miles per pound of fuel instead of at normal power,

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the range could be increased considerably but the average speed of the mission would be decreased.

84. (R) Ltr., 10 Sept. 1947
Fr: Col. G. F. Smith,
Chief, Airc. Proj. Sect.,
Eng. Div.
To: AC/AS-4, Wash.
(File: Contr., Proc. Div.)

Engineering acceptance inspection on the XP-87 airplane was scheduled to begin 30 Sept. 1947 at the contractor's plant. The airplane to be inspected was equipped with a dummy nose housing flight test instrumentation in lieu of the specified power turret. Certain items of unnecessary radio and radar equipment were omitted from the No. 1 airplane. The second airplane, to be delivered three months later, was to be complete with all tactical equipment. A working mock-up turret, capable of being remotely controlled from the cockpit and fired from any position in the forward hemisphere, was to be provided on the second airplane.

85. (U) Ltr., 11 Sept. 1947
Fr: Maj. Gen. L. C. Craigie,
Chief, Res. & Eng. Div.,
AC/AS-4, Wash.
To: Chief of Admin., AMC
(File: Contr., Proc. Div.)

Res. & Eng. Div., Wash., directed attention to the reference of XP-87 aircraft as a night fighter in the Sixth Edition of TSENG /Eng. Div./ Report No. 3, Characteristics of Experimental Aircraft. AMC was requested to refer to this type of aircraft as "all-weather fighters" to avoid confusion, in accordance with latest military characteristics of aircraft as revised 8 Oct. 1946. /See Doc. 104./

85A. (R) Ltr., 15 Sept. 1947
Fr: Col. G. F. Smith,
Chief, Airc. Proj. Sect.,
Eng. Div.
To: Curtiss-Wright Corp.,
Columbus, Ohio
(File: Contr., Proc. Div.)

AMC transmitted Westinghouse recommendations concerning the early flights of the XP-87 airplanes incorporating the XJ34-WE turbo-jet engines. AMC concurred in these recommendations and requested contractor's compliance. The recommendations limited the maximum flight speed on the basis of compressor inlet air density, as follows:

Altitude	True Airspeeds
Sea Level	564 knots (650 mph)
10,000 ft.	720 knots (830 mph)
20,000 ft.	870 knots (1000 mph)

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AMC advised contractor of the importance of making all data on engine performance at high speeds and altitudes available to the Command to further development of the Westinghouse engine.

86. (C) R&R-1, 23 Sept. 1947
Fr: Col. L. C. Peterson, Actg. Chief, Req. Div., AC/AS-3, Wash.
To: Res. & Eng. Div., AC/AS-4, Wash.
(File: AAG, Wash.)

Req. Div. submitted military characteristics for penetration and all-weather fighters which had been approved by the Airc. Weapons and Munitions Bd. for study and research. Req. Div. requested Res. & Eng. Div. to take the necessary action. Aircraft was to be a high performance fighter, capable of diversified operations in all kinds of weather. Its mission was to destroy enemy air forces and tactical targets at night and during inclement weather. The requirements stipulated the following performance characteristics:

High speed at 50,000 ft.	600 knots
High speed at Sea Level	600 knots
Climb to 50,000 ft.	15 min.
Combat Radius of Action at 10,000 ft.	670 nautical mi.
at best operational alt.	1300 nautical mi.

87. (U) Ltr., 26 Sept. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Servs. Sect., Proc. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright submitted revised quotation for designing, fabricating, and installing a powered nose turret on the No. 2 XP-87 airplane. The revised price totaled $89,750.40 and represented an increase of $26,714.23 over contractor's first quotation. /Doc. 65A.7 The revised proposal was based on accomplishing the power turret program in two phases. The first phase involved costs for constructing the nose shell and installing it on the airplane during preliminary flight testing; the second phase involved costs for designing, fabricating, and installing the turret mechanism, armament provisions and controls, and modifications necessary for converting the nose shell to a powered turret.

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88. (C) 2nd Ind., 30 Sept. 1947
Fr: Maj. Gen. E. M. Powers, AC/AS-4, Wash.
To: Eng. Div.
(File: AAG, Wash.)

Gen. Powers advised that the Aeronautical Bd. was reviewing the 24C [J-34] engine program with the expectation of cancelling Wright Aeronautical Corp. production of this engine. Gen. Powers stated that AMC action was desired to effect the installation of the J-33 engine in one XP-87 airplane because of diminishing requests for the 24C in other applications, the slight reduction in estimated performance of the P-87 using J-33-06 engines, and the greatly reduced power plant cost per airplane. Gen. Powers stated, further, that an evaluation of flight performance of the two XP-87's would then provide a sound basis for a decision on the engines to be incorporated in the production version. [See Docs. 79, 81, 94.]

89. (R) Supp. Agree. 1 to Contr. W33-038 ac-6266, 3 Oct. 1947.
(File: Contr., Proc. Div.)

Supp. Agree. 1 covered procurement of two XP-87 airplanes, spare parts, mock-up, wind tunnel models and data, and certain Phase I work performed on the XA-43. It was approved at the following change in price:

Increase: not to exceed	$9,107,020.32
Less funds previously obligated.	[illegible],971.00
Net.	$8,7[illegible],229.32

Total price of $9,107,020.32 included contractor's cost of $863,[illegible]5.32 for already performing Phase I work on the XA-43 airplane, covered in Items I through 4 under prime contract W33-038 ac-6266. Contractor had advised that all work had ceased before 31 Oct. 1945 on this portion of the contract. Supp. Agree. 1 stipulated the following cost for procurement of the XP-87 airplanes:

One model XP-87 airplane (No. 1)	$5,283,[illegible]62.00
One No. 2 XP-87 airplane . .	2,66[illegible],727.00
One complete mock-up	169,[illegible]12.00
Wind tunnel models	[illegible],060.00
Spare parts	75,000.00

Flight demonstration was omitted from the

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contract price, and only 10 hours of functional flight testing on each aircraft was included in the price.

90. (C) 1st Ind., 3 Oct. 1947
Fr: Maj. Gen. L. C. Craigie, Chief, Res. & Eng. Div., CAC/AS-4, Wash.
To: Photo. Lab., Eng. Div.
(File: CF-B)

Res. & Eng. Div., Wash., advised that a definite requirement existed for full exploitation of the photographic possibilities of the XP-87 airplane, and that if current plans materialized, this aircraft would be adopted "as an all-purpose tactical reconnaissance aircraft (to include night photographic reconnaissance) that /would/ overlap the mission of strategic reconnaissance." Therefore, AMC was directed (1) to establish a project, with high priority, for studying photographic potentialities of the XP-87--fabricating and testing the aircraft in such a manner that the results attained could be adapted to all types bordering on sonic speeds and having reconnaissance possibilities, and (2) to incorporate within the study the latest types of reconnaissance and associated equipment. /See Doc. 70./

91. (U) Ltr., 6 Oct. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Ops., Eng. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright submitted firm quotation for installing two Allison J-33 engines on the No. 1 XP-87 airplane in lieu of four Westinghouse 24-C /J-34/ engines. Cost of this installation was estimated at $520,316.15, based on the assumption that the substitution of engines would be accomplished on the No. 1, or instrumented, aircraft. In addition, flight testing of the airplane, with J-33 engines installed, was to be included in Phase III Flight Test Program. The contractor estimated six months would be required for preliminary engineering and completion of fabricated parts for this engine installation, and an additional three months would be required for the actual installation. Contractor requested an amendment to Contr. W33-038 ac-6286 to cover the engine substitution program.

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92. (U) Chg. O. 2 to Contr. W33-038 ac-6266, 6 Oct. 1947
(File: Contr., Proc. Div.)

The change order directed the contractor to comply with the following requirements:

1. Delete the wing and tail covers on the XP-87 airplane at a unit reduction in price of $664.61, or a total reduction in price for two airplanes of $1,329.22.

2. Install Government-furnished, in lieu of contractor-furnished, components of air position indicator system (angle drives and flexible transmission shafts) at a unit reduction in price of $15.62, or a total reduction in price for two airplanes of $31.24.

3. Revise windshield and anti-icing provisions to provide selective de-icing of either the pilot's windshield or both the pilot's and observer's windshield at a unit increase in price of $808.50, or a total increase for the two airplanes of $1,617.

93. (U) Rpt., 9 Oct. 1947
Conf. on mod. of XP-87 airp., 9 Oct. 1947, Curtiss-Wright Corp., Columbus, Ohio
(File: Airc. Proj. Sect., Eng. Div.)

In compliance with directive from AC/AS-4, Wash., /Doc. 907, a conference was held at contractor's plant to discuss photographic reconnaissance possibilities of the XP-87 airplane. Modification of the nose section, the cockpit, and the bomb bay was considered. Representatives present at the conference concluded that (1) requirements for modifying the No. 2 XP-87 airplane extended beyond the installation of a photographic nose and included, also, complete modification of the airplane to fulfill requirements for its tactical reconnaissance mission; (2) investigation would be made by AMC Photo Lab. to determine desirability of substituting a ground position indicator for Loran and Shoran navigational equipment required by military characteristics; (3) investigation would be made to determine latest method of flash bomb ejection; and (4) recommendations of AMC would be submitted to Washington in either a memorandum report or letter with

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request for a directive authorizing the Command to proceed with modifications. Further, when the contractor submitted quotation for the complete photo reconnaissance modification of the No. 2 airplane, quotation would be divided into three parts—nose installation, cockpit modification, and bomb bay modification.

94. (C) 3rd Ind., 9 Oct. 1947
Fr: Brig. Gen. W. M. Morgan, Chief, Eng. Ops., Eng. Div.
To: AC/AS-4, Wash.
(File: CF-B)

Eng. Ops. advised that AMC was initiating action to provide for installation of two J-33-06 engines in the first XP-87 airplane following completion of Phase II of flight test program. /See Doc. 88./

95. (U) Ltr., 24 Oct. 1947
Fr: Brig. Gen. W. M. Morgan, Chief, Eng. Ops., Eng. Div.
To: AC/AS-4, Wash.
(File: Airc. Proj. Sect., Eng. Div.)

Reference was made to the procurement of 60 P-87's and/or FP-87's specified in the Summary Minutes of the first meeting of the USAF Airc. and Weapons Bd., August 1947, and to the requirement which AC/AS-4 had stated existed for full exploitation of the XP-87 photographic possibilities. AMC contemplated fabricating and installing a photographic nose, providing for the carrying of flash bombs, engineering the installation of a viewfinder, and studying cockpit changes required on the No. 2 airplane, with expectations of flight testing about 1 May 1948. The first experimental flexible nose turrets for the XP-87 were not scheduled for delivery until 30 June 1949; therefore, procurement of an all-weather XP-87 airplane, tactically equipped, would be impossible during FY 1949 unless the flexible nose turret was supplanted by fixed forward-firing guns. AMC planned to install a semiflexible turret on the No. 2 airplane after photographic nose tests. Cost of the required modifications had not been budgeted in the FY 1948 program; hence, an adjustment was necessary in the 611 Res. & Dvlpmt. program. Eng. Div. requested information as to whether or not Hq. USAF wanted to procure FP-87's out of FY 1949 funds and in what quantity; also, whether Hq. USAF wanted to procure P-87 airplanes in FY 1949 with fixed nose guns, or whether a removable dummy nose could be used and flexible turrets substituted when available.

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96. (R) Memo. Rpt. TSECA-4-1587
/Airc. Proj. Sect., Eng. Div./ 28 Oct. 1947
Eng. Accept. Insp., 6 Oct. 1947,
Curtiss-Wright Corp., Columbus, Ohio
(File: Airc. Proj. Sect., Eng. Div.)

The engineering inspection of the XP-87 airplane indicated that while the aircraft was physically complete at the time of inspection, certain items had to be accomplished before shipment to Muroc Lake for flight testing. These items involved tests and clean-up for ultimate disassembly and shipping to Muroc and essential changes to insure flying safety. The Eng. Accept. Insp. Rd. recommended that the contractor accomplish the work and the changes listed in the report. /See document for complete list of suggested changes./

97. (C) TI-2087, Add. 3
28 Oct. 1947
(File: Hist. Office)

This addendum initiated action to accomplish the exploitation of the photographic potentialities of the XP-87 airplane. This action was desired in order to determine the airplane's adaptability to an all-purpose tactical reconnaissance aircraft (to include night photographic reconnaissance) that would overlap missions of strategic reconnaissance.

98. (U) Ltr., 4 Nov. 1947
Fr: Brig. Gen. A. A. Kessler, Jr., Dir., Proc. & Indust. Plan., Office, Deputy C/S, Mat., Wash.
To: Chief, Current Proc. Br., Supp., Serv. & Proc., USUSA, Wash.
(File: Contr., Proc. Div.)

USAF requested authorization to negotiate the following procurement:

1. Modification of one XP-87 airplane, Serial No. 45-59600.

2. Installation of a J-33 power plant, ground testing and the furnishing of engineering data, including calculated performance reports.

3. Procurement of spare parts, not to exceed $15,000 in cost, to be used as replacements for portions of airplane modified by reason of the J-33 engine installation.

Cost of this procurement was estimated at $535,317, and FY 1948 funds were to be obligated. Completion of the work by Aug. 1948 was anticipated. The modification program was considered to be an extension of the work required by Phase I and Phase II under Contr. W33-038 ac-6266. /See Doc. 113./

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99. (U) Ltr., 6 Nov. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Servs. Sub-Sect., Proc. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright had prepared estimate of the costs involved to accomplish installation of a complete nose turret in the No. 2 XP-87 airplane. Price totaled $88,508.87, which reflected a reduction over the contractor's previous quotation. /See Doc. 87.7 The reduction in price resulted primarily from changes which would be applicable in the event of a single phase program.

100. (R) Ltr., 7 Nov. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
(File: Contr., Proc. Div.)

Contractor considered the proposed turret installation one of the outstanding features of the XP-87 airplane and superior to the fixed-gun arrangement. The contractor claimed he already had spent approximately $40,000 to engineer the entire simulated turret and to fabricate a nose shell based upon Wright Field indications of subsequent contractual coverage. AMC action to provide this coverage was recommended so that procurement of flight data to be used for the actual turret need not be delayed.

101. (R) Ltr., 7 Nov. 1947
Fr: R. C. Blaylock, Chief Engr., Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
(File: Contr., Proc. Div.)

Because of an increase in actual thrust and improved reliability, the Westinghouse Engine Co. had recommended replacement of all experimental 24C-4A engines in the No. 1 XP-87 airplane with 24C-4B production engines. Difficulty had been experienced with the oil mist type lubricating system on X24C-4A engines, and it was understood that no X24C-4A engines were being flown by other airplane manufacturers. The contractor, therefore, concurred with the Westinghouse recommendation and requested AMC to authorize the change-over to production type engines in the No. 1 XP-87 airplanes; the experimental engines could be retained as spares should replacement become necessary during flight testing.

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102. (U) IOM, 10 Nov. 1947
Fr: L. E. Parmely, Project Engineering, Curtiss-Wright Corp., Columbus, Ohio
To: R. C. Blaylock, Chief Engr., Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

This IOM transmitted the contractor's report of shipping accident to the No. 1 XP-87 airplane which had left the Curtiss-Wright plant, Columbus, Ohio, 9 Nov. 1947, en route to Muroc AA Field, Calif. The accident occurred at the intersection of U. S. Highway Routes 40 and 42. Damage to the fuselage fin resulted because of inadequate clearance between top of airplane trainer and overhead bridge. The upper fittings of the fin had struck the bridge under-structure. Airplane convoy was returned to the contractor's plant, where the fin was removed and the fuselage inspected for damage. The trailer convoy left the Curtiss plant on 10 Nov. 1947, but the fin was to be repaired and shipped later to Muroc.

103. (U) Ltr., 12 Nov. 1947
Fr: USAF Inspr.-in-Charge, Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
(File: Contr., Proc. Div.)

USAF Inspr.-in-Charge at Curtiss-Wright transmitted his account of the shipping accident which occurred on 9 Nov. 1947 to the No. 1 XP-87 airplane while en route to Muroc AA Field, Calif., under USAF armed escort. The accident occurred at the intersection of U. S. routes 40 and 42. Route 42 was bridged over route 40. The lower fin was damaged while passing under the bridge under-structure because of inadequate clearance. Convoy was returned to Curtiss-Wright for removal of the damaged fin and inspection of the fuselage. No damage had resulted to the fuselage. The XP-87 airplane again left the Curtiss-Wright plant for Muroc on 10 Nov. 1947. The damaged fin was to be reworked at contractor's plant and subsequently shipped to Muroc for assembly.

104. (U) 1st Ind., 13 Nov. 1947
Fr: Eng. Stds. Sect., Eng. Div.
To: R&D, Mat., Wash.
(File: Contr., Proc. Div.)

Concerning request of Res. & Eng. Div., AC/AS-4, to refer to the XP-87 as an all-weather fighter instead of a night fighter to avoid confusion, Eng. Stds. Sect. advised that the designation of "all-weather fighter" would be used when applicable in future editions of Engineering

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Reports, Characteristics of Experimental Aircraft. /See Doc. 85./

104A. (U) R&R-1, 13 Nov. 1947
Fr: Col. J. S. Holtoner, Chief, Airc. Br., R&D, Deputy C/S, Mat., Wash.
To: Req. Div., Deputy C/S, Ops., Wash.
(File: AAG, Wash.)

Airc. Br., R&D, transmitted contents of AMC letter concerning procurement of 60 P-87's and/or FR-87's and full exploitation of the photographic possibilities of the XP-87, with the added comment that Deputy C/S, Ops., could best answer the questions posed by AMC in its letter. /See Doc. 95./

105. (U) Ltr., 17 Nov. 1947
Fr: Col. G. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

Installation of the J-33 engines in the No. 1 XP-87 airplane caused a change in designation to the XP-87A. AMC had initiated action to procure five J-33-A6 engines with "D" type accessory housing and diffuser type mountings for use in the modification.

106. (U) Ltr., 18 Nov. 1947
Fr: Lt. Col. T. J. Cummings, USAF Officer-in-Charge, Curtiss-Wright Corp., Columbus, Ohio
To: Lt. Col. D. L. Strickland, Dayton AFPFO
(File: Airc. Proj. Sect., Eng. Div.)

The XP-87 convoy en route to Muroc AA Field suffered a second accident on 16 Nov. 1947, approximately 16 miles east of Tulsa, Okla. The left hand nacelle was seriously damaged. It was assumed that repairs could be made at Muroc and convoy could proceed to that destination on 18 Nov. 1947.

107. (U) Ltr., 21 Nov. 1947
Fr: Col. G. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Airc. Proj. Sect., Eng. Div.)

AMC approved contractor's recommendation to substitute production type 24C-4B engines in the No. 1 XP-87 airplane provided the change-over could be made without additional cost to the Govt.

108. (C) R&R-2, 24 Nov. 1947
Fr: Brig. Gen. F. H. Smith, Jr., Chief, Req. Div., Dir. of Trng. & Req., Deputy C/S, Ops., Wash.
To: Director of R&D, Deputy C/S, Mat., Wash.
(File: AAG, Wash.)

Req. Div. advised that the XP-87 should be modified so that its full potentialities could be determined; anything short of full exploitation would not meet requirements. Further, the basic estimate of funds available indicated that 15 FP-87's and 28 P-87's could be procured from the 1949 budget, and 14 FP-87's and 40 P-87's from the 1949 supplemental budget, if approved. Req. Div. desired the P-87 procured in FY 1949 to have photographic installation, fixed-gun installation, semiflexible gun

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installation, and fully-flexible automatic gun installation as this equipment became available. Req. Div. also wanted similar priority given to the photographic installation and the initial armament installation.

109. (U) Ltr., 3 Dec. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Concerning costs for incorporating certain changes in the two X24C-4A engines to be installed on the No. 1 XP-87 airplane, the contractor requested that his original quotation of $311.81 be allowed to stand. The contractor, however, stated that a more realistic quotation, based on actual cost data available, would result in a price of $586.85 rather than $311.81.

110. (U) CCN 2 to Contr. W33-038 ac-6266, Issued 4 Dec. 1947
(File: Contr., Proc. Div.)

CCN 2 authorized the contractor to make all repairs caused by highway accidents to the No. 1 XP-87 airplane en route to Muroc, Calif. Repairs were to be made either at Muroc or at contractor's plant. /See Docs. 102, 103, 119.7

111. (U) Ltr., 11 Dec. 1947
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Sect., Proc. Div.
(File: Contr., Proc. Div.)

In compliance with an informal request from AMC, contractor revised his Muroc flight test proposal to cover 20 additional hours of flight at a total price increase of $87,561.60. These 20 additional hours increased the testing time proposed in the entire Phase I flight test program to 30 hours, or one and one-half times more than originally quoted. The additional hours were required to determine buffet boundary limitations, high speed limitations, and maximum gross weight at take-off.

112. (U) Routing Slip, 12 Dec. 1947
Fr: Capt. C. B. Thornton, Proj. Officer, Fighter Br., Airc. Proj. Sect., Eng. Div.
To: Dayton AFPFO
(File: Airc. Proj. Sect., Proc. Div.)

Capt. Thornton commented that in the opinion of Airc. Proj. Sect. the contractor's original quotation of $311.81, covering certain changes in the two X24C-4A engines in the first XP-87 airplane, should be allowed and purchase request processed. /See Doc. 109.7

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113. (U) 2nd Ind., 8 Jan. 1948
Fr: Lt. Col. M. M. Osborne, Proc. & Indust. Plan., Deputy C/S, Mat., Wash.
To: Proc. Div., AMC
With: 1st Ind., 5 Jan. 1948
(File: Contr., Proc. Div.)

Hq. USAF directed AMC's attention to 1st Ind., dtd. 5 Jan. 1948, from Col. P. M. Seleen, Chief, Proc. Br., Serv. Supply & Proc. Div., GSUSA, and signed statement of Findings and Determinations authorizing AMC to negotiate a contract with Curtiss-Wright for modification of one XF-87 airplane and installation of J-33 power plant on this aircraft. /See Doc. 98./

114. (U) R&R-1, 8 Jan. 1948
Fr: Airc. Proj. Sect., Eng. Div.
To: Dayton AFPFO
(File: Airc. Proj. Sect., Eng. Div.)

Airc. Proj. Sect., Eng. Div., requested Dayton AFPFO to take formal action to accept mock-up of the XF-87 and wind tunnel models, and to make them available to contractor for the remainder of the XF-87 program. Mock-up had been inspected and found satisfactory by the Mock-Up Board, and wind tunnel models had been tested and all required data obtained.

115. (R) TI-2073, Add. 22
Issued 9 Jan. 1948
(File: Hist. Office)

This addendum initiated action to revise the requirement for armament equipment to be installed in F-87 aircraft, and to retrofit this aircraft if it had not been equipped with fully automatic flexible gun turrets during production. All aircraft during production would be equipped with four fixed 20mm. guns with, if possible, the best air interception radar available. The four fixed guns were to be replaced by flexible gun hand-controlled turret as soon as this turret became available.

115A. (U) Ltr., 13 Jan. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Proc. Div.
(File: Contr. Sect., Dayton AFPFO)

Contractor quoted a total estimated price increase of $209,392.54 to accomplish conversion of the No. 2 XF-87 airplane to photo reconnaissance aircraft. The proposed conversion program included photo modifications, camera nose, radio and radar, flash bomb and infrared, cockpit modifications, and clean-up, preflight and tests. Procurement of photographic viewfinder was to be negotiated separately from basic conversion contract as proposed. Flight testing of photo reconnaissance aircraft was anticipated approximately 1 Oct. 1948; testing was to continue through January 1949. /See Doc. 140./

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116. (U) Ltr., 4 Feb. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. & Missiles Sect., Proc. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Contractor summarized the XF-87 general experimental and production program as of 4 Feb. 1948. The first XF-87 airplane was being reassembled at Muroc and was scheduled to fly early in February. Upon completion of flight tests, this airplane was to be accepted by the Government under Contr. W33-038 ac-6266 and returned to contractor for modification under Contr. W33-038 ac-19837. Modification was to incorporate the installation of Allison J-33 engines and a simulated turret. The second XF-87 airplane was being completed at contractor's plant and was to undergo Phase I and Phase II flight tests in the original configuration by using a dummy nose; the dummy nose ultimately was to become a part of the simulated turret on the first airplane. Modification program for the second XF-87 airplane included conversion to photo reconnaissance type, accomplishment by AMC of photo reconnaissance flight testing, and installation of a fixed gun nose. Curtiss-Wright stated immediate contractual action was necessary so that experimental items would properly dovetail into the experimental and production program and allow completion of flight tests as soon as possible.

117. (U) Contr. W33-038 ac-19837, 11 Feb. 1948
(File: Contr., Proc. Div.)

This contract was approved by the Government on 11 Feb. 1948. It covered modification of the No. 1 XF-87 airplane to accommodate the installation of two Allison J-33-A-8 engines and other equipment at a price of $520,316.15. Spare parts were to be furnished at a price not to exceed $15,652.23. The contract provided that the contractor was to fabricate and install removable nacelles for J-33 engines, new landing gear doors and landing gear strut doors, new landing gear door actuation mechanism, new engine access doors, new nacelle tail cones, and water injection system. Contract provided for necessary modification of nacelle fixed equipment,

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engine controls, cockpit installations, and normal and flight test instruments. No flight demonstration was included in contract price. Delivery of modified airplane was to be made within nine months from date of execution of contract.

118. (S) Ltr., 16 Feb. 1948
Fr: CG, AMC
To: C/S, Wash.
(File: CF-A)

In this letter the CG discussed in general the airplane procurement policy of the AF and the attainment of desired objectives. The CG commented briefly concerning the current situation with respect to 11 major suppliers of airframes for the AF. Included in the comments was the following statement on Curtiss-Wright: "This company is an old line manufacturer, who in recent years had contributed little in design, and less in production. His financial integrity is directly proportionate in the degree of support rendered by Curtiss-Wright Corporation, the parent holding company. This out-of-production facility at the present time appears to have the best available design of a vitally needed all-weather fighter (F-87). This company should be considered a future source of Air Force supply only if top management in the parent corporation can guarantee improvement in existing company policies." Curtiss-Wright at that time had an undelivered backlog of $7,389,132.

119. (U) Ltr., 18 Feb. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. & Missiles Sect., Proc. Div.
(File: Contr., Proc. Div.)

Contractor submitted a quotation of $14,477.14 to accomplish the repairs on the No. 1 XF-87 airplane which was damaged as the result of two accidents while en route to Muroc. /See Doc. 110.7

120. (U) Chg. O. 1 to Contr. W33-038 ac-19837, Issued 25 Feb. 1948
(File: Contr., Proc. Div.)

This change order provided for the design, fabrication, and installation of a simulated turret, in lieu of government-furnished power turret, in the No. 1 XF-87 airplane for the purpose of determining the aerodynamic feasibility of such a turret on a high speed airplane. Simulated turret was to consist of four 20mm. aircraft cannons, each with at least 100 rounds of ammunition and capable of being stowed in the straight-forward position for operation as fixed guns.

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Total price stipulated was $88,508.57. Completion of the modified airplane was given as on or before 30 Dec. 1948.

121. (U) Memo. for File,
25 Feb. 1948
By: B. I. Miller, Pilot,
Curtiss-Wright Corp.,
Muroc, Calif.
(File: Airc. Proj. Sect.,
Eng. Div.)

The pilot had made four taxi runs, including one lift-off, on the No. 1 XF-87 airplane. Run No. 1 was satisfactory; very little brake was used; landing flaps and stabilizer were down in a southwest direction; maximum air speed was 100 mph indicated. Run No. 2 was satisfactory, except lift-off could not be made at 130 mph; very little brake was used; landing flaps and stabilizer were down in a northeast direction; maximum airspeed was 130 mph indicated. Run No. 3 was discontinued at 150 mph because improper location of crash equipment made lift-off impossible; landing flaps and stabilizer were up in a southwest direction; maximum airspeed, 150 mph indicated. Run No. 4 was made with landing flaps and stabilizer up in a southwest direction. A lift-off was accomplished after a run of over one mile, and an indicated airspeed of 180 mph was obtained. While landing, the airplane indicated considerable vibration. At the end of the run, the pilot observed there was no tread on the four main landing gear tires, the number three warning light was on, and a fire could be seen from the cockpit. Flight characteristics during lift-off were satisfactory. The pilot cited his "crabs" as (1) erratic idling speeds of the engine; (2) inability to obtain maximum power from the No. 4 pipe; (3) maximum rating of 10,500 rpm obtained on No. 3 engine, necessitating readjustment of governor in order to obtain higher engine ratings; and (4) inoperative remote compass.

122. (U) Ltr., 25 Feb. 1948
Fr: Maj. Gen. L. C. Craigie,
Dir., R&D, Deputy C/S,
Mat., Wash.
To: CG, AMC
(File: CF-B)

R&D requested AMC to submit performance figures for the XF-87 with two Allison D-2 and D-4 engines. R&D stated that it was informally understood the C-6 engine development had been dropped; further, performance characteristics of the Allison D-2 and D-4 engines were substantially better than those for the C-6 engine.

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123. (C) Ltr., 1 Mar. 1948
Fr: Lt. Gen. H. A. Craig, Deputy C/S, Mat., Wash.
To: CG, AMC
(File: AAG, Wash.)

Hq. USAF granted AMC authority to negotiate procurement with Curtiss-Wright for production engineering and production tooling for F-87 aircraft. To implement the program, $7,500,000 of FY 1948 funds had been allocated for this project. R&D requested that if accomplishment of necessary production assurance within Curtiss-Wright proved impracticable, AMC should submit its recommendations for placement of F-87 aircraft procurement with other manufacturers. /See Doc. 118./

124. (U) Progress Rpt., 2 Mar. 1948
First flight of XF-87 airp.
1 Mar. 1948, Muroc, Calif.
(File: Contr., Proc. Div.)

The first flight of the XF-87 airplane was successful. No hydraulic or other difficulties were encountered. Control forces appeared normal during entire flight. Total flight time was 57 minutes. Take-off was accomplished with a gross weight of 42,000 lbs. and a cg of 20.1 per cent MAC. Acceleration was normal, and a ground roll of approximately 6,000 ft. was required for take-off at 150 mph with flaps full down. After take-off, flaps were raised and airplane stabilized at approximately 300 mph prior to climb. After climb to approximately 15,000 ft., idling speeds of all engines were checked. Flight was terminated by normal landing. Speed at touchdown was 140 mph with flaps down.

125. (U) CCN 6, Contr. W33-038 ac-c266, Issued 3 Mar. 1948
(File: Contr., Proc. Div.)

This CCN provided for continuance of flight testing of the No. 1 XF-87 airplane by contractor at Muroc until such time as all funds allocated for this purpose had been utilized.

126. (C) Memo. for File
3 Mar. 1948,
Curtiss-Wright Corp.,
Muroc, Calif.
(File: Airc. Proj. Sect., Proc. Div.)

The Curtiss-Wright Flight Test Engineer reported concerning repairs made on the XF-87 airplane to put it back in flight status. Repairs were caused by damages to tires and nacelle during high speed tests on 25 Feb. 1948. /See Doc. 121./ Post-taxi discussions resulted in the conclusion that tire failures probably were due to high centrifugal forces

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experienced at speeds of around 180 mph enhanced by heat acquired during preceding runs; the design of the tires did not stand the combined temperatures and forces to which they were subjected; the nose wheel tires apparently were not damaged because they were of different construction and lower temperatures. The Flight Test Engineer recommended that (1) all ground operations should be limited to a maximum speed of 160 mph; (2) a cooling period should be allowed after each take-off or landing before tires were again used; (3) Goodrich tires should be procured for the main wheels and tested, because they apparently were better suited for the high speed of XF-87 aircraft.

127. (C) Flight Test Rpt.,
3 Mar. 1948
Flight No. 1, XF-87
airp., Muroc, Calif.
1 Mar. 1948
(File: Airc. Proj. Sect.,
Eng. Div.)

This report presented the pilot's comments on first flight of the XF-87 at Muroc. A P-80 airplane was flown to observe the airplane in flight and to take pictures. Duration of flight was 57 minutes. Gross weight of airplane totaled 42,000 lbs.; cg, wheels down, was 20.1% MAC. Take-off was made in a west-south-west direction, with landing flaps full down and stabilizer set at 1-1/2° down from full up position; distance available was 4.4 miles. Of the general flight characteristics, elevator and rudder control forces were normal throughout the flight, and aileron was light, with very good "feel"; control effectiveness of elevator, rudder, and aileron was good throughout the entire flight. A satisfactory check of the general stability could not be made because of buffet throughout the airplane at speeds above 220 mph indicated. Included in the pilot's list of "crabs" were landing gear doors open in flight, buffet present in clean condition above 220 mph, landing gear indicator showing left gear down in flight before first extension of gear, bearing temperatures 40° higher on No. 2 engine, and fluctuation of oil pressures.

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128. (U) Chg. O. 3 to Contr. W33-038 ac-6266, 9 Mar. 1948 (File: Contr., Proc. Div.)

Chg. O. 3 covered specification changes in the design, development, and construction of two XF-87 airplanes being procured under Contr. W33-038 ac-6266. Cost of the required changes totaled $105,683.72. Changes included the design, fabrication, and installation of a dummy nose on the first XF-87 in lieu of government-furnished power turret at an increase in contract price of $10,161.73, and construction of simulated fuselage section, containing rear fuselage fuel tank and bomb bay tank, at an increase in contract price of $9,496.45.

129. (S) Ltr., 12 Mar. 1948 Fr: Maj. Gen. A. R. Crawford, Chief, Eng. Div. To: Deputy C/S, Mat., Wash. (File: CF-B)

In compliance with Hq. USAF request, AMC submitted performance figures for the XF-87 with two Allison D2 [J-33-29] engines installed or two D4 [J-33-27] engines installed, in comparison with the Northrop XP-89 equipped with two TG-190-A [J-35E-9] engines. [See Doc. 122.]

130. (U) Chg. O. 7 to Contr. W33-038 ac-6266, Issued 18 Mar. 1948 (File: Contr., Proc. Div.)

This change order amended Contr. W33-038 ac-6266 to cover miscellaneous engineering changes in design of the XF-87 at a total increase in fixed price of $1425.28.

131. (U) Chg. O. 8 to Contr. W33-038 ac-6266, Issued 18 Mar. 1948 (File: Contr., Proc. Div.)

Chg. O. 8 provided for an additional 20-hours of flight testing on the No. 1 XF-87 airplane, under a program designated as Phase IA, at a cost of $79,787.39. This 20-hour flight testing program was to be completed within nine consecutive work-weeks of 52 hours each. A two-weeks' maintenance and servicing program after completion of 20-hours flight testing was provided for at a price of $7,771.21. The change order, however, stipulated total increase [ceiling price] in fixed price of the contract amounting to $104,073.72. Exhibit "B" attached to change order outlined the 20-hour flight testing program. Chg. O. 8 was approved on 23 July 1948. [Details of Phase IA program are attached to the Chg. O.]

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132. (C) Ltr., 20 Mar. 1948
Fr: Lt. Gen. H. A. Craig,
Deputy C/S, Mat., Wash.
To: Maj. Gen. K. B. Wolfe,
Dir., Proc. & Indust.
Mobil. Plan.
(File: AAG, Wash.)

Confirming verbal instructions from Hq. USAF to Gen. Wolfe, AMC was authorized to proceed with basic directive, dated 1 Mar. 1948, for procurement of F-87 aircraft. /See Doc. 123/

133. (U) Ltr., 23 Mar. 1948
Fr: Col. G. F. Smith,
Chief, Airc. Proj. Sect.,
Eng. Div.
To: Deputy C/S, Mat., Wash.
(File: Contr., Proc. Div.)

A conference between personnel of AMC and contractor at W-PAFB developed that suitable radar equipment was not available for installation on the XF-87 airplane, and the best available radar set (the APS-10) would require a separate nose section to be interchangeable with the normal camera nose. Airc. Proj. Sect., Eng. Div., stated that ground position indicator was being considered as fulfilling the requirement for precision navigation on the XFP-87 /Photo/ airplane. Contractor, therefore, had been instructed to proceed with the design of the XFP-87 /Photo/ airplane, omitting radar equipment for precision navigation and using ground position indicator. Hq. USAF approval was requested. /See Doc. 142./

134. (U) CCN 8 to Contr. W33-038 ac-6266,
Issued 24 Mar. 1948
(File: Contr., Proc. Div.)

CCN 8 provided for continuance of flight testing on the No. 1 XF-87 airplane by contractor at Muroc until an additional 20 hours were accomplished. The CCN also provided for a two weeks' period of maintenance and servicing instrumentation and equipment program to be conducted by contractor during USAF Phase II flight testing period.

135. (C) Ltr. Contr. W33-038 ac-20450
Issued 29 Mar. 1948
(File: Contr., Proc. Div.)

This letter contract placed an order with and authorized Curtiss-Wright to expend or obligate not more than $1,500,000 for a series of engineering design, tooling and planning studies in anticipation of a production contract for P-87A /F-87A/ and FP-87A airplanes and spare parts. The contractor was to proceed with these studies and with the procurement of necessary critical and strategical

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materials in order to meet anticipated production schedules for 28 F-87A and 15 FP-87A airplanes. Production was to begin with one airplane in October 1949, to increase progressively month by month, and to end with seven airplanes in August 1950. Exhibits A and B attached to the letter contract give complete details covering this procurement.

136. (C) R&R-1, 29 Mar. 1948
Fr: Dir., R&D, Deputy C/S, Mat., Wash.
To: Req. Div., Dir., Tng. & Req., Deputy C/S, Ops., Wash.
(File: AAG, Wash.)

R&D directed attention to estimated performance ratings for the Curtiss-Wright No. 1 XF-87 airplane with four 24C engines, the No. 2 XF-87 with two J-33-27 engines, and the No. 3 XF-87 with two J-33-29 engines, in comparison with the Northrop No. 1 XF-89 airplane with two TG-180 engines installed and the No. 2 XF-89 with two TG-190A engines. R&D submitted production schedules of the advanced engine models to be used in these airplanes. /See Doc. 177/

137. (U) Ltr., 5 Apr. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
(File: Contr., Proc. Div.)

Because of malfunctioning of the X24C-4A and X24C-4B engines installed in the No. 1 XF-87 airplane, contractor had found it necessary to make numerous engine changes to assure satisfactory engine installations for flight at Muroc. AMC had indicated previously /Doc. 107/ that the change from experimental engine types to production engines should be accomplished at no additional cost to the Government. Neither AMC nor the contractor, however, was aware of the subsequent changes which would be required. Contractor, therefore, submitted a price of $26,781 for accomplishing all engine changes on No. 1 XF-87 airplane; included in this price was cost of crating and loading the engines from contractor's plant to Muroc and from Muroc to the Westinghouse plant.

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138. (U) Rpt., Tail Buffet Investigation & General Progress, XF-87 No. 1 Airplane, Hq. Muroc AF Base, Muroc, Calif., 15 Apr. 1948
(File: Contr., Proc. Div.)

Flights 11, 12 and 13 on the XF-87 No. 1 airplane occurred at Muroc during the period 27 March to 12 April 1948. Newly modified and strengthened main landing gear doors and actuating mechanism had been installed during this period. Because of damage to nacelle resulting from cycling main gear doors in an overloaded down position, all flights were made with horn balances removed from outboard tips of the elevators and with recently tested tail stinger installed. Flights 11 and 12 were performed to test elevator, rudder and fuselage buffets, and flaps and stabilizer actuation with single control. Landing gear "free fall" characteristics were checked at 200 mph IAS, and aileron control system forces were checked for landing configuration at 200 mph IAS with boost off. Some elevator, rudder and fuselage vibrations were detected during these flights. Aileron forces were high, but the pilot felt that the airplane could be landed safely in event of failure to the boost system. Flight 13 was performed to obtain take-off data and to photograph the airplane. Take-off was accomplished from the main base runway with a gross weight of 42,100 pounds and a cg of 20.6% MAC, gear down; flaps were down; a 30 mph headwind was utilized. Take-off was made at 140 mph IAS after a ground roll of 4,400 ft. While nose wheel action was very good during take-off and landing rolls, the pilot recommended the inclusion of nose wheel steering to provide directional control during taxi runs at speeds below 50-55 mph IAS where extensive use of brakes was necessary.

139. (U) Wire, 21 Apr. 1948
Fr: Col. G. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
To: Lt. Col. H. A. Griffith, Jr., Chairman, Mock-Up Bd., San Diego, Calif.
(File: Contr., Proc. Div.)

Eng. Div. requested Col. Griffith [Actg. Chief, Fighter Br., Eng. Div.] to investigate cause and extent of damage to the XF-87 airplane which crash landed at Muroc Lake on 20 April 1948.

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140. (U) Ltr., 21 Apr. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. & Missiles Sect., Proc. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright amended its previous quotation covering necessary modifications on the XF-87 No. 2 airplane to convert it to photo-reconnaissance type. The amended quotation reflected a total price of $231,892.54 for necessary modifications, as follows:

Total Cost	$190,811.40
Photo Viewfinder	20,000.00
Revised Cost	$210,811.40
Profit 10%	21,081.14
Total Price	$231,892.54

Contractor claimed that his continued efforts to obtain a firm quotation for viewfinder had been unsuccessful, but he believed preliminary estimate of $20,000 for this equipment was reasonably accurate. Contractor requested that a ceiling of 20% of total revised price ($46,378.51) be applied to the upward redetermination revision. /See Doc. 115A./

141. (U) Rpt., 23 Apr. 1948
Tel. Conv, Mr. W. Tydon, Curtiss-Wright Corp., and Capt. G. F. Thornton, Proj. Officer, Fighter Br., Airc. Proj. Sect., Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

The first XF-87 airplane was damaged as the result of wheels-up landing at Muroc Lake, 20 April 1948. The bomb bay section of the underside of the fuselage was severely damaged. This section had not been stressed to take ditching loads because of deletion of bomb bay doors and substitution of light skin structure. No damage to bulkheads or stringers was apparent. The Curtiss-Wright representative stated the bomb bay structure from the No. 2 airplane was being sent to Muroc and the fuselage portion having double curvature would be manufactured at the Columbus plant and flown to Muroc. It was estimated three weeks would be required to complete repairs. AMC Project Officer requested Curtiss-Wright to expedite a cost estimate covering necessary repairs.

142. (R) Ltr., 26 Apr. 1948
Fr: Col. G. E. Schaetzel, Chief, Airc. & Missiles Sect., Proc. Div.
To: USAF Inspr.-in-Charge, Curtiss-Wright Corp., Columbus, Ohio
(File: CF-B)

Because the mechanics of changing current "P" designation denoting Fighter, and "FP" denoting the Photo version, to "F" and "RF," respectively, had not been fully co-ordinated, designations to be adhered to were:

P-87A (2928) Fighter with six gun fixed nose. (This configuration was not anticipated for production.)

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P-87B (29Z6) Fighter with TO-8 fire control, or components thereof forming the armament for the airplane.

FP-87A (29Z9) Photo-reconnaissance version of P-87 production fighter.

143. (U) Rpt., 28 Apr. 1948 Buffet Investigation, XF-87, Airplane No. 1, Flights 14 & 15, Hq. Muroc AF Base, Muroc, Calif.
(File: Airc. Proj. Sect., Eng. Div.)

Flights 14 and 15 were made on 17-20 April 1948 to investigate buffeting on the No. 1 XF-87 airplane. Both flights were made with main landing gear doors installed. For Flight 14, the elevator overbalance was reduced to 37.5 lbs. Airplane was trimmed to zero control force, in the clean configuration, at various speeds from 200-400 mph IAS at an altitude of 10,000 ft. Check climb was started from 12,000 ft. at the rated engine speed of 11,000 rpm and 275 mph IAS. Climb was made to an altitude of 26,500 ft. in approximately 22 minutes; at this altitude the IAS was 225 mph. On the descent, at an increase in indicated air speed to 365 mph, violent buffeting was experienced at 20,000 ft., which also excited considerable response in elevator and rudder controls. Since violent buffeting occurred at 20,000 ft. altitude, investigation of the Mach number effect was decided upon. For Flight 12, configuration was the same as for previous flight, but elevator overbalance was increased to initial test value of 150 in. lbs. The Mach number effect was investigated at altitudes of 7,300 to 20,000 ft. and at various air speeds from 250 to 460 mph IAS. Buffeting was similar to, but somewhat less than, that encountered with reduced overbalance. While no violent buffeting was encountered, the consensus was that this buffeting remained a possible hazard at speeds in excess of 300 mph IAS. During this flight the pilot decided to make a crash landing on the lake with all gears up. Landing gear had cycled successfully four times but when the pilot attempted the fifth extension, the left main gear would not extend; the right main and nose

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gear, however, had extended and locked satisfactorily. The landing was made at approximately 125 mph IAS. Inspection revealed that tripping mechanism for left main gear door uplocks had contacted the landing gear roller and had become wedged in the door operating arm during retraction. The crash landing damaged several fuselage bulkheads, nose gear door, and fairing skin directly forward and aft of bomb bay. Contractor estimated the airplane would be ready for further flight testing by 17 May.

144. (U) Chg. O. 4 to Contr. W33-038 ac-19837, Issued 28 Apr. 1948 (File: Contr., Proc. Div.)

This Chg. C. provided that changes directed by CCN 3, dtd. 4 Mar. 1948, were to be accomplished at no increase in contract price. CCN 3 /attached to Chg. O./ stipulated that contractor was to receive wooden mock-up of the XF-87 for use in development of J35 engine installation and that drawings, data, and AMC engineering inspection of mock-up as modified would constitute ample consideration for property to be retained and disposed of by contractor.

145. (U) Chg. O. 10 to Contr. W33-038 ac-6266, Issued 29 Apr. 1948 (File: Contr., Proc. Div.)

Chg. O. 10 provided for changes in weight and performance specifications on the XF-87 because of oil system redesign at no further change in contract price. /See CCN 7 attached to Chg. O./

146. (U) Ltr., 30 Apr. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. & Missiles Sect., Proc. Div.
(File: Contr., Proc. Div.)

The contractor submitted the following quotation covering procurement of 33 P-87A /F-87A/ and 30 FP-87A /Photo/ airplanes on the basis of a definitive contract contemplated by Ltr. Contr. W33-038 ac-20150 /See Doc. 135./:

	Unit Price	Total Price
26 P-87A Airplanes	$ 715,187	$18,588,862
32 P-87A Airplanes	334,160	10,693,760
9 P-87A Airplanes	809,193	7,282,737
21 FP-87A Airplanes	381,920	8,020,320
Spare Parts		7,595,171
Static Test Article		288,922
Mock-Up		123,061

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Installation of Nene Engines in one airplane	125,656
Engineering Development Study of Single-Point Refueling	19,573
Installation of After-Burners in one airplane	49,944
Phase III Flight Test on the No. 1 XF-87 airplane	343,611
Additional Tools required to increase the schedule from 12 airplanes per month to 19 airplanes per month	1,790,250
Total price quoted	$55,013,667

Delivery of 58 P-87A airplanes was scheduled to begin with one airplane in January 1950, to increase progressively month by month, and to end in January 1951 with seven airplanes. Delivery of 30 FP-87A airplanes was scheduled to begin with one airplane in May 1950, to increase progressively month by month, and to end in January 1951 with five airplanes. Mock-up was to be delivered to the Government 90 days prior to delivery of first airplane. /See Doc. 142 for redesignation of airplane types./

147. (U) Routing Slip, 6 May 1948
Fr: Capt. C. E. Thornton,
Proj. Officer, Fighter Br.,
Airc. Proj. Sect.,
Eng. Div.
To: Lt. Col. H. A. Griffith,
Actg. Chief, Fighter Br.,
Airc. Proj. Sect.,
Eng. Div.
(File: Airc. Proj. Sect.,
Eng. Div.)

In commenting on the contractor's summary of XF-87 flight tests up to the wheels-up landing 29 April 1948 at Muroc AF Base, the project officer pointed out that the contractor blamed the apparent low rate of climb on an 18% deficiency of thrust. /See Docs. 141, 143, 148./

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148. (R) Ltr., 6 May 1948
Fr: Curtiss-Wright Corp.,
Columbus, Ohio
To: Fighter Br., Airc. Proj.
Sect., Eng. Div.
(File: Airc. Proj. Sect.,
Eng. Div.)

Contractor submitted a summary of XF-87 flight testing at Muroc, Calif. Total of 15 flights was completed during a total accumulated time of nine hours and 44 minutes. Ten hours of flight testing had been initially authorized under Phase I Flight Test Program. Contractor stated results were satisfactory except for difficulties with longitudinal "rough ride" characteristics and with mechanics of landing gear doors; no operational difficulties were experienced with either the main gear or the nose wheel. General flight results were obtained at lower speed range, but a high speed of 530 mph (true speed) was obtained in a dive condition (465 mph IAS at 3,000 ft. altitude). Stall tests, conducted at a gross weight between 39,000 and 40,000 lbs., with flaps and landing gear down, resulted in an uncalibrated 130 mph IAS. Take-off distance of 4,400 ft. was obtained at 41,050-lb. gross weight, but 18% deficiency in thrust from specification requirements was indicated. In this connection the contractor stated that "the reference to a deficiency in thrust was based on a similar experience in climb to altitude, for the purpose of exploring high altitude longitudinal 'rough ride' characteristics, where the time to climb at normal rpm far exceeded calculated data." Contractor did not feel these tests were reliable because maximum lift characteristics during stall tests appeared satisfactory and both take-off distance and climb to altitude indicated an equivalent 18% deficiency in thrust, varied drag configurations having been utilized. Pilot did not report any deficiency in either directional or lateral stability. Contractor estimated approximately 21 hours of flight testing would be required to complete Phase I and Phase IA Flight Test Program.

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149. (U) Chg. O. 11 to Contr. W33-038 ac-6266, Issued 21 May 1948
(File: Contr., Proc. Div.)

Chg. O. 11 provided for an increase of $1,551.24 in fixed price of contract to cover installation of seat ejector gun on each of the seats in the two XF-87 airplanes.

149A. (S) Ltr., 24 May 1948
Fr: CG, AMC
To: C/S, Wash.
(File: Hist. Office)

AMC requested authorization to contract immediately for 58 F-87 airplanes at a unit price of $900,000 or a total price of $52,200,000. AMC certified that the contract was "necessary to National Defense" and would result in "maximum utilization of improvements in aircraft and equipment now available."

149B. (S) Ltr., 24 May 1948
Fr: CG, AMC
To: C/S, Wash.
(File: Hist. Office)

AMC requested authorization to contract immediately for 30 RF-87A airplanes at a unit price of $934,000 or a total price of $28,020,000. AMC certified that the contract was "necessary to National Defense" and would result in "maximum utilization of improvements in aircraft and equipment now available."

150. (U) Chg. O. 12 to Contr. W33-038 ac-6266, Issued 28 May 1948
(File: Contr., Proc. Div.)

This change order stipulated that the Government was to receive a credit of $33,391.04 on contract covering the XF-87 airplane for certain materials which the contractor would retain as scrap or on a negotiated sales basis. Exhibits "A" and "B," attached to change order, list the materials to be retained by contractor, the value of the materials, and the contractor's offer.

151. (U) Ltr., 28 May 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. & Missiles Sect., Proc. Div.
(File: Contr., Proc. Div.)

Contractor submitted an estimated price of $33,349.47 to accomplish the necessary repairs on the No. 1 XF-87 airplane, which was damaged as the result of wheels-up landing at Muroc.

152. (C) Ltr., 1 June 1948
Fr: Maj. Gen. E. M. Powers, Asst. Deputy C/S, Mat., Wash.
To: Proc. Div.
(File: AAG, Wash.)

This letter constituted Procurement Directive [illegible]-12 and granted AMC authority to negotiate immediately for procurement of 30 RF-87 airplanes, initial spares, and spare parts, from Supplemental FY 1948 Project 110 Funds.

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153. (C) Ltr., 1 June 1948
Fr: Maj. Gen. E. M. Powers, Asst. Deputy C/S, Mat., Wash.
To: Proc. Div.
(File: AAG, Wash.)

This letter constituted Procurement Directive 49-17 and granted AMC authority to immediately negotiate for procurement of 58 F-87 airplanes, initial spares, and spare parts, from Supplemental FY 1948 Project 110 Funds.

154. (U) Chg. O. 13 to Contr. W33-038 ac-6266, Issued 3 June 1948
(File: Contr., Proc. Div.)

This change order provided that contractor was to make all repairs to the No. 1 XF-87 airplane, at a total cost of $39,969.53. These repairs were necessitated because of highway accidents while the airplane was en route to Muroc AF Base from contractor's plant, Columbus, Ohio.

155. (C) Rpt., 11 June 1948 XF-87 Flight Comparison with Specification Values
(File: R&D, Wash.)

Curtiss-Wright submitted a statement giving the following comparison of the XF-87 flight results with specification values:

	Muroc Flight Test	Specification Data
Take-Off over 50 ft. obstacle	4245 ft. *	4300 ft.
High Speed @ 30,000 ft.	531 mph**	541 mph
Rate of Climb:		
@ 4000 ft. @ 369 mph true	4657 ft/min.	4623
@ 4300 ft. @ 3353 mph. true	4452 ft/min.	4440
@ 3900 ft. @ 308 mph true	3781 ft/min.	4163
Stall speeds Power Off:		
Flaps up	153 mph	153 mph
Flaps down	123 mph	130 mph

* Full 12,000 rpm was used; power was not known, as these data were in AMC possession.

** Drag of airplane not optimum:
Nacelle tail cone shortened, leaving 2.74 sq. ft. flat plate area.
Scoops for temporary cockpit ventilation and for instrumentation installed.
Landing gear and nose gear doors not sealed.
Instrumentation installed in one engine inlet air duct.

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The data were based on a weight of 39,941 lbs. Specification combat design gross weight was 37,026 or 2,915-lb. differential. All data were corrected to specification thrust. All tests were conducted by AMC except rate of climb. Rate of climb data was taken from Flight 16 made by contractor. Comparative performance figures were submitted on the F-87 airplane with the following engine installations: Westinghouse 24C-4B (J34-WE-7), Westinghouse 24C-8 (J34-WE-32), Allison I-40 (J33-27), Allison I-40 (J33-29), and Pratt & Whitney Nene (J48P). The Pratt & Whitney Nene and the Westinghouse 24C-8 engines were alternate installations.

156. (R) TI-2073, Add. 23
14 June 1948
(File: Hist. Office)

This addendum initiated action to insure (1) installation, during production, of the most modern armament equipment available (four or more fixed 20mm. guns), and (2) installation of fully automatic gun turrets in the airplanes delivered with fixed guns. Priority of 1-B was assigned to this project. This addendum rescinded Add. 22 /Doc. 115/ to revise requirements.

157. (C) R&R-1, 15 June 1948
Fr: Col. G. F. Smith,
Chief, Airc. Proj. Sect.,
Eng. Div.
To: Airc. Lab., Eng. Div.
(File: Airc. Proj. Sect.,
Eng. Div.)

For purposes of direct comparison between Flight Test Div. test data and contractor's guarantees on the XF-87 airplane, Airc. Proj. Sect. requested Airc. Lab. to reduce Flight Test Div. data to conditions of design gross weight and calculated thrust. Airc. Proj. Sect. stated that it was important "to determine only if the airplane would meet performance expectations with the amount of thrust used by the contractor in his calculations." /See Doc. 158./

158. (U) Rpt., /15 June 1948/
/Flight Test Div., W-PAFB/
Preliminary inf. on test of F-87 for Maj. Gen. F. O. Carroll /Flt. Test Div., Dir. R&D, W-PAFB/
(File: Airc. Proj. Sect.,
Eng. Div.)

Preliminary information concerning tests of the F-87 presented the following results: take-off gross weight was 42,000 lbs; best take-off out of four measured take-offs gave a ground roll of 3,550 ft. with a total distance of 5,000 ft. over a 50-ft. obstacle, at an IAS of 120 mph and 130 mph at a 50-ft. height; average ground roll for four landings was 5,300 ft. at an IAS of 125 mph. /See Doc. 157./

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Rate of Climb Data:

S. L. altitude	3950 ft/min.
10,000 ft.	3000 ft/min.
20,000 ft.	2200 ft/min.

Mach number reached in level flight was .775 between 15,000-ft. and 30,000-ft. altitudes. Corresponding speeds for operation under standard atmospheric conditions were:

Altitude	True Speed
15,000 ft.	556 mph (482.8 knots)
25,000 ft.	535 mph (464.6 knots)
30,000 ft.	525 mph (455 knots)

159. (R) Memo., 15 June 1948
Fr: Col. J. T. Kingsley, Jr., AF Secy., Airc. Comm., Munitions Bd., Natl. Mil. Estab., Wash.
To: Dir., Proc. & Indust. Plan., Deputy C/S, Mat., Wash.
(File: Dir., Proc. & Indust.) Plan., Deputy C/S, Mat., Wash.)

Aircraft Committee had approved the name Blackhawk for the Curtiss-F-87 Airplane.

160. (C) Ltr., 17 June 1948
Fr: Capt. C. B. Thornton, Proj. Officer, Fighter Br., Airc. Proj. Sect., Eng. Div.
To: Lt. Col. H. A. Griffith, Actg. Chief, Fighter Br., Airc. Proj. Sect., Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Capt. Thornton submitted results of a high speed test conducted on the XF-87 airplane on 16 June 1948. Duration of flight was 1 hour 17 minutes. The following high speed points were obtained in stabilized level flight at 12,000 rpm:

Altitude	Cal. Airspeed	Mach No.	True Airspeed	Contr. Estimate
29,300'	346	.785	532	542
28,700'	354	.790	552	546
17,600'	428	.750	548	560
9,200'	499	.770	570	586
8,300'	502	.760	572	588

Capt. Thornton stated the airplane was completely out of elevator trim at all high speed points and the pilot had to use full forward control wheel to maintain level

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flight. All speed points were obtained with low thrust engines and excessive drag, and all points were within 16 mph of contractor's specification values with one point 6 mph above.

161. (C) R&R-1, 18 June 1948
Fr: Col. Albert Boyd,
Chief, Flight Test Div.
To: Airc. Proj. Sect.,
Eng. Div.
(File: Airc. Proj. Sect.,
Eng. Div.)

Col. Boyd reported results of a test conducted on the No. 1 XF-87 airplane at Muroc during the period 1 June through 6 June 1948 to obtain preliminary flight test data. The XF-87 weighed 42,120 lbs. gross. Manufacturer, however, had reported a combat weight of 38,000 lbs. Manufacturer had also reported an actual thrust of less than the design thrust of the 24-C engine by approximately 250 lbs. per unit. Pilot's observations of flight characteristics included the following: (1) airplane did not feel entirely secure immediately after breaking ground and very careful maneuvering was required after take-offs, which were conducted at indicated speeds of 125 mph to 140 mph; (2) flight characteristics at indicated speeds from 200 to the maximum obtained were satisfactory, with the exception of accelerated stall performance; (3) buffeting was experienced at 180 mph IAS in the clean configuration, actual stall occurring at 160 mph and very light stall warning at 125 mph IAS with wheels and flaps fully extended; (4) rate of descent was slow because of inoperative dive brakes and excessive engine idling speed; (5) flight characteristics when flaps were being lowered for landing approach were unsatisfactory. Because of high stalling speed and danger of entering an accelerated stall, lowering the flaps at least half way prior to lowering the gear was considered desirable. Minimum IAS at touchdown was 122 mph at gross weight of 36,000 lbs; corresponding ground roll was 3,600 ft. Heavy braking was required to stop in this distance. Touchdown at 125 to 130 mph resulted in a measured ground roll of 5,300 ft. at weight of 39,000 lbs. Flight Test Div. recommended that complete Phase II tests be conducted on the XF-87 airplane as soon as possible to obtain accurate quantitative data. /See Doc. 163./

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162. (U) Chg. O. 14 to Contr. W33-038 ac-6266, Issued 19 June 1948
(File: Contr., Proc. Div.)

This change order authorized contractor to repair the No. 1 XF-87 airplane, which was damaged in a wheels-up landing at Muroc, at a total cost of $33,349.97.

163. (U) Memo., 21 June 1948
Fr: The Hon. A. S. Barrows, Under Secy. of AF, Wash.
To: Lt. Gen. H. A. Craig, Deputy C/S, Mat., Wash.
(File: Dir., Proc. & Indust. Plan., Deputy C/S, Mat. Wash.)

Mr. Barrows wrote Gen. Craig as follows: "The orders for the F-87 and P-87 will be subject to my approval, notwithstanding the Finding and Determination already approved by me." /See Doc. 171./

164. (U) Memo., 22 June 1948
Fr: Maj. Gen. Grandison Gardner, OSAF, Wash.
To: The Hon. A. S. Barrows, Under Secy. of AF, Wash.
(File: R&D, Wash.)

Gen. Gardner commented on the problem of F-87 airplane procurement. He stated that the Office of Deputy C/S felt that the Air Forces had "a definite and almost desperate requirement for a defensive fighter," and that the fighter must have a radius of action of 700-800 nautical miles or more and be capable of operating day or night in any weather. Further, the range and equipment requirements would make the airplane a large one (around 40,000 lbs.); however, small aircraft like the P-38 could not meet the requirements. Gen. Gardner stated that the urgency of the need would justify the gamble to start tooling for production of an airplane which had not been completely tested; also, that "the P-[illegible] may be more nearly suitable than the P-87, but our requirements (recently increased to equipment for 16 Groups) are so large that we may have to employ all available capacity." Gen. Gardner suggested that Materiel Command test pilots and a group of Proving Ground Command test pilots be sent to Muroc to fly the prototype airplane for evaluation purposes.

165. (U) R&R-1, 29 June 1948
Fr: Col. G. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
To: Proc. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Flight test data on performance of the XF-87 airplane had been reduced to conditions of design gross weight, calculated thrust available, and sea level standard conditions. Corrected figures represented performance based on the original 24-C engine installation; these engines were limited to 12,000 rpm and 3,000 lbs. thrust. Newer 24-C

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engines, rated at 12,500 rpm and 3,300-lbs. thrust, were to be installed during Phase II; therefore, final performance figures were expected to be well above the contractor's prediction in all respects. /See Docs. 157, 161./

166. (U) R&R-1, 8 July 1948
Fr: Lt. Col. H. A. Griffith, Jr., Chief, Fighter Br., Airc. Proj. Sect., Eng. Div.
To: Col. G. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Fighter Br., Airc. Proj. Sect., submitted comparative data as to performance, armament, and equipment of experimental and production versions of the XF-87 airplane and the XF3D airplane. To arrive at an equitable comparison of radius of action and take-off distance, full load of the production XF3D was increased to 2600 gal. by adding two drop tanks of 650 gal. each; this addition was made on the assumption that adequate wing structural provisions were available. The indicated maximum gross weight only allowed for weight of fuel and weight of tanks. Since 2,000 lbs was believed to be the maximum weight that could be carried externally, the wing would require structural reinforcement to carry tanks weighing approximately 4,200 lbs. each. No performance losses because of increased structural weight were included in the table.

166A. (U) Daily Activity Rpt. of Dir. of R&D, Office Deputy C/S, Mat., Wash. 9 July 1948
(File: R&D, Wash.)

This report contained information that (1) Flight Test Div. had made advance flight tests on the XF-87 airplane to obtain preliminary general flight and handling characteristics data; (2) flight test pilots were disappointed in the airplane's performance because of buffet boundaries and high speed stalls in low "C" maneuvers; (3) performance, after reducing flight test data to standard conditions, was as good or better than the calculated characteristics for an aircraft with wing loadings as high as those of the F-87, even though the F-87 exhibited poor maneuverability when compared to conventional ships.

167. (U) Chg. O. 6 to Contr. W33-038 ac-6266, 13 July 1948
(File: Contr., Proc. Div.)

This change order provided for performance of a 10-hour Phase I flight test program on the first XF-87 airplane, to be conducted for a period of 135 days beginning with date

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of shipment from contractor's plant, at a cost of $141,268.33. Change order further provided that this price could be either decreased or increased and that the revised price was not to exceed the sum of $169,522. /Exhibit "A" outlining details of the XF-87 Phase I Flight Test Program is attached to this document./

168. (U) Chg. O. 3 to Contr. W33-038 ac-19837, 19 July 1948 (File: Contr., Proc. Div.)

Chg. O. 3 to Contr. W33-038 ac-19837 provided for necessary modifications to the second XF-87 airplane, to produce a photo-reconnaissance prototype airplane at a cost of $202,319.54. The change order further stipulated a ceiling price of $243,383.44 to accomplish the modifications. These modifications consisted of changes to airplane structure and furnishings in nose, cockpit, and bomb bay area; design, fabrication and installation of a camera nose; installation of flash bomb and infrared lighting equipment; miscellaneous clean-up items, preflight and ground functional testing of all equipment; and engineering data.

169. (U) CCN 10 to Contr. W33-038 ac-6266, Issued 23 July 1948 (File: Contr., Proc. Div.)

This CCN authorized removal and replacement of one 24C-4B engine on the first XF-87 airplane; crating and shipment of six production "B" engines to Westinghouse Electric Corp.; shipment of two 24C-4B engines from Columbus to Muroc for use as spares; removal of one experimental 24C-4B engine and its replacement with a production type 24C-4B engine; and removal of a 24C-4B engine, because of faulty ignition, and its return to Westinghouse.

170. (U) Amend. 3 to Ltr. Contr. W33-038 ac-20450, Issued 26 July 1948 (File: Contr., Proc. Div.)

Amend. 3 amended Ltr. Contr. W33-038 ac-20450 to initiate action for an increase in the wing area of XF-87 aircraft from 600 sq. ft. to 740 sq. ft., with an aspect ratio change from 6 to 7, and an upper surface split flap type aileron to supplement the normal aileron. Amendment provided for automatic half flap setting for use in approach and maneuvering at lower altitude and speed ranges, and for permanent liquid rocket installation with droppable alcohol and liquid oxygen tanks.

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171. (U) Ltr., 27 July 1948
Fr: Brig. Gen. H. A. Shepard, Chief, Proc. Div.
To: Under Secy. of AF, Wash.
Thru: Deputy C/S, Mat., Wash.
(File: Dir., Proc. & Indust. Plan., Deputy C/S, Mat., Wash.)

In order to complete a definitive contract covering the production of F-87 and RF-87 airplanes, Proc. Div. requested authority to proceed with procurement of this aircraft. AMC and Curtiss-Wright apparently had resolved the difficulties encountered in flight tests and had determined the changes required to make a satisfactory airplane. /See Doc. 163./

172. (C) Wire, /21/ July 1948
Fr: Muroc AF Base, Muroc, Calif.
To: Col. G. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
(File: CF-B)

Muroc AF Base reported that interconnector fitting between oleo and lower strut had failed as the XF-87 airplane was being maneuvered in turn from standard position prior to taxiing onto lake for take-off. Airplane had nosed downward, causing considerable damage to nose wheel assembly and fairing door, and to nose wheel doors under fuselage screen in nose wheel area. Fitting was believed to be too weak for the torsional loads imposed during turns.

172A. (U) IDM, 29 July 1948
Fr: Airc. Br., Office of Dir., R&D, Deputy C/S, Mat., Wash.
To: Maj. Gen. L. C. Craigie, Dir., R&D, Deputy C/S, Mat., Wash.
(File: R&D, Wash.)

This memorandum informed Gen. Craigie informally of final decision reached at AMC conference, 21 July 1948, for Curtiss-Wright to go ahead on the design of a new F-87 wing configuration. The new configuration contemplated a 740 sq. ft. wing in lieu of the 600 sq. ft. wing.

173. (U) Ltr., 30 July 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
(File: Contr., Proc. Div.)

Contractor reviewed the results of a conference held at AMC 26 July 1948 concerning the XF-87 Flight Test Program. The following decisions were made at the conference: (1) the contractor would flight test the XF-87 to determine flap-slat settings and stabilizer-flap setting for synchronization, including checkup for high speed and buffet boundary, general airworthiness tests, and functional checkup of Phase II cleanup items; (2) certain changes would be made to airplane by contractor prior to AMC Phase II and contractor flight tests, including ground test stand engine thrust calibration and deletion of bomb bay fuel tanks, miscellaneous instrumentation and ballast to decrease

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weight of airplane; (3) certain tests, involving items which would not be operational for AF evaluation during Phase II, could be deferred to Phase III in order to expedite Phases I, IA, and II flight tests; (4) certain changes as to location of cockpit instruments, single throttle control and nose wheel steering could be considered for production version of the airplane. Tentative starting date for AMC flight testing was set for 23 August 1948. /See Doc. 174./

174. (U) CCN 11 to Contr. W33-038 ac-6266, Issued 2 Aug. 1948 (File: Contr., Proc. Div.)

CCN 11 authorized contractor to continue Phase I flight testing of the first XF-87 airplane at Muroc Lake for flight time not to exceed 40 flying hours. /See Doc. 173./

175. (U) Ltr., 5 Aug. 1948 Fr: Curtiss-Wright Corp., Columbus, Ohio To: Airc. Sect., Proc. Div. (File: Contr., Proc. Div.)

Contractor quoted revised price of $21,[illegible]65 for procurement of a wide angle viewfinder to be installed in the second XF-87 as a component unit of the photo reconnaissance version. This price was based on charges quoted to the contractor by the Chicago Aerial Survey Co., a subcontractor. Delivery of viewfinder was anticipated in four to six weeks.

176. (C) R&R-3, 5 Aug. 1948 Fr: Maj. Gen. L. C. Craigie, Deputy C/S, Mat., Wash. To: Req. Div., Dir., Tng. & Req., Deputy C/S, Ops., Wash. With: R&R-2, 5 Apr. 1948 (File: AAG, Wash.)

R&D advised Req. Div. that during a conference at AMC on 21 July 1948, final decision was reached for Curtiss-Wright to go ahead on the design of a new F-87 wing configuration, and 740 sq. ft. wing was considered satisfactory in lieu of the 600 sq. ft. wing. R&D also advised that the No. 1 XF-87 was undergoing repairs at Muroc as the result of nose wheel failure while taking off and that the repairs should be completed by 23 Aug. 1948.

177. (U) Ltr., 11 Aug. 1948 Fr: Curtiss-Wright Corp., Columbus, Ohio To: Airc. & Missiles Sect., Proc. Div. (File: Contr., Proc. Div.)

Contractor submitted a total price of $1,[illegible]19,283 to accomplish modification program on the No. 2 XF-87 airplane. Quotation included price of $846,936 for incorporation of an enlarged wing on this second airplane. Modification program involved shifting the J-33 engine installation from the first airplane to the second airplane, providing for production type engine, and incorporating a larger wing on the second

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airplane. To meet delivery schedules, contractor stated that provision was necessary for acceptance of and payment for the second XF-87 on Contr. W33-038 ac-6266 without flight test requirement on second airplane prior to its transfer from Contr. W33-038 ac-6266 to Contr. W33-038 ac-19837.

178. (C) Ltr., 12 Aug. 1948
Fr: Brig. Gen. A. A. Kessler, Jr., Dir., Proc. & Indust. Plan., Deputy C/S, Mat., Wash.
To: CG, AMC
(File: AAG, Wash.)

This letter presented the possibility that the F-89 would be procured in addition to or in lieu of the F-87. Information was requested as to whether the Glenn L. Martin fire control system could be installed in the F-89 without major modification. /See Doc. 181./

179. (C) Ltr., 25 Aug. 1948
Fr: Col. G. E. Schaetzel, Chief, Airc. & Missiles Sect., Proc. Div.
To: Dir., Proc. & Indust. Plan. Office, Deputy C/S, Mat., Wash.
(File: Contr., Proc. Div.)

AMC requested USAF final approval of weight saving changes which reflected the results of the Command's vigorous prosecution of a weight reduction program on F-87B aircraft to be procured under Contr. W33-038 ac-20450. These changes involved reducing thickness of airplane armor plate from 5/8" to 1/2" and from 3/8" to 5/16", and omitting bomb bay door operating mechanism. RF-87A airplanes would include bomb bay door mechanism in design gross weight. AMC stated that decrease in the airplane's weight of approximately 131 lbs. would be effected by these changes. /See Doc. 198./

180. (U) Chg. C. 15 to Contr. W33-038 ac-6266, Issued 30 Aug. 1948
(File: Contr., Proc. Div.)

This change order provided that contractor was to accomplish engine changes on the first XF-87 airplane as outlined in CCN 10, dtd. 23 July 1948, at a total increase in contract price of $26,981. /See Doc. 169./

181. (C) 1st Ind., 20 Aug. 1948
Fr: Brig. Gen. H. A. Shepard, Chief, Proc. Div.
To: Dir., Proc. & Indust. Plan. Office, Deputy C/S, Mat., Wash.
(File: CF-B)

Proc. Div. advised that fire control system /Glenn L. Martin/ would be specified for incorporation as a production item on any production F-87 or F-89 program; further, this system could be installed on the F-89 airplane with very little, if any, modification. /See Doc. 178./

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182. (C) 2nd Ind., 1 Sept. 1948
Fr: AMC /Airc. & Missiles Sect., Proc. Div./
To: Deputy C/S, Mat., Wash.
With: 1st Ind., 17 Aug. 1948
(File: AAG, Wash.)

AMC again requested authority to proceed with F-87 procurement program. The Command stated the F-87 originally had appeared to be the most desirable airplane available that had been designed to meet all-weather military characteristics, and subsequent flight tests had proved requirements and performance guarantees had been met or exceeded. Certain undesirable flight characteristics had been noted, but these could be eliminated by increasing wing area. The enlarged wing also would provide characteristics comparable with the F-80, the adopted standard jet fighter. AMC considered release of F-87 program mandatory because contractual coverage under Ltr. Contr. W33-038 ac-20450 no longer allowed program continuity. AMC pointed out that F-87 aircraft had been included in the revised USAF Five-Year Aircraft Procurement Schedule, approved 8 Aug. 1948, and AMC believed this constituted authority to proceed with F-87 procurement. AMC stated that "the delay would be intolerable" if authority to complete the F-87 definitive contract were withheld until after the F-88 had been flown and evaluated and Curtiss-Wright had demonstrated a satisfactory F-87 airplane. The second XF-87, with production wings, engines and nacelles, was scheduled to fly in June 1949. This would give seven months of flying in which to gain flight experience on production prototype before delivery of first production airplane. AMC was of the opinion the F-87 logically should be one of two airplane types /all-weather fighter/ to be procured for the 70-group program. No conclusions could be drawn as yet on the F-89, because only four short flights had been conducted on this aircraft. A minimum of four months would be required to complete flight tests and evaluations for production configuration. It was known, also, that several major engineering changes were necessary to produce satisfactory F-89 aircraft. A go-ahead at this time to proceed with the F-87 program would assure delivery

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of an all-weather fighter as scheduled. Any further delay would make this impossible. /See Doc. 184./

163. (U) Ltr., 1 Sept. 1948
Fr: Col. G. E. Schaetzel, Chief, Airc. & Missiles Sect., Proc. Div.
To: Chief, Chicago USAFPFO, Chicago, Ill.
(File: Contr., Proc. Div.)

AMC requested Chicago USAFPFO to investigate the Chicago Aerial Survey quotation which Curtiss-Wright had submitted for photographic viewfinder to be installed on the RF-87 airplane. As the viewfinder was one of the major equipment items for RF-87 aircraft, the entire project might be held up unless the unit were contracted for immediately. /See Doc. 175, 189./

184. (U) Ltr., 1 Sept. 1948
Fr: Brig. Gen. E. A. Shepard, Chief, Proc. Div.
To: Under Secy. of the AF,
Thru: Deputy C/S, Mat., Wash.
(File: Contr., Proc. Div.)

AMC forwarded a statement of required Findings and Determinations for signature of Under Secy. of the AF requesting authority to negotiate with Curtiss-Wright for procurement of an enlarged wing on the No. 2 XF-87 airplane. The procurement was to cover design, fabrication, and installation of a 740 sq. ft. wing at an estimated cost of $846,936. Installation was to be accomplished in conjunction with J33 engines and nacelles in order to provide a complete prototype airplane of the new wing assembly.

185. (C) 3rd Ind., 3 Sept. 1948
Fr: Lt. Gen. H. A. Craig, Deputy C/S, Mat., Wash.
To: CG, AMC
(File: Dir., Proc. & Indust. Plan., Deputy C/S, Mat. Wash.)

Hq. USAF approved AMC's request of 27 July 1948 for authority to proceed with the F-87 procurement program. Teletype approval /copy attached to this document/ had been sent to AMC on 1 Sept. 1948. This approval was predicated on recommendation of the CG, AMC, that immediate release of this procurement program was mandatory. /See Docs. 163, 182./

186. (U) Wire, 7 Sept. 1948
Fr: Lt. Col. W. A. Davis, Contr. Officer., Airc. & Missiles Sect., Proc. Div.
To: AF Inspr.-in-Charge, Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

AMC authorized contractor to proceed immediately with fabrication of 58 F-87C and 30 RF-87C airplanes under Contr. W33-038 ac-20450, including spare parts, special tools, and ground handling equipment, one static test article, cockpit mock-up, technical data, and additional special tooling required to accelerate production to peak rate of 19 airplanes per month by 1951. The cost of this procurement was to be $48,677,984. Delivery of F-87C airplanes

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was scheduled to begin with one article in Jan. 1950, to increase progressively month by month, and to end with seven articles in Jan. 1951. Delivery of RF-87C airplanes was scheduled to begin with one article in May 1950, to increase progressively month by month, and to end with five articles in Jan. 1951. Funds were available from supplemental FY 1948 appropriation.

187. (U) R&R-1, 8 Sept. 1948
Fr: Lt. Col. H. A. Griffith, Chief, Fighter Br., Airc. Proj. Sect., Eng. Div.
To: Equip. Br., Airc. Proj. Sect., Eng. Div.
(File: Airc. Proj. Sect., Eng. Div.)

Fighter Br. requested a change in procurement action with Allison from J-33-A8 engines to J-33-29 engines and cancellation of A8 starter procurement with Westinghouse. Installation of J-33-29 production type engines was more desirable than the interim J-33-A8 engine installation. J-33 engines could be installed in the six to eight months additional time gained by installing the 740 sq. ft. wing on the second XF-87 aircraft, provided J-33-29 engines would be installed on the second airplane.

188. (U) Ltr., 10 Sept. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
(File: Contr., Proc. Div.)

Curtiss-Wright cancelled original Phase III flight test program on the first XF-87 airplane and submitted a revised proposal to accomplish Phase III flight testing at a cost of $452,804. Price was subject to price redetermination provisions with ceiling of 10% on upward redeterminations, or maximum allowable price of $498,084. Contractor claimed the revision was necessary because of AMC's recent decision to install enlarged wing /740 sq. ft. area/ and J-33 engines on the second airplane in lieu of the first airplane. The Phase III Flight Test Program submitted by contractor outlined flight tests accomplished in five stages over a period of approximately 15 months.

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189. (U) Ltr., 13 Sept. 1948
Fr: Col. C. E. Schaetzel, Chief, Airc. & Missiles Sect., Proc. Div.
To: AF Officer-in-Charge, Curtiss-Wright Corp., Columbus, Ohio
(File: Airc. Proj. Sect., Eng. Div.)

AMC advised contractor that report had been received upon the analysis of cost quotation covering procurement of photographic viewfinder to be installed on the XF-87 airplane. This report indicated that reduction in price of $1,032.73 was in order and CCN would be issued to grant contractual coverage for this procurement. /See Docs. 175, 183./

190. (U) Memo., 15 Sept. 1948
Fr: Col. J. S. Holtoner, Chief, Airc. Br., Eng. Div., R&D, Wash.
To: Col. J. W. Sessums, Jr., Actg. Asst. Deputy C/S, Mat., Wash.
(File: Airc. Br., Eng. Div., Wash.)

Col. Holtoner advised Col. Sessums that the cost of $846,000 for changing wing on the F-87 airplane covered an increase in wing area and a change in engine nacelles to house two engines instead of the four originally housed.

190A. (C) Ltr., 15 Sept. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. & Missiles Sect., Proc. Div.
(File: Contr., Proc. Div.)

Since issuance of Ltr. Contr. W33-038 ac-20450 for procurement of F-87C airplanes, contractor had introduced numerous changes into the design of this aircraft as the result of flight tests at Muroc and conferences with AMC personnel. The contractor, therefore, submitted a new production procurement quotation, as follows:

	Unit Price	Total
26 F-87C Airplanes	$798,389	$20,758,114
32 F-87C Airplanes	364,653	11,668,396
9 RF-87C Airplanes	859,224	7,733,016
21 RF-87C Airplanes	399,563	8,390,823
Spare Parts		3,330,559
Special Tools & Ground Handling Equipment		1,000,147
Static Test Article		321,885
Mock-Up		126,843
Additional Tooling Required to increase from 12 airplanes to 19 airplanes per month		1,946,261
Wind Tunnel Models and Tests		87,583
TOTAL		$55,432,127

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Delivery of 58 F-87C airplanes was scheduled to begin with one airplane in Jan. 1950, to increase progressively month by month, and to end with seven articles in Jan. 1951. Delivery of 30 RF-87C airplanes was scheduled to begin with one airplane in May 1950, to increase progressively month by month, and to end with five articles in Jan. 1951.

191. (C) R&R-1, 16 Sept. 1948
Fr: Fire Control Br., Dir. of Armament, Deputy C/S, Mat., Wash.
To: Dir. of Tng. & Req., Deputy C/S, Ops., Wash.
(File: AAG, Wash.)

AMC's proposal to delete certain items from the F-87B series being procured under Contr. W33-038 ac-20450, in order to comply with the program of weight reduction, was transmitted to the Dir. of Tng. & Req., Deputy C/S, Ops. AMC had proposed a weight saving of approximately 83 lbs. by reducing armor plate thickness, and a weight saving of approximately 48 lbs. by omitting bomb bay door operating mechanism. These deletions did not apply to RF-87A aircraft. /See Docs. 179, 197./

192. (U) Wire, 21 Sept. 1948
Fr: Col. A. T. Culbertson, Actg. Chief, Airc. Proj. Sect., Eng. Div.
To: Proc. Inspr., Muroc AF Base, Muroc, Calif.
(File: Airc. Proj. Sect., Eng. Div.)

Eng. Div. granted authority for release of XF-87 airplane for Phase II flight testing by AMC personnel.

193. (C) Ltr., 21 Sept. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. & Missiles Sect., Proc. Div.
(File: Contr., Proc. Div.)

Because of a mathematical error in compilation of group unit prices quoted 15 Sept. 1948 covering procurement of F-87 and RF-87 aircraft, contractor submitted corrected prices as follows:

	Unit Price	Total Price
26 F-87C Airplanes	$ 798,389	$20,758,114
32 F-87C Airplanes	364,456	11,668,992
9 RF-87C Airplanes	859,586	7,736,274
21 RF-87C Airplanes	398,607	8,370,747
Spare Parts		3,397,389
Special Tools & Ground Handling Equipment		999,803
Static Test Article		321,585
Mock-Up		126,843

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Additional Tooling Required to increase production from 12 to 19 airplanes per month	1,946,261
Wind tunnel models and tests	87,583
Total	$55,413,891

Corrections reduced the total over-all contract price from $55,432,127 to $55,413,891. All terms and conditions quoted in contractor's previous proposal remained applicable.

194. (C) Prog. Rpt., 22 Sept. 1948
Fr: Engr. Liaison Sect., Eng. Ops., Eng. Div.
To: Col. C. F. Smith, Chief, Airc. Proj. Sect., Eng. Div.
(File: CF-B)

This report summarized the results of Flights 46 through 55 on the XF-87 airplane conducted at Muroc AF Base during the period 30 Aug. 1948 through 15 Sept. 1948. Following Flight 55, the airplane was prepared for Phase II tests, which were scheduled to begin 20 Sept. However, contractor performed Flight 56 on 20 Sept. because Phase II pilot was not available at that time. On this flight, investigation was made of buffet boundary to 0.81 Mach number at 25,000 ft. with elevator and rudder spring tabs locked in neutral, and a check climb was made to 30,000 ft. The contractor felt that all controls were now satisfactory. On 21 Sept. the airplane was turned over to Flight Test Div. for performance of instrumentation and thrust calibrations prior to start of Phase II tests on 23 Sept. 1948.

195. (U) Ltr., 24 Sept. 1948
Fr: Col. G. E. Schaetzel, Proc. Div.
To: Dir., Proc. & Indust. Plan. Office, Deputy C/S, Mat., Wash.
(File: Contr., Proc. Div.)

Proc. Div., AMC, forwarded for signature of the Under Secretary of the Air Force a statement of Findings and Determinations authorizing negotiation of procurement with Curtiss-Wright, by Change Order to Contr. W33-038 ac-19337, for design and fabrication of a 740 sq. ft. wing to be installed on the No. 2 XF-87 airplane. Installation was to be accomplished in conjunction with J33 engines /in lieu of Model 24C engines/ and nacelles in order to provide a complete prototype of the new wing assembly for production airplanes. Estimated cost of this procurement was $648,356. This procurement was to be obligated from supplemental

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FY 1948 funds. The 740 sq. ft. wing modification was entirely new to the F-87. Proc. Div. stated that "to date the Government has invested in the ultimate product, a production F-87, the cost of the two experimental airplanes, and that money which the contractor has already expended on production, approximately $12,500,000." The amount ($648,356) requested would complete the project. Further, it would be to the best interest of the Government for contractor to complete this project because he had nearly completed Contr. W33-038 ac-6266 for No. 1 and No. 2 airplanes and had from two to three years' experience in building this type of airplane. /See Doc. 196./

196. (U) 2nd Ind., 24 Sept. 1948
Fr: Col. C. E. Schaetzel, Proc. Div.
To: Deputy C/S, Mat., Wash.
With: 1st Ind., 16 Sept. 1948
(File: Contr., Proc. Div.)

AMC resubmitted its request for permission to negotiate for procurement of 740 sq. ft. wing on the second XF-87 airplane in conjunction with J-33 engine installation; a statement of Findings and Determinations was also submitted. AMC directed attention to the reduced price of $648,356 for changing the wing on this aircraft and stated the actual cost of accomplishing the work had not decreased but that the contractor was absorbing more of the cost. In so doing, the contractor would sustain an indicated deficit of $559,608 /document shows deficit inaccurately totaled as $559,587/ to perform the work under this procurement. /See Doc. 195./

197. (C) R&R-2, 26 Sept. 1948
Fr: Dir., Tng. & Req., Deputy C/S, Ops., Wash.
To: Fire Cont. Br., Dir. of Armament, Deputy C/S, Mat., Wash.
(File: AAG, Wash.)

The Office of Dir. of Tng. & Req., Deputy C/S, Ops., concurred in weight reduction proposed by AMC for the F-87B series being procured under Contr. W33-038 ac-20150. Complete study on weight reduction of fighter aircraft was to be made in the near future. /See Doc. 191./

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198. (C) 1st Ind., 7 Oct. 1948
Fr: Brig. Gen. H. C. Coupland, Dir. of Armament, Office, Deputy C/S, Mat., Wash.
To: CG, AMC
(File: Contr., Proc. Div.)

Hq. USAF concurred in AMC's proposal to reduce weight of F-87B aircraft by eliminating armor plate and omitting bomb bay door operating mechanism, including hydraulic struts and linkage. AMC was advised that F-87B aircraft would be considered further upon the completion of a study which was to be made in the near future on weight reduction of all fighter aircraft. /See Doc. 179./

199. (S) Rpt., 8 Oct. 1948
Conf. at Muroc AF Base, Muroc, Calif., on All-Weather Fighter Req., 6 Oct. 1948
(File: AAG, Wash.)

The Committee on Evaluation of XF-87, XF-89, and XF3D Aircraft reported the decisions and recommendations of its voting members in conference at Muroc AF Base on 6 Oct. 1948. Eleven voting members and 12 non-voting members were present at the conference. The committee decided that to evaluate the XF-87, XF-89 and XF3D airplanes properly and to compare their performance characteristics, each aircraft should be flown by qualified night fighter pilots. Accordingly, flights were conducted on the airplanes 6 and 7 Oct. 1948. Upon completion of the flights, the committee reconvened to receive comments on each aircraft from pilots, observers, and maintenance personnel. The following results of the discussions were submitted: (1) all voting members agreed upon procurement of all weather version of the TF-80 airplane, which was to carry modified APG3 radar and a radar operator; (2) none of the members voted to procure the XF-87 or the XF3D airplanes; (3) seven members--Maj. Gen. K. B. Wolfe, Maj. Gen. F. C. Carroll, Col. Albert Boyd, Lt. Col. C. E. Johnson, Capt. D. M. Dessert, Lt. F. J. Smith, and Lt. R. A. LeBeuf--voted to procure the XF-89; (4) four members--Brig. Gen. C. A. Brandt, Col. P. K. Holloway, Lt. Col. G. D. Timmons, and Maj. B. E. Turner--voted not to procure the XF-89; (5) all members concurred in the establishment of new military characteristics to supplant existing all-weather military characteristics. /Verbatim notes on the conference are given in Doc. 200./

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200. (S) Minutes, 7 Oct. 1948, Conf. at Muroc AF Base, Calif., 7 and 8 Oct. 1948
(File: Hist. Office)

These minutes reported the open discussion held at Muroc AF Base on 7 and 8 Oct. 1948 by members of the Committee on Evaluation of XF-87, XF-88, and XF3D aircraft. Maj. Gen. C. A. Brandt, Chief, Req. Div., Directorate of Trng. & Req., Deputy C/S, Ops., USAF, directed the discussion. He asked for the opinions of the pilots, observers, and maintenance personnel who had flown the aircraft on 6 Oct. 1948 in order to evaluate the merits and performance characteristics of each airplane. In addition to Gen. Brandt, representatives from USAF in attendance included Brig. Gen. R. L. Coupland, Dir. of Armament, Office, Deputy C/S, Mat., and Lt. Col. C. E. Johnson, Req. Div., Deputy C/S, Ops., Wash. Other committee members present included Maj. Gen. K. B. Wolfe, Directorate, Proc. & Indust. Plan., Hq. AMC; Maj. Gen. F. O. Carroll, Directorate, R&D, Hq. AMC; and representatives of Flight Test Div., Eng. Div., and Proc. Div., AMC; also, the Los Angeles Field Office, Eglin AFB, Hamilton Field, Calif., Dow AF Base, and Mitchel AF Base, N. Y. The committee voted against procurement of the XF-87 airplane. /See Doc. 1,[illegible]7

201. (C) Memo., 14 Oct. 1948
Fr: Gen. M. S. Fairchild, Vice C/S, Wash.
To: Deputy C/S, Mat., Wash.
(File: AAG, Wash.)

This memorandum directed the Deputy C/S, Mat., to implement action to carry out decisions made by the Secretary of the Air Force and the Chief of Staff, as follows: (1) discontinuance of further production of the F-87 and submission of recommendations regarding termination of experimental contracts; (2) removal of XF3D from future aircraft production schedules; (3) production of all weather fighter version of the TF-80 as an interim measure; (4) expeditious production of the [illegible]; (5) determination of production distribution between TF-80 and F-[illegible] aircraft within available funds from termination of the F-87 based on production possibilities and requirements; (6) setting up of design competition within available FY 1949 funds

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205. (U) Ltr., 18 Oct. 1948
Fr: Fighter Br., Airc. Proj. Sect., Eng. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

Change in model designation was made from the XRF-87 to the XRF-87C because of the incorporation of enlarged wing and J-33-29 engines in the second airplane under Contr. W33-038 ac-19837.

206. (C) Rpt., 18 Oct. 1948
Fr: Col. E. P. Gaines, Field Air.Inspr., Hq. USAF
To: Chief, Proc. Div., Office, The Air Inspr., c/o IG, First Region, Langley AF Base, Langley Field, Va.
With: 1st Ind., 26 Oct. 1948
(File: Prod. Div., Dir., Proc. & Indust. Plan., Deputy C/S, Mat., Wash.)

Through the Chief, Dayton AFPFO, the Field Air Inspr., Hq. USAF, submitted as Case Rpt. No. 2 the results of an inspection of Curtiss-Wright conducted during 20-22 Sept. 1948. He recommended (1) suspension of production order for 88 F-87C and RF-87C airplanes until the No. 2 prototype had been modified to include the larger wing and two engines and had been satisfactorily flight tested, and (2) discontinuance of the practice of placing production orders in peacetime before delivery of satisfactory prototype. In discussing the 88 F-87C and RF-87C production order, the Air Inspr. stated: "There is no assurance that the production model will be satisfactory and will not have many faults caused by the modifications." He quoted Curtiss-Wright's latest figures as to the estimated cost to the Government for 88 unproven airplanes plus two experimental articles:

Contr. W33-038 ac-6266	$ 9,503,518.47
Contr. W33-038 ac-20450	55,713,591.00
Contr. W33-038 ac-19837	87,328.00
Contr. W33-038 ac-19837 (Ltr. Contr.)	648,350.00
Contr. W33-038 ac-19837	109,325.36
Total	$66,559,112.83

The Air Inspr. further commented that "considering the fact that one of these is known to be unsatisfactory and the performance of the remaining 89 is problematical, in the opinion of the inspecting officer it would be unwise to accomplish the production order until at least one satisfactory prototype is delivered." In forwarding these recommendations by 1st Ind., dtd. 26 Oct. 1948, the

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based on new military characteristics prepared to cover mission of all-weather interceptors.

202. (C) Ltr., 15 Oct. 1948
Fr: Maj. Gen. E. M. Powers, Asst. Deputy C/S, Mat., Wash.
To: CG, AMC
(File: AAG, Wash.)

Office, Deputy C/S, Mat., directed AMC to take the necessary action to implement the decisions made regarding aircraft procurement program /Doc. 201/. AMC also was to submit recommendations regarding termination of F-87 experimental contracts. AMC was advised that Proc. Dir. 49-17 and 49-19 would be forthcoming to cancel procurement of 58 F-87's and 30 RF-87's.

203. (C) Ltr., 15 Oct. 1948
Fr: Maj. Gen. E. M. Powers, Asst. Deputy C/S, Mat., Wash.
To: CG, AMC
(File: AAG, Wash.)

This letter constituted Proc. Dir. 49-17 and directed AMC to take immediate action to terminate procurement of 30 RF-87 aircraft as authorized in Proc. Dir. 49-12 dtd. 1 June 1948. /See Doc. 152./

203A. (C) Ltr., 15 Oct. 1948
Fr: Maj. Gen. E. M. Powers, Asst. Deputy C/S, Mat., Wash.
To: CG, AMC
(File: AAG, Wash.)

This letter constituted Proc. Dir. 49-18 and directed AMC to take immediate action to terminate procurement of 58 F-87 aircraft as authorized in Proc. Dir. 49-15 dtd. 1 June 1948. /See Doc. 153./

204. (U) R&R-1, 15 Oct. 1948
Fr: AF Officer-in-Charge, Muroc Sub-Office, Muroc AF Base, Calif.
To: Officer-in-Charge, Curtiss-Wright Corp., Columbus, Ohio
(File: Airc. Proj. Sect., Eng. Div.)

Prog. Rpt. on the first XF-87 airplane was submitted for biweekly period ending 14 Oct. 1948. Number of flights made to date totaled 86; total airplane time, 66:34 hrs. Phase II flight tests, consisting of 19 flights for total flight time of 12:58 hrs., were completed with Flight 75 on 2 Oct. 1948. Flight 75 was made for the purpose of measuring maximum weight take-off distance and performance climb at maximum weight to 25,000 ft.--also level flight performance at 25,000 ft. Results were satisfactory. After completion of Flight 85 on 12 Oct., the F-87 was ready for ferrying to Columbus, Ohio. On 13 Oct. it took off on Flight 86 at 0705 for W-PAFB, with gross weight of 49,500 lbs. and full fuel, including tip tanks. Landing was made at Tinker Field, Okla. (after 3:01 hrs.) where aircraft remained overnight for early morning take-off the next day to W-PAFB.

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Chief, Dayton AFPFO, stated that his office considered this a policy matter beyond its jurisdiction.

207. (C) Ltr., 19 Oct. 1948
Fr: Col. H. E. Wilson, C/S, Hq. APG, Eglin AF Base, Fla.
To: Req. Div., Deputy C/S, Ops., Wash.
(File: AAG Wash.)

Hq. APG, Eglin AF Base, submitted its recommendations and comments concerning military characteristics for penetration and all-weather type fighter aircraft. That headquarters believed the primary mission of the all-weather fighter airplane should be limited to interception and destruction of enemy aircraft during all conditions of weather or visibility. Further, if the all-weather fighter's mission was to destroy enemy bomber aircraft, then the required fighter performance should be based on the bomber's performance, and the fighter should be capable of climbing to an altitude of 50,000 ft. in 10 minutes to be effective with limited early warning.

208. (C) Memo., 19 Oct. 1948
Fr: Gen. M. S. Fairchild, Vice C/S, Wash.
To: Deputy C/S, Ops., and Deputy C/S, Mat., and the Comptroller, Hq. USAF, Wash.
(File: AAG, Wash.)

On 19 Oct. 1948 the Secy. of AF had approved for implementation certain proposals in the Aircraft Procurement Program, which included plans to hold design competition on a new all-weather fighter under revised military characteristics and use of funds made available from FY 1949 authorizations. In addition, the Secy. of AF had given formal confirmation to the previous verbal decisions made by him and the C/S that the existing F-87 procurement contracts were to be immediately terminated; no further plans were to be made for production of this aircraft; and development and test of experimental articles was to continue in these contracts unless undue costs were involved.

209. (U) Wire, 19 Oct. 1948
Fr: Readj. Sect., Proc. Div., Dir., Proc. & Indust. Plan., AMC
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

AMC advised Curtiss-Wright that Dr. Contr. W33-038 ac-20450, dtd. 29 Mar. 1948, including all amendments, was terminated in its entirety, effective immediately. The contractor was instructed to stop all work immediately, to terminate subcontracts and purchase orders, and to place no further orders in connection with this contract.

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210. (C) Wire, 20 Oct. 1948
Fr: Dir., Proc. & Indust. Plan., Wash.
To: CG, AMC
(File: Airc. Proj. Sect., Eng. Div.)

Hq. USAF submitted directive from Vice C/S for appropriate AMC action on certain proposals in the Airc. Proc. Program approved by the Secy. of AF on 19 Oct. 1948, as follows: existing F-87 procurement contracts were to be immediately terminated; no further plans were being made for production of F-87 aircraft; development and test of experimental articles would continue as in the existing contract unless undue costs were involved. /See Doc. 208./

211. (U) R&P-1, 21 Oct. 1948
Fr: Airc. Proj. Sect., Eng. Div.
To: Eng. Div., Dir., R&D
(File: Airc. Proj. Sect., Eng. Div.)

Comments and recommendations were given concerning termination of XF-87 experimental contracts. The F-87 development program involved two experimental contracts: W33-038 ac-6266 and W33-038 ac-19837. Contr. W33-038 ac-6266, under which two XF-87's were being procured, was practically completed. No. 1 airplane was ready for acceptance, Phase I and Phase II of flight test program having been accomplished. No. 2 airplane would be acceptable after the accomplishment of 10 hours shakedown flying upon return of engines from Muroc overhaul line to provide complete engine complement. Airc. Proj. Sect. recommended this contract be completed. USAF then would have two airplanes available for use in developing a flexible turret and in accomplishing the all-weather research program conducted by All Weather Flying Div., Clinton Co. AF Base. Contr. W33-038 ac-19837 covered modifications, contracted for and in process, as follows: development of simulated turret--cost, $88,000; development of demolition bomb provisions and HVAR rockets in production fighter version--cost, $66,000; modification of No. 2 airplane to photo reconnaissance prototype--cost, $250,000; enlargement of wing area and J-33 engine installation--cost, $1,590,000. Certain work already had been accomplished on these items. Completion of Contr. W33-038 ac-6266 and termination of Contr. W33-038 ac-19837 would effect approximate savings, as follows:

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	Funds	FY	
Simulated Turret	611	1948	$ 60,000
Bomb & Rocket Inst.	611	1949	86,000
Photo. Recon. Mod.	611	1948	150,000
Large Wing and	611	1948	300,000
Engine Change	180	1949	700,000
Total Savings			$1,300,000

Only $86,000 of this amount was FY 1949 Proj. 611 Funds which could be utilized toward the development of a new all-weather interceptor.

212. (C) TI-2249, Add. 3
27 Oct. 1948
(File: Hist. Office)

This addendum initiated action to terminate immediately procurement of 30 RF-87 airplanes under Proc. Dir. 49-17 and 58 F-87 airplanes under Proc. Dir. 49-19.

213. (U) R&R-1, 23 Oct. 1948
Fr: AF Officer-in-Charge,
Muroc Sub-Office,
Muroc, Calif.
To: Officer-in-Charge,
Curtiss-Wright Corp.,
Columbus, Ohio
(File: Airc. Proj. Sect.,
Eng. Div.)

The No. 1 XF-87 airplane took off on Flight 87 from Tinker Field, Okla., on 14 Oct. 1948 and landed at W-PAFB. A total flying time of 68:44 hrs. had been chalked up for the 87 flights.

214. (U) R&R-1, 28 Oct. 1948
Fr: Airc. Proj. Sect.,
Eng. Div.
To: Servs. Sect., Proc.
Div.
(File: Contr., Proc. Div.)

Airc. Proj. Sect., Eng. Div., requested immediate action to cancel Contr. W33-038 ac-19837 and change orders. Modifications to be made to the XF-87 airplane under this contract were no longer required because of the termination of production contract. Action was also requested to cancel the 740 sq. ft. wing being fabricated for the No. 2 XF-87.

215. (C) Memo., 29 Oct. 1948
Fr: The Hon. W. S. Symington,
Secy. of AF, Wash.
To: The Hon. J. V. Forrestal,
Secy. of Defense,
Natl. Mil. Estab., Wash.
(File: Hist. Office)

Mr. Symington wrote Mr. Forrestal that flight tests had indicated the F-88 to be superior over the XF-87, that the XF-87 would require major redesign to make it operationally acceptable, and that procurement of F-87 and RF-87 aircraft had been cancelled. He further stated that to fulfill the urgent requirement for an all-weather fighter, plan was to place the F-88 in

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production on an accelerated basis and to procure a modified all weather version of the F-80C as an interim measure. To make funds available for this purpose, the AF proposed to use the $80,220,000 resulting from the cancellation of 58 F-87 and 30 RF-87 airplanes.

215A. (C) Memo., 29 Oct. 1948
Fr: Maj. Gen. E. M. Powers, Asst. Deputy C/S, Mat., Wash.
To: The Hon. A. S. Barrows, Under Secy. of AF, Wash.
(File: AAG, Wash.)

The Office of Asst. Deputy C/S, Mat., informed Mr. Barrows that early flight tests of F-87 aircraft had proved it to be "a very poor weapon from a performance standpoint and that it had many deficiencies aerodynamically." Also, predicted performance of the XF-87, even with new wing installed to overcome flutter difficulties experienced at relatively low speeds, did not compare favorably with that of new aircraft becoming available. The F-87 had been compared with F-84 and F-3D aircraft by an evaluation board of senior USAF officers at Muroc, Calif., with the result that Hq. USAF decided to stop production of the F-87 and to procure the F-84. Latest cost estimates were given, as follows: unit cost for 58 F-87's was $1,402,182 (original estimate, $900,000), and for 48 F-84's the unit cost was $1,336,041.

216. (U) Wire, 3 Nov. 1948
Fr: Contr. Officer, Readj. Sect., Proc. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

AMC notified contractor that Contr. W33-038 ac-19337 was terminated and instructed him to stop all work immediately, to terminate subcontracts and purchase orders, and to place no further orders in connection with this contract.

217. (U) Ltr., 3 Nov. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. Proj. Sect., Eng. Div.
Thru: Dayton AFPRO
(File: Contr., Proc. Div.)

In connection with closing out Contr. W33-038 ac-6262 covering XF-87 airplanes, contractor proposed (1) that airplane No. 1 be accepted in its present condition at W-PAFB at a reduction in price of $87,990.79; (2) that airplane No. 2 be accepted in its present condition at contractor's plant, at a reduction in price of $112,911.33. Upon acceptance of aircraft and reduction in price, contractor was to be relieved of all further work, tests, liability, or obligations. In the case of airplane No. 2,

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contractor would disassemble it for storage at his plant for a period not to exceed one year, without cost to the Government; at the end of that time, contractor and the Government would review existing conditions to determine disposition of the article.

218. (U) 1st Ind., 4 Nov. 1948
Fr: Contr. Officer, Dayton AFPFC
To: Airc. & Missiles Sect., Proc. Div.
(File: Contr., Proc. Div.)

Contracting officer recommended as fair and reasonable the contractor's reduction in price of $87,990.79 for airplane No. 1 and $112,941.33 for airplane No. 2, with the understanding the contractor would disassemble the No. 2 airplane at his plant for one year storage.

219. (C) Wire, 5 Nov. 1948
Fr: Lt. Col. W. A. Davis, Contr. Officer, Airc. & Missiles Sect., Proc. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Contr., Proc. Div.)

Airc. & Missiles Sect., Proc. Div., requested contractor to stop all work immediately on No. 2 XF-87 airplane being procured under Contr. W33-038 ac-626[illegible].

220. (C) Ltr., 8 Nov. 1948
Fr: Maj. Gen. F. O. Carroll, Dir., R&D
To: Deputy C/S, Mat., Wash.
(File: Contr., Proc. Div.)

R&D requested approval of AMC's recommendation that No. 2 XF-87 airplane be accepted in its existing condition for use as a spare parts stock pile to maintain No. 1 XF-87 on flying status. R&D stated that an apparent requirement for that airplane existed in the research program being conducted by All-Weather Flying Div. at Clinton County AF Base. The No. 1 airplane would be retained on flight status only as long as available spare parts permitted economical maintenance. /See Doc. 223.7

221. (U) Wire, 9 Nov. 1948
Fr: Curtiss-Wright Corp., Columbus, Ohio
To: Airc. & Missiles Sect., Proc. Div.
(File: Contr., Proc. Div.)

Contractor advised that he had accomplished work stoppage on No. 2 XF-87 airplane as of 5 Nov. 1948.

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221A. (U) Ltr., 12 Nov. 1948
Fr: Contr. Officer, Readj. Sect., Proc. Div.
To: Curtiss-Wright Corp., Columbus, Ohio
(File: Readj. Sect., Proc. Div.)

This letter constituted a termination notice to confirm AMC's telegram of 3 Nov. 1948 to Curtiss-Wright terminating in its entirety Contr. W33-038 ac-19837 for the convenience of the Government, effective immediately.

222. (U) Chg. C. 18 to Contr. W33-038 ac-[illegible]266, 22 Nov. 1948
(File: Contr., Proc. Div.)

Chg. C. 18 further amended Contr. W33-038 ac-[illegible]266 to cover (1) acceptance of XF-87 airplane No. 1 in an "as is" condition at W-PAFB at a reduction in contract price of $87,390.79, the contractor to be relieved of further work, tests, liability, or obligations; (2) stoppage of all work on XF-87 airplane No. 2 by contractor and immediate termination of all subcontracts, work orders, and other commitments; (3) acceptance by the Government of XF-87 airplane No. 2 in an "as is" condition at a decrease in contract price of $112,[illegible]1.33, the contractor to disassemble the airplane and store it for one year for use as a spare parts stock pile for No. 1 XF-87 at no additional expense to the Government; (4) acceptance of balance of spare parts for both XF-87 airplanes in an "as is" condition and storage by contractor for one year at no change in contract price.

223. (C) 1st Ind., 6 Dec. 1948
Fr: Brig. Gen. A. A. Kessler, Jr., Actg. Asst. Deputy C/S, Mat., Wash.
To: CG, AMC
(File: Aircr. Proj. Sect., Engr. Div.)

Hq. USAF concurred in AMC's recommendation of 3 Nov. 1948 concerning disposition of XF-87 airplane and authorized the Command to accept that airplane in its existing condition for use as a spare parts stock pile to maintain the No. 1 XF-87. /See Doc. 220./

224. (C) 2nd Ind., 17 Dec. 1948
Fr: Brig. Gen. M. B. Garfield, IG, Hq. AMC
To: TIG, Wash.
(File: AAG, Wash.)

Referring to recommendations contained in inspection report from Field Air Inspr., Hq. USAF, dtd. 1[illegible] Oct. /Doc. 2[illegible]7, the IG, Hq. AMC, stated that placement of production contracts prior to delivery of satisfactory prototype was "an Air Force not an Air Materiel Command policy and was established

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with full knowledge of the difficulties involved." Because of the rapid advance in aeronautical technical progress and length of development programs, aircraft became obsolescent before reaching production stage unless production overlapped the development program to a reasonable degree. For that reason it was sometimes necessary to place production contracts before delivery of prototype aircraft in order to meet military requirements.

225. (U) Rpt., 20 Dec. 1948
/Curtiss-Wright Corp.,
Columbus, Ohio/
Contr. W33-038 ac-6266,
Two XF-87 airp.
(File: Dayton AFPFO)

This report presented the status of Contr. W33-038 ac-6266 as of 20 Dec. 1948. As of that date, the final contract price totaled $9,340,977.39, computed as follows:

No. 1 XF-87		$5,283,862.00
No. 2 XF-87		2,466,727.00
		7,750,589.00
Design changes and modifications by Chg. C. 2, 3, 5, 7, 8, 11, 13, 14, and 15		439,047.21
Spare Parts		71,[illegible].93
Mock-up of No. 1 XF-87		169,[illegible]12.00
Wind Tunnel Model of No. 1 XF-87		48,960.00
Chargeable to original XA-43 (Buffalo Div.) portion of contract		363,[illegible]59.32
		8,5[illegible],30[illegible].51
Less price reductions by Chg. C. 13,		
No. 1 XF-87	$ 87,[illegible]90.79	
No. 2 XF-87	112,[illegible]1.33	200,332.12
		$9,340,[illegible]77.39

The Government had been billed for $1,140,367.93 of the above amount, leaving an amount of $8,200,10[illegible].56 to be invoiced.

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226. (U) R&R-1, 4 Feb. 1949
Fr: Col. G. F. Smith,
Chief, Airc. Proj. Sect.,
Eng. Div.
To: Airc. Sect., Supply Div.
(File: Airc. Proj. Sect.,
Eng. Div.)

Airc. Proj. Sect., Eng. Div., quoted from Chg. O. 13, dtd. 22 Nov. 1948, to Contr. W33-038 ac-6266. This change order directed contractor to stop all work on XF-87 airplanes and to terminate all subcontracts, work orders, and other commitments. Airc. Proj. Sect. stated that acceptance of No. 2 XF-87 airplane was effected on 14 Dec. 1948 and aircraft was being disassembled for storage by authority of Chg. O. 13. That office also was of the opinion that "XF-87 serial no. 46-522 should be dropped from accountability records as a complete airplane inasmuch as the article has never existed nor will it ever exist as such."

227. (C) Memo. Rpt., MCRFT-2183
/Flt. Test Div., AMC/
15 Feb. 1949
(File: Airc. Proj. Sect.,
Eng. Div.)

Memo. Rpt. MCRFT-2183 reported the results obtained on No. 1 XF-87 during AF Phase II flight tests at Muroc, Calif. The AF had completed a total of 19 flights in a period of nine days from 24 Sept. 1948 to 2 Oct. 1948; flying time, 13 hrs. 20 min. Aircraft was described as a two-place, side-by-side, mid-wing airplane, designed as a night and all-weather fighter, propelled by four J-34-WE-22 jet engine units located in two nacelles underneath the wings of 600 sq. ft. area. Normal design gross weight of airplane, with full internal fuel load, was 39,200 lbs.; with full tip tanks, 49,200 lbs.; cg position was 17.3% MAC for normal condition and 20.3% MAC with tip tanks attached. Conclusions reached were that handling characteristics and stability were considered satisfactory for the range of cg tested, except at maximum speeds; further, climb performance exceeded contractor's guarantees, and the maximum speed and take-off performance was marginal. No recommendations were made. /Detailed flight test data is given in the report./

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228. (U) Chg. O. 19 to Contr. W33-038 ac-6266, 23 Feb. 1949
(File: Contr., Proc. Div.)

Chg. O. 19 provided that the model XF-87 airplane, AF Serial No. 45-59600, under Contr. W33-038 ac-6266, would be inspected and accepted by the Government at W-PAFB in lieu of the contractor's plant at Columbus, Ohio, at no further change in contract price.

229. (U) Ltr., 8 June 1949
Fr: Contr. Officer, Dayton AFPFC
To: Recorder, Settlement Br., Readj. Sect., Proc. Div.
(File: Contr. Officer, Dayton AFPFC)

The Contr. Officer, Dayton AFPFC, submitted his report following completed negotiations with Curtiss-Wright concerning termination settlement of Contr. W33-038 ac-19837. End items called for by this contract were (1) modification of XF-87 airplane, (2) spare parts, (3) simulated turret, and (4) further modification of XF-87 airplane. These items were cancelled upon termination of contract; the contract price of these items totaled $919,692.31. Exhibit "A" attached to this report summarized the contractor's claim and the recommendations of the auditor and the contracting officer for settlement of the contract. In the final negotiations an over-all settlement of $895,000 was agreed upon. The amount of contractor's gross settlement was $960,57[illegible].79 and the net settlement, $533,711.73 after deducting partial payments of $426,[illegible]68.06; the AFPFC Contr. Officer recommended gross settlement of $8[illegible],000, and net settlement of $46[illegible],131.94, after deducting partial payments of $426,[illegible]68.06. Disposal credits of $[illegible],[illegible]6.39 further reduced the Contr. Officer's recommended settlement to $46[illegible],2[illegible].55. AFPFC Contr. Officer stated the amount of the proposed negotiated gross settlement was $8[illegible],000, that it was fair and reasonable to the Government and the Contractor, and recommended approval by the Settlement Review Bd.

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230. (C) Rpt., June 1949
/Air. Proj. Sect.,
Eng. Div., AMC/
Proc., Insp., Testing,
& Accept. of Curtiss-
Wright Airc. Corp. XF-87,
XF-87A, XRF-87, and XRF-87C
(File: Airc. Proj. Sect.,
Eng. Div.)

This report summarized the development of the XF-87 All-Weather Fighter Program. Objectives of the program had been to produce jet fighters capable of offensive operations in all weather conditions in order to comply with All-Weather Fighter Military Characteristics dated 23 Nov. 1945, revised 8 Oct. 1946. The report stated, "The prime consideration was the prevention of a recurrence of the 'Battle of the Bulge,' during which tactical air support for ground troops was lost due to weather conditions. The XF-87 was therefore conceived as an offensive fighter capable of seeking out and destroying enemy aircraft and ground targets in all weather conditions day or night." The combined efforts of AMC and Curtiss-Wright had resulted in an agreement to construct one XF-87 airplane and to utilize unexpended funds on a contract covering the XA-43 airplane (Contr. W33-038 ac-6266); production of the XA-43 had been stopped because it had failed to meet military characteristics. Originally the term "all weather" had been interpreted to mean good as well as bad weather; however, Hq. USAF had clarified the term and determined it to imply night and/or inclement weather conditions only. Subsequently, the tail turret and sighting mechanism were removed from basic design. The first XF-87 was completed in Sept. 1947 and flight tested at Muroc during the period March 1948 through Oct. 1948. AMC Phase II flight testing proved the XF-87 to be inferior to another model based on requirements for all-weather interceptors; these requirements had become the paramount consideration of tactical units which were to operate the all-weather fighters. Meanwhile, a second XF-87 airplane had been contracted for in Feb. 1948 under Contr. W33-038 ac-19837. Under this contract, modifications were approved to convert the second article into photo reconnaissance type and to incorporate a

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larger wing (740 sq. ft.); also to install two J-33-29 engines on the first airplane in lieu of four J34 engines. Upon completion of Phase II flight testing by AMC, plans for quantity production of the XF-87 were dropped and all contracts terminated. The first XF-87 was ferried to W-PAFB where it was accepted by the Government and assigned to Flight Test Div., AMC, for disposition. The second XF-87 airplane was accepted by the Government in an unfinished condition at contractor's plant and disassembled for use as spare parts to maintain the first airplane. Effective date of acceptance by the Government of both XF-87 airplanes was 14 Dec. 1948.

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Project MX-745, XP-87 Airplane

Project MX-805, Studies, Fire Control System, XP-87

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452.1 Curtiss-Wright P-87, 1945-1949

452.1 Model Designations, 1944-1949

452.1 Military Characteristics Liaison

452.1 Curtiss-Wright, Technical Instructions

Procurement Division Contract Files, Classified and Unclassified

Contract W33-038 ac-6266, with Change Orders, Supplemental Agreements, Amendments, Contract Change Notifications, and Correspondence, 1944-1949.

Contract W33-038 ac-19837, with Change Orders, Supplemental Agreements, Amendments, Contract Change Notifications, and Correspondence, 1948-1949.

Contract W33-038 ac-20450, and Correspondence, 1948-1949

Contract W33-038 ac-10363, Blanket Bailment Contract, 1948-1949

Dayton Air Force Procurement Field Office

Miscellaneous File, Office of the Contracting Officer

Contract File, Office of the Chief, Contract Section

Historical Office

Monograph, Five Year Procurement Program

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Fighter Branch, Aircraft Projects Section, Engineering Division

Correspondence Files, XF-87 Airplane, Nos. 1 through 9, 1944-1949

Engineering Acceptance Inspection (689) Reports on XF-87 Airplane

Final Report on Procurement, Inspection, Testing, and Acceptance of the Curtiss-Wright Aircraft Corporation XF-87, XF-87A, XRF-87, and XRF-87C.

Flight Progress Report File on XF-87 Airplane

AMC Flight Test Data File, XF-87 Airplane, Files No. 1, 2, 3, 1948-1949

Memorandum Reports on the XF-87 Airplane

Military Characteristics of Aircraft (All-Weather), 1944-1948

NATIONAL MILITARY ESTABLISHMENT FILES

Air Adjutant General Files, Unclassified

452.13 Engines and Parts, 1946-1947, Vol. I

452.01 Procurement, Allotment and Distribution, Miscl., Vol. I, 1946-1947

Air Adjutant General Files, Classified

452.02 Design & Performance Data, Miscl., Vol. 1, 1946-1947

452.02 Design & Performance Data, Miscl., Vol. 2, 1946-1947

452.02 Design & Performance Data, Miscl., Vol. 3, 1946-1947

452.1 Jet Propulsion Aircraft, Vol. I, 1946-1947

452.1 Jet Propulsion Aircraft, Vol. II, 1948

452.1 Pursuits, Vol. I, 1946-1947

452.1 Pursuits, Vol. I, 1948

Production Division, Director of Procurement and Industrial Planning, Deputy Chief of Staff, Materiel

Curtiss-Wright Corporation Correspondence

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Aircraft Branch, Engineering Division
Director, Research and Development, Materiel

P-87 Experimental, 1945-1948

P-87 Modification

F-87 Equipment

F-87 General, 1948

All-Weather Fighter File

INTERVIEWS

Thornton, Captain O. B., XF-87 Project Officer, Aircraft Projects Section, Engineering Division, Air Materiel Command, Wright-Patterson Air Force Base, May and June, 1949.

Rubin, M. L., Contracting Officer, Dayton Air Force Procurement Field Office, Wright-Patterson Air Force Base, June 1949.

Collins, H.W.T., Chief, Contract Section, Dayton Air Force Procurement Field Office, Wright-Patterson Air Force Base, June 1949.

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TO BE RETURNED
TO THE ARCHIVES
OF THE AAF
HISTORICAL SECTION
AIR HQ - Jan 49
WAR DEPT.
202.1 - 44

CASE HISTORY OF THE XF-87 ALL-WEATHER FIGHTER AIRPLANE

DOCUMENTS 1 THROUGH 109 (1945 - 1947)

March 1945 - June 1949

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BY THE USAF
PIRSUANT TO ...
Mar 45 - Jun 49
202.1-44
V.2

CASE HISTORY OF THE XF-87 ALL-WEATHER FIGHTER AIRPLANE

March 1945 - June 1949

FOR OFFICIAL USE ONLY

Classification cancelled or changed to [redacted] 16 Jun 49
by authority of Ltr AFLC (McKH) 24 Jun 49
by E Rw date

[redacted]
Auth: C G, AMC
Initials: MKH
Date: 12-23-49

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DOCUMENTS 1 THROUGH 109 (1945 - 1947)

CASE HISTORY OF THE XF-87 ALL-WEATHER FIGHTER AIRPLANE

March 1945 - June 1949

Prepared by
Historical Office
Executive Secretariat
Air Materiel Command
Wright-Patterson Air Force Base
January 1950

SECRET
Auth: CG, AMC
12-23-49

By

Helen W. Schulz
Historian

Prepared under provision of AF Regulation No. 210-3 as a part of the USAF Historical Program.

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18 U.S.C., Sections 793 and 794. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

S-56337-4

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15 March 1945
WTF:WA-125

Subject: All Weather Fighter Proposal

To: Chief, Engineering and Procurement
Air Technical Service Command
Wright Field, Dayton, Ohio

Attention: Brig. Gen. Frank O. Carroll
Chief, Engineering Division

Enclosures: (A) Four (4) Proposal Booklets No. 9162
(B) Four (4) Copies of Proposal Form No. 43-1
(C) Four (4) Copies of Tax Statement
(D) Four (4) Drawings - General Arrangement P-1032-22A
(E) Four (4) Drawings - Inboard Profile - P-1032-28
(F) Test Model Requirements

1. General

Recognizing the need of the Army Air Forces for a fighter capable of operating in all weather conditions, we are proposing herein design and fabrication of a mock-up, three flight test articles and one static test article to fulfill the development of the type. Following informal discussions on previous fighter studies, we are submitting proposal booklets, Enclosure (A), detailing engineering data which meets the characteristics outlined in the Preliminary Specification as a part of the booklet. An immediate letter contract to be followed by a formal CPFF contract for the work and physical articles proposed herein will assure the earliest possible completion of the project.

2. Specification

The airplane proposed herein is a single place, twin-jet propelled fighter. The airplane shall conform to Curtiss-Wright, Airplane Division, Preliminary Model Specification No. 9162, dated 15 March 1945 and included as a part of Enclosure (A).

Orig to CF 8-31-45

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3. Description of Work

It is proposed that the contract specify the following work to be accomplished:

(a) One mock-up airplane.
(b) Three flight test articles, flight testing to be done by the contractor.
(c) One static test article, static testing to be done by the contractor.
(d) Wind tunnel models and testing.
(e) Engineering data of the absolute minimum necessary for the design and fabrication of the airplane not in complete compliance with AAF Specification No. 4-11-A, dated April 1, 1943.

4. Performance

Performance data as tabulated in Enclosure (A) has been ...ulated on the best available power unit data as described in General Electric specification for the TG180 unit, and on current aerodynamic data extrapolated for the performance quoted. This performance data is based on N.A.C.A. tests for the selection of an air foil section and on current methods of calculation as discussed between Curtiss Wright and ...f Aircraft Laboratory personnel. In view of the lack of definite information on high speed and high Mach numbers, we are willing to ...ar view the performance as specified in the Preliminary Specification No. 166 included as a part of Enclosure (A), the section on Performance, providing a tolerance of five percent (5%) is allowed on speeds.

5. Mock-up

A mock-up shall be constructed, incorporating the general design features and clearances of the actual airplane. The mock-up shall be retained at the contractor's plant and be available for inspection by "AF" personnel. Government Furnished Equipment or suitable mock-ups thereof shall be delivered to the contractor's plant within sufficient time for incorporation in the airplane mock-up.

6. Flight Test and Static Test

In view of the highly experimental nature and confidential status of this airplane, a definite flight test program has not been established and shall, therefore, be the subject of later negotiations. We desire, however, to correlate the program of the flight test and static test articles in order to substantiate structural calculations on flight loads at the higher speeds and Mach numbers. It is, of course, important to expedite this portion of the program in order to lift flight restrictions at the earliest possible date. In order to carry out such flight investigations with reasonable safety, it will be necessary to be able to prove by static test that the airplane components can withstand one hundred fifty percent (150%) of the loadings allowed by extrapolation from those

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measured in previous slightly less severe flight tests. Therefore, static tests shall be conducted by the contractor up to one hundred thirty five percent (135%) of design limit analysis loads before performing any severe dive demonstration flights. During the dives, the results of the flight load measurements shall be extrapolated to the next dive demonstration and the structure shall have been static tested to the next one hundred fifty percent (150%) of the anticipated loads before performing that dive. The airplane shall be flight tested by the contractor to insure that its components/ systems function satisfactorily and that it will fulfill the purposes for which it is intended. It is proposed that we conduct the following flight tests prior to delivery of the airplane. When delivered the airplane shall reasonably comply with Specification C-1815 on Stability and Control, but quantitative data will not be obtained. The following performance checks will be made by the contractor:

(a) Level high speed at best altitude.
(b) Level high speed at 25,000 ft.
(c) Stall speed.
(d) Take-off distance over a 50 ft. obstacle.
(e) Time of climb to 25,000 ft.
(f) Fuel consumption at best cruising speed at 25,000 ft.

7. Price and Delivery

Price and delivery information are included in Proposal Forms No. 43-1 as Enclosure (B). An immediate reply in the form of a letter contract is desired and will assure the least amount of delay in determining an early completion of this project.

Respectfully,

CURTISS-WRIGHT CORPORATION
Airplane Division-Buffalo Plant

Edwin J. Ducayet
Contract Engineer

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62 (Exh 7) attach 61

Part III Delivery Schedule

A. Airplanes will be delivered at a flying field approved by the Government in the vicinity of the Contractor's plant unless otherwise specified. Other items and parts will be delivered F. O. B. cars and/or freight station at

.....

in accordance with the following:

MONTH AND YEAR	QUANTITY AND ITEM	QUANTITY AND ITEM	QUANTITY AND ITEM

Mock-up ~~one month~~ six weeks after firm go-ahead.
First flight article nine (9) months after mock-up approval.
Static test article ten (10) months after mock-up approval.
Subsequent airplanes to follow at approximately two month intervals.

B. Maintenance Parts: (Check)

.....1. A portion of the total quantity of each item of Maintenance Parts will be delivered prior to or concurrently with and in proportion to the quantity of the basic articles delivered in each month. Where a fractional portion of more than one-half (1/2) of a part is involved in this arrangement, a complete part shall be delivered.

.....2. Will be delivered in accordance with the AAF Spare Parts Provisioning policy established in standard spare parts appendix for this type of procurement.

.....3. Other: (Explain)

C. Miscellaneous Items will be delivered as follows:

ITEM	DELIVERY SCHEDULE

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15 March 1945

Subject: (U)

Ref: Airplane-wright letter, NAV:NS-LPF dated 13 March 1945

WIND TUNNEL MODELS

1. One complete stability and control model, 1/[illegible] scale. 400 hours testing at CIT and/or Caltech.

2. One 1/4 scale isolated horizontal tail model. 100 hours testing at MIT and/or Caltech.

3. Two two-dimensional Airfoil Section Models, 2 foot chord for flap and aileron development. 100 hours testing at Caltech.

4. Three two-dimensional airfoil models, 5" chord for development of lateral control devices, etc. 100 hours testing in small compressed laboratory High Speed tunnel.

5. One supported high speed tunnel model, approximately 1/8 scale for determining high speed control and stability, aerodynamic heating, and compressibility effects. Four hours testing at [illegible].

6. Flutter model of wing, approximately 1/6. 150 hours testing in [illegible] laboratory tunnel.

7. Flutter model of horizontal tail and fin portion of fuselage approximately 1/4 scale. 150 hours testing at [illegible] Research Laboratory Tunnel.

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Office Memorandum • UNITED STATES GOVERNMENT

TO

FROM

SUBJECT

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TSESE-2C:JFA/fkk

9 April 1945

SENG-1 (TSESE-2C)

Curtiss Twin-Engine Jet Fighter Proposal

AIR MAIL

Commanding General
Army Air Forces
Washington 25, D. C.

Attention: AC/AS, M. & S.,
Aircraft Projects Section

1. The Curtiss Airplane Division, Buffalo, New York, has presented during recent conferences at the Air Technical Service Command a proposal showing their version of an airplane designed to meet the Military Characteristics of the Day Fighter. It is proposed to equip this airplane with all necessary equipment for instrument flying as well as heated wing deicing with the result that Curtiss styles the airplane as an "All Weather Fighter". The preliminary design as described in Curtiss Report 1602 is a twin-engine, single-place fighter powered by two TG-180 jet propulsion units mounted in center-line nacelles outboard of the fuselage. Provisions are made for 1000 gallons of internal fuel and 700 gallons of external fuel. All internal fuel is carried in the fuselage symmetrically distributed about the c. g. The armament consists of six .60 caliber machine guns and 1320 rounds of ammunition installed in the nose of the fuselage. Tail warning radar and the A-1 gun sight complete with radar range finding equipment (AN/APG-5) are provided. The wing is 9 percent thick from root to tip. Several novel features are proposed, the most interesting of which are the tandem main wheels and the dive brakes mounted on the engine nacelles controlled by the ground brake foot pedals in flight. Curtiss stresses the ease of maintenance resulting from the relatively small overall height of the airplane.

2. Curtiss quotes a maximum gross weight with all fuel of 32,100 pounds and a design or combat gross weight of 25,[illegible] pounds. These weights are considered reasonable with the exception that Curtiss did not include all internal fuel in the design gross weight. With all internal fuel the design or combat gross weight becomes 2[illegible],000 pounds.

3. The performance quoted by Curtiss is considered somewhat optimistic. The following table shows a comparison between the

See M[illegible] dated 2-1118 [illegible] 28 [illegible]
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AC/AS, M.& S.,
Aircraft Projects Section
Curtiss Twin-Engine Jet Fighter Proposal
9 April 1945

quoted figures and the Air Technical Service Command calculated figures:

	Curtiss Calculations	ATSC Calculations
High speed at sea level, mph	532	537
High speed at 25,000 feet, mph	591	549
Combat radius at 25,000 feet, mi	750	650
Average cruising speed for above range, mph	370	385
Endurance at average cruising speed, hours	4.05	3.38
Service ceiling (maximum RPM), ft.	49,000	43,500
Time to climb to 20,000 feet, Min	5.5	
Time to climb to 25,000 feet, Min		7.6
Take-off over 50 foot obstacle at @32,100 ft	5,310	Curtiss O.K.
Landing over 50 foot obstacle, ft.	2,550	Curtiss O.K.
Rate of climb at sea level ft.per,min.	4,800	4,400
Rate of climb at 25,000 feet ft per,min.	2,610	2,310

NOTE: The designer's performance is estimated at a gross weight of 25,480 pounds except as noted. The Air Technical Service Command's performance is calculated at a gross weight of 26,680 pounds as this will be the design gross weight with full internal fuel.

4. Discussions of this proposal at the Air Technical Service Command have resulted in a general review of the fighter picture. The problem can be summed up in this question --"Is a large twin-engine airplane required to fully comply with the present Military Characteristics of the Day Fighter?" For airplanes propelled by our present jet engines, the answer to this question is "Yes". In this connection, your attention is invited to the attached table showing a comparison of the Curtiss proposal, the XP-81 airplane and several configurations of the XP-84 airplane. These figures were all calculated at the Air Technical Service Command by current methods of performance calculation. It is believed that they represent quantitatively the results that can be reasonably expected with present engine ratings and in any event will serve the purposes of a comparison since the method of calculation is the same for all cases. From an examination of this table, it is apparent that for the XP-84 it is possible to meet the range requirement by adding additional fuel; however, the airplane will then have a prohibitive take-off distance and assisted take-off devices will be required. Even though run-ways of sufficient length were available, assisted take-off would still be required because of overheating of present sized wheels. In addition, there is insufficient space in the XP-84

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to house six .60 caliber machine guns and a complete redesign of the fuselage would be required to make the necessary provisions. The six .60 caliber gun installation will always seriously compromise the weight of a single engine jet fighter and in addition will dictate fuselage size.

5. The XP-81 easily meets the range requirement but sacrifices high speed because of the propeller installation. However, preliminary flight tests indicate that this airplane has a reasonable chance of meeting the minimum speed requirement of 500 mph. when the TG-100 unit is installed.

6. Additional fuel can be provided for the proposed Curtiss airplane which can then be expected with reasonable assurance to meet the combat radius requirement of 750 miles and at the same time have a reasonable take-off distance. This will result in little if any loss in speed in the combat condition as the additional fuel will be external. There is a possibility of effecting a considerable weight reduction (1000 to 2000 pounds) on the Curtiss proposal by using thicker wing sections and under-slung nacelles. This, however, will result in a sizeable speed loss, probably 20 to 30 mph.

7. Although it appears that the proposed Curtiss airplane can be made to meet all the present Military Characteristics of the Day Fighter, the resulting penalties are considered to outweigh the advantages. In order to obtain an additional 100 miles radius of action with somewhat heavier armament and additional equipment, it is necessary to build an airplane of over twice the gross weight of the single engine experimental jet fighters now on procurement. In addition to the well known objection to large airplanes from the pilot's standpoint, there are the additional objections of high cost and increased supply and maintenance problems. These objections are considered of sufficient importance to warrant a careful review by OC&R of the present Military Characteristics of the Day Fighters. It is recommended that the range requirements be lowered and that, at least for the time being, the implied requirement for six .60 caliber machine guns be eliminated. With the jet units presently available, it does not appear practicable to attempt to combine the exceptional speed of the purely jet propelled airplane with requirements for extremely long ranges and large quantities of equipment.

8. With the development of jet units of about 6000 pounds thrust, it should be possible to construct a single-engine airplane of reasonable size to fully comply with the present Military

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SECRET

PERFORMANCE COMPARISON - FIGHTERS

Column 1 Item	(2) Curtiss XP-80A Official Performance Flight Tests	(2) Curtiss All Weather (see note 1 below)	(3) Curtiss Design #13a Curtiss Figures	(3) XP-81 (see note 1 below)	(4) XP-81 Values Based on Flight Tests	(4) XP-81	(5) XP-81 with 4-60 caliber guns thermal de-icing, radar (see note 2 below)	(6) XP-81 in column (5) further modified to give combat radius of 750 miles.
Gross Weight (Design) . . . . (lbs)	11307	25,630	20460	18,330	19,520	12,500	13,540	14,600
Gross Weight (Take-Off) . . . (lbs)	13780	32,100	24250	23,000	24,620	15,500	,300	16,750
Internal Fuel . . . . . (gal)	485	1,000	775	817	811	472	474	525
External Fuel . . . . . (gal)	330	700	300	600	700	413	377	565
* High Speed at sea level . . (mph)	558	537	635	413	494	549	540	538
* High Speed at 25,000 ft. . . (mph)	520	549	619	495	509	538	537	533
Combat Radius at 25,000 ft. . (mi)	500	550	507	945	1125	650	490	750
Take-Off over 50-ft obstacle. (ft)	6450	5,300	4625	3,300	4000	4,950	5,600	7,800 (see note 3 below)
* Rate of Climb at sea level. (ft/min)	4720	4,400	6920	5,850	6570	5,050	4,650	4,100
* Rate of Climb at 25,000 ft. (ft/min)	2520	2,300	3635	3,0	3300	2,700	2,500	2,100

* Based on Design Gross Weight

NOTE 1: XP-81 data are aircraft laboratory estimates based on the contractor's wind tunnel data.

NOTE 2: Four-.60 caliber guns instead of six - space not available for six.

NOTE 3: This take-off distance appears to require the use of assisted take-off devices.

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Curtiss Twin-Engine Jet Fighter Proposal

AC/AS, Plans, Requirements Division — 16 April 1945

1

AC/AS, Plans, Materiel Division — Major Bussey/bkw/74551

1. Attached for your examination is a descriptive brochure outlining a new Curtiss twin-engine jet fighter aircraft proposal, which has been designed to fulfill "Military Characteristics of Day Fighter Aircraft" as revised 11 September 1944. It is proposed to equip this airplane with all necessary equipment for instrument flying as well as heated wing deicing with the result that Curtiss styles the airplane as an "All Weather Fighter". The preliminary design, as described in Curtiss Report 9162, is a twin-engine, single-place fighter powered by two TG-180 jet propulsion units mounted in center-line nacelles outboard of the fuselage. Provisions are made for 1000 gallons of internal fuel and 700 gallons of external fuel. All internal fuel is carried in the fuselage symmetrically distributed about the c. g. The armament consists of six .60 caliber machine guns installed in the nose of the fuselage. Tail warning radar and the A-1 gun sight complete with radar range finding equipment (SCR/APG-5) are provided. Several novel features are proposed, the most interesting of which are the tandem main wheels and the dive brakes mounted on the engine nacelles controlled by the ground brake foot pedals in flight. Curtiss stresses the ease of maintenance resulting from the relatively small overall height of the airplane.

2. Curtiss quotes a maximum gross weight with all fuel of 32,100 pounds and a design or combat gross weight of 29,480 pounds. These weights are considered reasonable with the exception that Curtiss did not include all internal fuel in the design gross weight. With all internal fuel, the design or combat gross weight, becomes 26,680 pounds.

3. The performance quoted by Curtiss is considered generally optimistic. The following table shows a comparison between the quoted figures and the Air Technical Service Command calculated figures:

	Curtiss Calculations	ATSC Calculations
High speed at sea level, mph	54[illegible]	537
High speed at 25,000 feet, mph	591	549
Combat radius at 25,000 feet, mi	750	6[illegible]
Average cruising speed for above range, mph	37[illegible]	[illegible]65
Endurance at average cruising speed, hours	4.05	3.38
Service ceiling (maximum R/C), ft.	49,00[illegible]	[illegible],500
Time to climb to 20,000 feet, min	5.5	
Time to climb to 25,000 feet, "		7.0
Take-off over 50 foot obstacle, ft. (W=32,100 lbs.)	5,[illegible]10	5,810
Landing over 50 foot obstacle, ft.	2,550	2,550
Rate of climb at sea level ft. per min.	4,3[illegible]	4,[illegible]
Rate of climb at 25,[illegible] feet per min.	2,61[illegible]	[illegible],510

NOTE: The designer's performance is estimated at a gross weight of [illegible],[illegible] pounds

Brain (Hq.) 4-9-45 [redacted] + Pilot (Hq.) 10-5-45

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[redacted]

Curtiss Twin-Engine Jet Fighter Proposal

AC/AS, [illegible] Requirements Division

AC/AS, [illegible], Material Division

1 [illegible]
1 (Cont'd)
[illegible] /Tab 1

[illegible] Curtiss' performance is [illegible] at a gross weight of [illegible] pounds as this will be the design gross weight with full internal fuel.

4. Inclusions of this proposal [illegible] fighter aircraft picture and it has been determined that [illegible] by our present jet [illegible], a large tail [illegible] aircraft is required [illegible] ply with the recent military characteristics [illegible] fighter aircraft. [illegible] result [illegible] the present [illegible].

a. XF-88 - This airplane early [illegible] this [illegible] high speed because of the propeller [illegible]. Preliminary [illegible] indicate that this airplane has a reasonable [illegible] with the [illegible] requirement of 500 mph when the J-100 unit is [illegible].

b. XF-84 - By adding additional [illegible] devices, it [illegible] to meet the range requirement with [illegible]. However, to meet the requirement caliber [illegible] would require [illegible] weight of the airplane.

c. Curtiss - Additional fuel can be added to the Curtiss proposal which then could be expected with reasonable assurance to meet the combat range requirement of 750 miles and at top speed [illegible]. This additional fuel would be external and would result in little if any loss in speed in the combat condition.

5. It appears that the subject Curtiss proposal can be made to meet the present military characteristics of fighter aircraft and is typical [illegible] can be expected to try to meet these characteristics with the jet power [illegible] currently available. Curtiss has tentatively indicated that the first flight [illegible] can be completed in approximately 21 months after they are given a go-ahead. It is requested that the attached brochure, together with [illegible] reviewed and a decision be rendered relative to the [illegible] development exists for an airplane of this type.

6. In order to obtain an additional 100 miles radius [illegible] heavier armament, it will be necessary to add [illegible] might of the airplane. While experimental jet fighters [illegible] not appear practicable to attempt to achieve [illegible] speed [illegible]

[redacted]

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Curtiss-Wright Jet Fighter Proposal

AC/AS, Data Requirements Division

AC/AS, Plans, Operations Division

propelled airplane, data requirements [illegible] of equipment. [illegible] that the military characteristics [illegible] eye toward [illegible] caliber .50 machine guns.

7. The attached brochure is a [illegible] be appreciated.

1 Incl:
Brochure, as listed above.

[illegible]
Colonel, Air Corps,
Chief, Procurement Planning Section

[redacted]

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ARMY AIR FORCES
MATERIEL COMMAND
ENGINEERING DIVISION
MEMORANDUM REPORT ON

SUBJECT: Curtiss Twin-Engine Jet Fighter Proposals Date 3 April 1945

SECRET

OFFICE Aircraft Projects Section Contract or Order No.

SERIAL No. [redacted]-1275 Expenditure Order No. [redacted]-5

1. To present further comments on the subject proposals.

2. [illegible]:

3. The initial airplane [illegible] proposal for a twin-engine jet fighter has been reviewed by the Air Technical Service Command and comments and recommendations concerning this proposal have been submitted in a letter dated [illegible] to the Assistant Chief of Air Staff, Material and Services.

4. The contractor was informed [illegible] of the Air Technical Service Command's opinion of this proposal. The substance of this opinion is that the airplane is too large and heavy for a fighter type. However, both the Air Technical Service Command and the Contractor agree that an airplane of about [illegible] would be necessary to fully meet the current military requirements for the Day Fighter if the present jet propulsion units were employed.

5. The Contractor has completed further study and has presented another version of the twin-engine proposal which, by making certain modifications to the airplane, changes it to that range and arrangement [illegible] similar to the [illegible]. The revised characteristics and performance of this new version are as follows:

GUN CONFIGURATION

Power Plant ---------- Two J.-33 units in outboard nacelles.
Armament ---------- Six .50 caliber guns with 1400 rounds. Alternate, four .50 caliber guns with 700 rounds.
[illegible] ---- Six pilots internal.
[illegible] ---- Two pilots internal plus [illegible] internal.

K. R. Cyfers, 7-10-45

Cont K. R. [illegible] 12-9-47

m.s

[redacted]-111000

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Distribution:

Prepared by

Approved by

[redacted]

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45

SECRET

[redacted]

Subject: [illegible]

[illegible]

To: Director, [illegible]
[illegible], Attention: [illegible]

1. [illegible]

[illegible]

2nd Ind. [illegible]

2nd R (ffa) 7-10-45

[redacted]T

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CLASSIFICATION CANCELLED
Changed to
By DOE ltr dated 10-24-45

[redacted] Contract No. W 33-038 ac-6266

CURTISS WRIGHT CORPORATION
New York, New York

[redacted]

APPROVED: 24 May 1945
By Direction of the Secretary of War under the Provisions of the First War Powers Act, 1941, and Executive Order 9001, dated 27 December 1941.

/s/ D. C. Swatland
D. C. SWATLAND
Brig. General, U. S. A.
Deputy Chief, Procurement Division

X-18371 - 4 -
ProjectNo.: MX-582

[redacted]

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C. P. F. F. FORM NO. 3
(Revised)

Contract No. W 33-038 ac-6266 (13235)

ANMB Preference: AA-1 (C-1)

Allocation Classification System Symbol: USA None

AFP: 391310

Classification: CL-01

COST-PLUS-A-FIXED-FEE

SUPPLY CONTRACT

(Army Air Forces)

WAR DEPARTMENT

ESS/CLM

Contractor: CURTISS-WRIGHT CORPORATION

Contract For: Engineering Services, Mock-Up, Wind Tunnel Model and Data With Respect to the XA-43 Airplane

Estimated Cost: $ 352,984.00

Fixed-Fee $ 13,807.00

Payments to be made by The Finance Officer, U. S. Army, 12-14 North Division Street, Buffalo, New York.

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in, and are chargeable to the following Procurement Authorities, the available balance of which are sufficient to cover the cost of the same.

212/50705, 502-5150 P 611-07 S 33-038

This formal contract supersedes Letter Contract dated 14 November 1944, as amended.

By authority of the War Production Board the preference ratings indicated are assigned to the deliveries on this contract.

[redacted]

10/30/43

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COST-PLUS-A-FIXED-FEE

SUPPLY CONTRACT

THIS CONTRACT, entered into this 28th day of April, 1945, by THE UNITED STATES OF AMERICA, hereinafter called the Government, represented by the Contracting Officer executing this contract,** and CURTISS-WRIGHT CORPORATION

* a corporation organized and existing under the laws of the State of

* Delaware

of the City of New York

in the State of New York

hereinafter called the Contractor, witnesseth that:

*Delete all lines which do not apply.

**This contract was negotiated under the authority of the First War Powers Act, 1941, and Executive Order No. 9001, December 27, 1941.

33-038 ao-6266
3-1537 - 4/2

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ARTICLE 2 - ESTIMATED COSTS (Based upon data on file in the office of the Commanding General, Army Air Forces.)

Item	Quantity	Estimated Cost
1	Wind Tunnel Model and Tests	$171,634.00
2	Test Report	Included in Item 1
3	Mock-Up	Included in Item 1
4	Engineering Services	$181,350.00
5	Data	Included in Item 4

Total Estimated Cost $352,984.00

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ARTICLE 4 - DELIVERY

(a) All of the work called for by Article 1 hereof shall be completed on or before 15 March 1945. The Model and the Mock-Up of the XA-43, called for by Items 1 and 3 of Article 1 (a) shall be delivered to the Government at Contractor's plant, Buffalo, New York, at such time, after the completion of said work, and packed in such manner, as the Contracting Officer may direct. The report and data called for by Items 2 and 5 of Article 1 (a) shall be delivered to the Government on or before 15 March 1945, by registered mail, postage prepaid, addressed to the AAF Supply Officer, Wright Field, Dayton, Ohio, Attention: TSESM2A.

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ARTICLE 4 - DELIVERY (Cont'd)

(b) The Contractor shall not be liable for any delay in the performance of this contract which results without fault or negligence on the part of the Contractor and which is due to causes beyond its control including, without being limited to, acts of God or of the public enemy, any preference, priority or allocation order issued by the Government or any other act of the Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and unusually severe weather; and, unless the Contracting Officer shall determine that the materials or supplies to be furnished under a subcontract are procurable in the open market, any delay of a subcontractor which results without fault or negligence on the part of the Contractor, and which is due to causes beyond the control of the Contractor, including without being limited to the types or causes above enumerated; provided, that the Contractor shall notify the Contracting Officer in writing of such delay and the cause thereof, within 180 days from the beginning thereof or within such further period as the Contracting Officer shall, with the approval of the Secretary of War or his duly authorized representative, prior to the date of final settlement of this contract, grant for the giving of such notice. The Contracting Officer shall then ascertain the facts and the extent of the delay and shall make an equitable adjustment in the fee and in the prescribed time of performance when in his opinion the facts justify such action. If the Contractor objects to any adjustment made by the Contracting Officer under this Article, the dispute shall be determined as provided in Article 16. Delay in the performance of this contract resulting from the inability of the Contractor, acting with due diligence, to procure materials or parts required for the manufacture of the articles called for hereunder, and delay in the performance of this contract resulting from the loss of a substantial number of skilled employees through being drafted or volunteering for service in the Armed Forces and inability of the Contractor, despite due diligence, to replace such employees, shall each be considered a delay "which results without fault or negligence on the part of the Contractor and which is due to causes beyond its control" within the meaning of this paragraph. This Article shall apply to all provisions of this contract governing default in the performance.

ARTICLE 5 - CHANGES

The Contracting Officer may, at any time, by a written order make changes in or additions to the drawings and specifications, issue additional instructions, require additional work, or direct the omission of work covered by the contract. If such changes cause a material increase or decrease in the amount or character of the work to be done under this contract, or in the time required for its performance, an equitable adjustment of the estimated cost and of the amount of the fixed fee to be paid to the Contractor shall be made and the contract shall be modified in writing accordingly. Any claim for adjustment under this Article must be asserted within 90 days from the date the change is ordered: Provided, however, that the Contracting Officer, if he determines that the facts justify such action,

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may receive and consider, and, with the approval of the Chief of Branch, adjust any such claim asserted at any time prior to the date of final settlement of the contract. If the parties fail to agree upon the adjustment to be made the dispute shall be determined as provided in Article 16 hereof. But nothing provided in this Article shall excuse the Contractor from proceeding with the prosecution of the work so changed.

ARTICLE 6 - PAYMENTS

(a) Reimbursement for Cost. - The Government will currently reimburse the Contractor for such expenditures made in accordance with Article 3 hereof as may be approved or ratified by the Contracting Officer, and upon certification to and verification by the Contracting Officer of the original signed payrolls for labor, the original paid invoices for materials or other original papers; provided, however, that subject to the requirement of paragraph (b) of Article 7 hereof, in respect of the maintenance so far as practicable of a complete separate system of accounts for work under this contract, in the event it be impracticable to furnish the Contracting Officer with original signed payrolls for labor, original paid invoices for materials, or other original papers, the Contractor shall furnish evidence in a form satisfactory to the Contracting Officer, covering expenditures to be reimbursed under this Article. Generally, reimbursement will be made weekly, but may be made at more frequent intervals if the conditions so warrant.

(b) Payment of the Fixed Fee. - Ninety percent (90%) of the fixed fee set forth in paragraph (a) of Article 3 hereof shall be paid as it accrues, in monthly installments based upon the percentage of the completion of the work as determined from estimates made and approved by the Contracting Officer. Upon completion of the work and its final acceptance, any unpaid balance of the fee, including the additions thereto, if any, to which the Contractor may be entitled, as provided in said paragraph (a) of Article 3, shall be paid to the Contractor.

(c) As of the date of the execution of this contract there has been allotted for it the total sum of $ 366,791.00 . This sum may be increased from time to time by the Government solely in its discretion. Upon the making of any such increase the Contracting Officer shall notify the Contractor in writing of the amount of such increase.

(d) Notwithstanding any other provisions of this contract the Contractor shall not be bound to take any action in connection with the performance of this contract that would cause the amount for which the Government will be obligated hereunder to exceed the sum allotted for this contract, and the obligation of the Contractor to proceed with the performance of this contract shall be limited accordingly. If at any time the Contractor has reason to believe that the amount to be expended by it in the next succeeding 30 days, when added to all previous expenditures and to the total amount of the Contractor's fixed fee, will exceed the sum allotted for this contract, it shall notify the Contracting Officer to that effect, giving a new estimate of its total expenditures under this contract, so that an appropriate increase may be made in the sum allotted for this contract. Anything in this contract to the contrary notwithstanding, the Government shall not be obligated to pay to the Contractor either for reimbursement of expenditures or fixed fee or otherwise any amount in excess of the sum allotted for this contract; provided, however, that if the Contractor makes any expenditures for which funds are not allotted, the Contracting Officer may ratify such expenditures when funds are allotted.

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ARTICLE 7 - INSPECTION AND AUDIT

(a) All material and workmanship shall be subject to inspection and test by representatives of the Government. For this purpose, the Contractor shall allow at all times inspectors and other Government personnel free access to the plant and operations and shall furnish such facilities, supplies and services as may be required for this work.

(b) The Contracting Officer and his representatives shall have access to all accounting records applicable to this contract. The method of accounting used by the contractor shall be subject to the approval of the Contracting Officer but no material change will be made in the contractor's method if it conforms to good accounting practice and the costs are readily ascertainable therefrom. So far as practicable, the contractor shall maintain a complete separate system of accounts for work under this contract and shall preserve for a period of at least three years after completion or cessation of said work all the books, papers and other accounting records pertaining thereto; Provided, that, if the contractor, at any time after the three-year period has elapsed, desires to dispose of said books, papers and accounting records, he shall so notify the Chief of Branch who shall either authorize their destruction or notify the contractor to turn them over to the Government for disposition.

(c) All information obtained from the contractor's records shall be treated as confidential.

ARTICLE 8 - MATERIAL AND WORKMANSHIP

(a) The work shall be executed in the best and most workmanlike manner by qualified, careful and efficient workers, in strict conformity with the best standard practices.

(b) Except it be otherwise authorized by the Contracting Officer, all materials shall be of the best quality of their respective kinds. If the Contracting Officer requires that the Contractor submit for prior approval samples of materials proposed for use in the work covered by this

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ARTICLE 8 - MATERIAL AND WORKMANSHIP (Con't.)

contract, the Contractor shall make no commitments for such materials until the submitted sample has been approved by the Contracting Officer.

(c) In the event that public necessity requires the acceptance of articles contracted for but not conforming to the specifications or failing to meet contract guarantees, payment therefor shall be made by the Government subject to a suitable reduction in the fee.

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ARTICLE 9 - TERMINATION BY THE GOVERNMENT

(a) Notice of Termination of Contractor's Right to Proceed. The performance of work under this contract may be terminated by the Government in whole, or from time to time in part, (1) whenever the Contractor shall default in performance, or shall so fail to make progress in the prosecution of the work hereunder as to endanger performance (which shall be considered as a default for purposes of this contract) of this contract in accordance with its terms, and shall fail to cure such fault or failure within a period of ten days (or such longer period as the Contracting Officer may allow) after receipt from the Contracting Officer of a notice specifying the fault or failure, or (2) whenever for any reason the Contracting Officer shall determine any such termination is for the best interests of the Government. If termination of work under this contract is simultaneous with, a part of, or in connection with, a general termination (1) of all or substantially all of a group or class of contracts made by the War Department for the same product or for closely related products, or (2) of war contracts at, about the time of, or following, the cessation of the present hostilities, or any major part thereof, the termination shall not be for the default of the Contractor, unless the Contracting Officer finds that the Contractor is then in gross or wilful default under this contract. Termination of work hereunder shall be effected by delivery to the Contractor of a Notice of Termination specifying whether termination is for the default of the Contractor or at the option of the Government, the extent to which performance of work under the contract shall be terminated, and the date upon which such termination shall become effective.

(b) Certain Obligations of the Contractor. After receipt of a Notice of Termination and except as otherwise directed by the Contracting Officer, the Contractor shall (1) terminate work under the contract on the date and to the extent specified in the Notice of Termination; (2) place no further orders or subcontracts for materials, services or facilities except as may be necessary for completion of such portions of the work under the contract as may not be terminated; (3) terminate all orders and subcontracts to the extent that they relate to the performance of any work terminated by the Notice of Termination; (4) assign to the Government, in the manner and to the extent directed by the Contracting Officer, all of the right, title and interest of the Contractor under the orders or subcontracts so terminated; (5) settle, with the approval or ratification of the Contracting Officer to the extent that he shall require such approval or ratification (which approval or ratification shall be final for all the purposes of this Article), all subcontracts (whether fixed-price or cost-plus-a-fixed-fee), obligations, commitments, liabilities and claims, the cost of which would be reimbursable in accordance with the provisions of this contract in whole or in part; (6) transfer title (to the extent that title has not already been transferred) and deliver to the Government in the manner, to the extent and at the times directed by the Contracting Officer (i) the fabricated or unfabricated parts, work in process, completed work, supplies and other material produced as a part of or acquired in respect of the performance of, the work terminated in the Notice of Termination, (ii) the plans, drawings, information and other property which, if the contract had been completed, would be required to be furnished to the Government, and (iii) the jigs, dies, fixtures, and other special tools and tooling acquired or manufactured

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for the performance of this contract for the cost of which the Contractor has been or will be reimbursed under this contract; (7) use his best efforts to sell in the manner, to the extent, at the time, and at the price or prices directed or authorized by the Contracting Officer, any property (whether or not title thereto has been transferred to the Government for security or otherwise) of the types referred to in subdivision (6) of this paragraph, provided, however, that the Contractor (i) shall not be required to extend credit to any purchaser and (ii) may retain any such property at a price or prices approved by the Contracting Officer, and provided further that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the Government to the Contractor under this contract or shall otherwise be paid in such manner as the Contracting Officer may direct; (8) complete performance of such part of the work as shall not have been terminated by the Notice of Termination; and (9) take such action as may be necessary or as the Contracting Officer may direct for the protection and preservation of property which is in the possession of the Contractor and in which the Government has or may acquire an interest. The Contractor shall proceed immediately with the prosecution of the work required under this contract notwithstanding any delays in connection with the adjustment of the fixed fee in accordance with this Article.

(c) The Contractor and the Contracting Officer may agree upon the whole or any part of the amount or amounts, including an amount with respect to the fixed fee payable under this contract, payable in connection with the Contractor's claim under the contract in the event of the total or partial termination of work pursuant to this Article.

(d) In the event of the failure of the Contractor and Contracting Officer to agree as provided in paragraph (c) upon the whole amount to be paid to the Contractor in connection with the termination of work pursuant to this Article, the Government, but without duplication of any amounts agreed upon in accordance with paragraph (c), shall pay to the Contractor the following amounts:

(1) All costs and expenses reimbursable in accordance with this contract, not previously paid to the Contractor for the performance of this contract prior to the effective date of the Notice of Termination and such of these costs as may continue for a reasonable time thereafter with the approval of or as directed by the Contracting Officer (which approval shall not be unreasonably withheld), provided, however, that the Contractor shall proceed as rapidly as practicable to discontinue such costs.

(2) The cost (so far as not included in payments under subparagraph 1 above) of settling and paying claims either arising out of the termination of work under subcontracts or orders or with respect to any other obligations, commitments and liabilities the cost of which would be reimbursable in accordance with the provisions of this contract or arising in connection with the termination of this contract in whole or in part and properly chargeable to this contract, provided:

(A) Any such claim has been settled by negotiation or otherwise and (1) the Contracting Officer has approved or authorized such settlement in writing or (2) such settlement of a

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fixed-price subcontract or order calls for payment of an amount not in excess of the amount which would be payable under paragraph (b) of the Approved Termination Provision for Use in Fixed Price Orders or Subcontracts for the Manufacture of Supplies under Government War Contracts, as amended by General Regulation No. 6 of the Director of Contract Settlement; or

(B) A final judgment has been rendered against the Contractor by a court of competent jurisdiction determining the liability of the Contractor with respect to any such claim, and the Contractor has (1) given the Contracting Officer prompt notice of the initiation of the proceedings in which judgment was rendered and offered in writing to give the Government complete control of the defense of the proceedings, and (2) diligently defended the suit or, in the event that the Government has assumed control of the defense of the proceedings, rendered such reasonable assistance as has been requested by the Government; and provided further that with respect to a judgment determining the liability of the Contractor under any subcontract or order one of the following conditions is satisfied:

(i) the Contracting Officer has approved in writing such subcontract or order or the provisions of such subcontract or order dealing with the rights of the parties thereto upon its termination in whole or in part;

(ii) such subcontract or order (if fixed price) provides in the event of termination thereof in whole or in part for payments to the subcontractor or supplier of an amount not in excess of the amount which would be payable under paragraph (b) of the Approved Termination Provision referred to in paragraph (d) (2) (A) above;

(3) Any other reasonable cost, approved or ratified by the Contracting Officer (which approval or ratification shall not be unreasonably withheld), incidental to the termination of work under this contract, including legal, accounting, clerical and other costs and expenses (taking into account a reasonable allocation of executive, administrative, and office expenses of the Contractor properly allocable to the termination of such work) incidental to:

(i) termination of subcontracts or orders hereunder;

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(ii) cessation of work in accordance with the Notice of Termination and the determination of the amounts due to subcontractors and other third parties;

(iii) obtaining payment from the Government, but only to the extent reasonably necessary for the preparation and presentation of settlement proposals and cost evidence in connection therewith, provided that termination is not due to default of the Contractor, and;

(iv) protection, disposition, removal, storage, and transportation (including delivery costs into and out of storage resulting from directions of the Contracting Officer), pursuant to paragraphs (b) (7) and (b) (9) hereof, of property in which the Government has or may acquire an interest under this contract (including any Government furnished equipment).

(4) A portion of the fixed fee payable under the contract, determined as follows:

(i) In the event of the termination of this contract at the option of the Government and not for the default of the Contractor, there shall be paid a percentage of the fee equivalent to the percentage of the completion of work contemplated by the contract, less fixed fee payments previously made hereunder.

(ii) In the event of the termination of this contract due to the fault of the Contractor, the Contractor shall be paid a percentage of the fee equivalent to the percentage of the completion of the work contemplated by the contract less ten per cent (10%) and less fixed fee payments previously made hereunder.

If the amount so determined is less than the total payment of fixed fee theretofore made to the Contractor the Contractor shall repay to the Government the excess amount thereof.

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(e) Amendment of Contract to Adjust Fixed Fee in Event of Partial Termination. In case only a part of this contract is terminated the fixed fee payable with respect to the work to be performed shall be equitably adjusted and such adjustment shall be reduced to writing as an amendment to this contract prior to final settlement hereunder.

(f) Partial Payments. The Government shall make advance and partial payments and payments on account, from time to time, of the amounts to which the Contractor shall be entitled under this Article, whether determined by agreement or otherwise, whenever in the opinion of the Contracting Officer the aggregate of such payments shall be within the amount to which the Contractor will be entitled hereunder. Any such partial payment or payments in the discretion of the Contracting Officer, may be made to the Contractor or directly to, or in escrow for, any subcontractor or third party.

(g) Limitations on the Liability of the Government. The obligation of the Government to make any payments under this Article (1) shall be subject to deductions in respect of (i) all unliquidated partial or progress payments, payments on account theretofore made to the Contractor and unliquidated advance payments, (ii) any claim which the Government may have against the Contractor in connection with this contract, and (iii) the price agreed upon or the proceeds of sale of any materials, supplies or other things retained by the Contractor or sold, and not otherwise recovered by or credited to the Government, and (2) in the discretion of the Contracting Officer, shall be subject to deductions in respect of any claim of any subcontractor or supplier whose subcontract or order shall have been terminated as provided in paragraph (b) (3) except to the extent that such claim covers (i) property or materials delivered to the Contractor, or (ii) services furnished to the Contractor in connection with the production of completed articles under this contract.

(h) Contractor's Records. Unless a longer period is otherwise provided for in this contract, or by applicable statute, the Contractor for a period of five years after final settlement under the contract shall make available to the Government at all reasonable times at the office of the Contractor all of its books, records, documents, and other evidence bearing on the costs and expenses of the Contractor under the contract and in respect of the termination of work thereunder.

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ARTICLE 46 APPROVAL

This contract shall be subject to the written approval of The Secretary of War or such individual as said Secretary may designate and shall not be binding until so approved. The date of such approval shall be deemed to be the true date for the purpose of determining all times of performance.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

By /s/ D. O. Armstrong, Major, Air Corps
Contracting Officer

(Official Title)

Two witnesses:

/s/ A. M. Mueller
A. M. Mueller

/s/ R. R. Benzow
R. R. Benzow

CURTISS-WRIGHT CORPORATION
Airplane Division-Buffalo Plant
Contractor

By /s/ Edwin J. Ducayet
Edwin J. Ducayet

New York, New York
Business Address

I, R. E. Winfield; certify that I am the Assistant Secretary of the corporation named as Contractor herein; that Edwin J. Ducayet who signed this contract on behalf of the Contractor was then Representative of said Corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

(Corporate Seal)

/s/ R. E. Winfield
R. E. Winfield, Assistant Secretary

I hereby certify that, to the best of my knowledge and belief, based upon observation and inquiry, CURTISS-WRIGHT CORPORATION who signed this contract for the had authority to execute the same, and is the individual who signs similar contracts on behalf of this corporation with the public generally.

[redacted]

W 33-038-ac-6266
L-16371

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Supplement to Letter
Contract No. W 33-038 ac-6266

CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION-BUFFALO PLANT
Buffalo, New York

File [redacted]

Mcl

[redacted] cancelled

cp 356

MS

Date 10-1-45

[redacted]

APPROVED: 25 May 1945
By Direction of the Secretary of War
under the Provisions of the First War
Powers Act, 1941, and Executive Order
9001, dated 27 December 1941.

DANIEL E. FARR
Colonel, Air Corps
Administrative Assistant
Office of the Chief,
Engineering and Procurement

[redacted]

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2 (attached to 1)

TSBCONT Form No. 6A
(13 Mar 45)

Letter Contract

ARMY AIR FORCES [redacted]
AIR TECHNICAL SERVICE COMMAND TSEPR604/WTB/CLH
OFFICE OF THE DIRECTOR

Supplement to Letter
Contract No. W 33-038 ac-6266

Wright Field, Dayton, Ohio

22 May 1945

NAME: Curtiss-Wright Corporation

ADDRESS: Buffalo 5, New York

By authority of the War Production Board the preference ratings indicated are assigned to the deliveries on the purchase order or contracts

Dear Sirs:

1. An order is hereby placed with you for the furnishing to the Government of the following supplies or services:

Item 1 - AAF Model XA-43 Airplanes, in accordance with Contractor's Specification 9533, dated 15 March 1945, and including all Engineering Drawings and Reports, as follows:

(a) One (1) Static Test Article
(b) Three (3) Flight Test Article

Item 2 - Test Models for the AAF Model XA-43 Airplane in accordance with Exhibit "A" attached hereto and hereby made a part hereof.

Item 3 - One (1) AAF Model TG-180 Aircraft Engine, installed and flight tested on Government-owned AAF Model C-46 Airplane to be loaned to the Contractor in accordance with an appropriate Bailment Agreement.

MX-582

[redacted] is prohibited by law.

2. Except as otherwise expressly provided to the contrary herein, you are directed, upon your acceptance of this order (or upon its approval if required by paragraph 9) to proceed immediately to procure the necessary materials, and to commence the manufacture of the supplies or performance of the services, called for in paragraph 1, and to pursue such work with all diligence to the end that the supplies may be delivered or services performed at the earliest practicable date.

3. All applicable articles (other than the article "Termination at the option of the Government") now required by Federal Law, Executive Order, or War Department Procurement Regulations to be included in contracts for supplies or services of the kind herein described are incorporated herein by reference. There is also incorporated herein by reference the article prescribed by Paragraph 365.1 of War Department Procurement Regulations in effect at the date of this Letter Contract.

4. By your acceptance hereof, you undertake without delay to enter into negotiations with the War Department looking to the execution of a definitive contract which will include all applicable articles then required by Federal Law, Executive Order and War Department Procurement Regulations to be included in contracts for supplies or services of the kind herein described. The definitive contract will also contain a detailed delivery schedule and prices, terms and conditions as agreed to by the parties, which may or may not be at variance with the provisions of this order. It is expected that such definitive contract will be placed with you prior to 1 August 1945

5. You are not authorized to expend or obligate, in furtherance of your performance hereunder, more than $2,919,865.52 in the aggregate. Pending the execution of a defin-

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TSEAONT Form No 6C
(13 Mar 48)

itive contract, each expenditure, order, subcontract or commitment made by you in furtherance of your performance hereunder, if for an amount that shall exceed either five per cent (5%) of the ount last above stated or $25,000.00, whichever is less, for tools, dies, jigs, fixtures, materials, supplies, parts, equipment, engineering assistance or reproduction or other license rights will be subject to written approval by the Contracting Officer. No contract, regardless of the amount, shall be made by you with any other party for furnishing any of the completed or substantially completed articles, spare parts or work herein called for, without the written approval of the Contracting Officer as to sources. Title to all work under this contract, completed or in the course of manufacture or assembly at your plant, shall be in the Government. Title to all tools, dies, jigs, fixtures, materials, supplies, parts and equipment for which you will be entitled to be reimbursed under this contract or under the definitive contract mentioned in paragraph 4 hereof, shall vest in the Government (i) upon delivery to you at any point within the continental limits of the United States or (ii) at any place or time directed by the Contracting Officer. Property accountability shall be in the AAF Property Accountable Officer at your plant or such other officer as may be appointed by the AAF District Supervisor for your District. At the direction of the Contracting Officer, whether given prior to or after any termination of this order, you will transfer or otherwise dispose of such Government owned property to such parties and upon such terms and conditions as the Contracting Officer may approve or ratify. The proceeds of such transfers and dispositions shall be applied in reduction of the cost of the work under this order.

6. **Termination**— (a) In case a definitive contract is not executed by the date specified in paragraph 4 hereof, (or any subsequent date at any time mutually agreed upon) because of the inability of the parties to agree upon a definitive contract, this order will terminate on the stated date or such subsequent date, as the case may be.

(b) The Government may at any time terminate this order in whole or in part for its convenience by giving you written notice of such termination.

(c) In the event of any termination pursuant to either paragraph 6 (a) or paragraph 6 (b) of this order, you and the Contracting Officer will attempt to agree by negotiation upon a settlement estimated by the parties to be the aggregate amount (less payments previously made to you) of the costs incurred by you in the performance of this order and the amounts paid or to be paid by you or for your account in settling with the approval of the Contracting Officer your obligations for commitments made in the performance of this order. In case of termination pursuant to paragraph 6 (b), such negotiated settlement may include a reasonable allowance for profit. Any such negotiated settlement shall be embodied in a Supplemental Agreement.

(d) If you and the Contracting Officer are not able to agree upon such a negotiated settlement within a period after the effective date of the termination (or within such longer period as at any time may be mutually agreed upon), the Government binds itself (without duplication of any of the following payments) to pay (or to have paid) to reimburse you (1) for the costs incurred by you in the performance of this order, (2) for any amounts paid by you or for your account settling with the approval of the Contracting Officer your obligations for commitments made in the performance of this order, and (3) for expenditures (other) and costs incurred by you with the approval of the Contracting Officer after the date of the termination for the protection of Government property and for other necessary purposes in connection with the settlement of this order. In lieu of reimbursing you for expenditures made by you in settling any of your obligations for commitments, the Government, in the discretion of the Contracting Officer, may assume such obligations or any of them. The total of such payments (including all payments previously made), together with the amount of any obligations assumed, shall not exceed the amount specified in the first sentence of paragraph 5. If such termination shall take place pursuant to paragraph 6 (a) of this order no allowance of profit will be made to you. If termination shall take place for the convenience of the Government pursuant to paragraph 6 (b) of this order, such allowance of fee will be made to you with respect to the work done by you prior to the effective date of the termination as the Contracting Officer may find to be reasonable under all the circumstances; [redacted]

(e) The Government will become entitled to any rights under any commitment which it may assume or for the settlement of which it shall have reimbursed you

(f) Any dispute which arises under this paragraph 6 regarding a matter of fact (including any dispute (1) as to whether termination has in fact taken place for the convenience of the Government or because of the inability of the parties to agree upon a definitive contract, or (2) as to the extent of any allowance of a fee in the event of a termination for the convenience of the Government) will be treated and resolved as a dispute under the "Disputes" Article incorporated in this order by reference.

(g) Partial payments on account of any amount admittedly due to you pursuant to this paragraph 6 may be made by the Government at any time in the discretion of the Contracting Officer.

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4 Apr 45 (1 of 2)

SBCONT Form No. 6D
(13 Mar 45)

7. After your acceptance hereof, partial and advance payments, in accordance with regulations from time to time applicable, may be made to you upon your application.

8. Any claim arising under this order may be assigned subject to the terms of the Assignment of Claims Act of 1940 unless the subject matter of this order has been determined to be secret, confidential or restricted, and any claims arising under this order shall be subject to reduction or set off for any indebtedness of the assignor to the United States arising independently of this order.

9. Your acceptance of this order will be indicated by affixing your signature to this letter and two copies thereof and returning the executed original and two executed copies to the Contracting Officer not later than 4 June 1945, such acceptance to constitute this order a contract on the terms set forth herein, subject to the written approval of the Secretary of War or such individual as said Secretary may designate.

10. This instrument is authorized by and has been negotiated under the First War Powers Act, 1941, and Executive Order No. 9001.

11. See paragraph 11 below.

12. See paragraph 12 below.

THE UNITED STATES OF AMERICA

By D. W. Waterbury

D. W. WATERBURY, Major, Ord. Dept.
Contracting Officer

ACCEPTED May 10, 1945

CHARLES BRUNO CORPORATION
(Contractor)

Affix Corporate Seal

By Edmund Kincaid
(Person Signing for Contractor)
President

U. S. Army, Court Square Building,
The Disbursing Officer, 4 Lafayette Street, New York, New York,
is designated as the officer to make payments in accordance with this order.

The amount to be expended by the Government hereunder and chargeable to the following appropriations, the available balances of which are sufficient to cover the same:

Cla/50/0, 501-/150 F 411-09 S 33-[illegible] - $2,[illegible]

11. The Articles entitled "Reproduction and License Rights", [illegible] dated 17 February 1944, (Modified), and "Authorization and Assent [illegible]" B (CPFF) dated 15 July 1944, attached hereto are hereby made a part hereof.

12. Contractor agrees to and does hereby grant to the Government the right to reproduce, use and disclose for any Governmental purposes all [illegible] reports, drawings, blueprints, data and technical information to be delivered by Contractor to the Government under this contract, provided, however, that nothing contained in this sentence shall be deemed to grant a license under [illegible] or hereafter issued.

Point of Inspection and Acceptance and F.O.B. Point: Buffalo, New York
Type Contract (Anticipated): CPFF
Authority for Purchase No.: [illegible]
Priority Rating: [illegible]
Equipment Class: [illegible]
Classification: Confidential
Program: Exp.
Project No. LX-682
Letter Contract (3-b)

Supplement to letter [illegible]
" 30-[illegible]

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Exhibit "A" to Letter Contract Dated 22 May 1945 Designated
Supplement to W 33-038 ac-6266

1. Nacelle model, 1/5-scale, to develop nacelle and wheel fairing, fillets, ducts and duct lips, exit shapes for test in Curtiss 8-foot wind tunnel.

2. Isolated horizontal tail model, 1/4 scale to develop balancing devices, determine effectiveness and hinge moments, for test at M.I.T.

3. High speed tunnel model, approximately 1/8-scale for determining high speed control and stability, aerodynamic loading, and compressibility effects for test at N.A.C.A.

4. Revised stability model, 1/10-scale for further low speed stability and control tests, to be tested at M.I.T. or GALCIT tunnels depending on availability.

5. Two dimensional tunnel model of wing section (two required) for development of flap and aileron, to be tested by N.A.C.A.

6. Isolated empennage model, to be tested at high speed, for detail control surface design to provide satisfactory high speed characteristics, to be tested by N.A.C.A.

7. Half span wing model for tests of flap, aileron, spoilers, and dive flaps, and for development of filleting and nacelle fairing at high speeds, to be tested by N.A.C.A.

8. Flutter model of wing for test in Curtiss 8 foot wind tunnel.

9. Flutter model of horizontal tail and aft portion of fuselage, for test in Curtiss 8-foot wind tunnel.

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Amendment No. 1 to
Letter Supplement to W 33-038 ac-6266

CURTISS-WRIGHT CORPORATION
Buffalo 5, New York

[redacted]

CD-356

bs

10-1-45

APPROVED: 2d June 1945
By direction of the Secretary of War
under the Provisions of the First War
Powers Act, 1941, and Executive Order
9001, dated 27 December 1941.

DANIEL E. FARR
Colonel, Air Corps
Deputy Chief for Procurement
Procurement Division

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ARMY AIR FORCES
HEADQUARTERS, AIR TECHNICAL SERVICE COMMAND

TSHPR6C4:WEB:e-jv
Wright Field, Dayton, Ohio
27 June 1945

SUBJECT: Letter Contract Dated
22 May 1945 Designated
Supplement to # 55-USI ac-[illegible]

Amendment No. 1 to subject Letter Contract

TO: Curtiss-Wright Corporation
Buffalo 5, New York

1. Subject Letter Contract placed an order with you for the supplies or services therein described.

2. It is now desired to amend subject Letter Contract in the following respects:

a. By deleting from Item 1 thereof subparagraphs (a) and (b) and substituting in lieu thereof the following:

(a) One (1) Stripped Flight article
(b) One (1) completely Equipped Flight Article

b. By deleting Item 3 and substituting therefor the following Item 3:

"Item 3 - One (1) AAF Model [illegible] Aircraft Engine installed and ground tested in a ground testing installation.

c. By increasing the amount you are authorized to expend or obligate from $2,[illegible],065.52, as set forth in paragraph 1 thereof, to $5,119,965.52.

3. No costs having been incurred with regard to the quantity of the articles cancelled by this Amendment the Contractor shall not be entitled to any additional sums by reason thereof.

4. If the foregoing is acceptable to you, kindly so indicate by signing three copies of this Amendment and return same to the Contracting Officer forthwith, whereupon subject Letter Contract shall be deemed amended accordingly, subject to the written approval of the Secretary of War or such individual as said Secretary may designate.

5. This Amendment was negotiated under the authority of the First War Powers Act, 1941, and Executive Order No. 9001.

THE UNITED STATES OF AMERICA

BY [signature]
D. C. WAINWRIGHT, Major, Air Corps
(Contracting Officer)

[illegible], 1945

CURTISS-WRIGHT CORPORATION

BY [redacted]
(Official Title)

ATTEST:

AFFIX SEAL

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October 30, 1945
Datum - 849

...ber 22, 1945
...-4266

...Bureau for Curtiss
...N.

...ber 18 and October 22, 1945 with
...erful consideration of
...advise you that we will
...change in the Speci-
...current and at the same time
...cost basis in accordance

...work with the least possible
...ct, reference (b), as amended,
...completion of only one (1)
...units in accordance with pre-
...dated October 1945, as included in
...the Contract when prepared shall be
...mutually being prepared and
...satisfaction of both the Air
...the same time, a detailed
...included in the Contract.

The total amount of money allocated to subject Contract is as follows:

Basic Contract, Phase I	$ 366,791.00
Letter Supplement as amended, Phase II	5,419,865.00
Total Allocated	$5,786,656.00

Of the above stated amount, it is estimated that we have already expended through mid-September, approximately $28,446.00 and that additional expenditures and change-over or termination costs resulting from the change in

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[redacted]

Srb: Contract [redacted]

[redacted]

Specification [illegible] amount to an estimated maximum [illegible],000,000.00 making a total of $976,446,000.00, and leaving an estimated total of $4,000,000.00 available under the Contract.

4. Our estimate of the cost of [illegible] and constructing one (1) airplane in accordance with the purchase [illegible] description, including mock-up and wind tunnel models and testing is $5,056,[illegible],000.00, which amount includes no profit or contingency and is based on definite limitations on the work involved and definite relief on certain requirements as included in this letter. Detailed cost breakdown of the above quoted price is shown on exhibit (A). In general, this price covers work as listed below:

(a) Design and construction of one (1) complete airplane - It being understood that for initial flight test, some of the equipment and armament may be omitted, if it is not needed to determine the initial flying qualities of the airplane. The price, however, includes the later installation of this equipment at the Contractor's Plant.

(b) The construction of one (1) complete mock-up.

(c) The construction of five (5) wind tunnel models as listed in Enclosure (B). The cost of testing models Numbers 1 and 3 has been included in the quotation. The cost of testing models Numbers 2, 3, and 4 has not been included in the quotation and said testing is understood to be furnished by the Government at no cost to the Contractor.

(d) No static test is included in the quotation.

(e) The quotation includes only ten (10) hours of preliminary functional flight test at the Contractor's Plant. The Contractor is not clear as to the desires of the Air Technical Service Command in regard to limitation of flight testing as we do not believe that the airplane after only ten hours of preliminary functional flight testing should be turned over to the Government for further testing. It is to be understood, however, that at this time the proposal as submitted includes only the very limited flight testing and no provision has been made for further testing or changes which might be required as a result of this preliminary testing. It is our opinion that the above furnishes sufficient information to include in the original contract, but that the subject of flight testing in general should be discussed further and any modification of the Contract required as a result of the discussions could be included in a later Supplement. Furthermore, should it be considered necessary to conduct initial flights at some Airport other than at the Contractor's Plant, this shall be the subject of later negotiations.

(f) No flight test instrumentation has been included in the proposal although it is believed that negotiations should be conducted at a later date

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Commanding General [redacted] 4

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Auth: C.G. AAF per
AAF AT&C Report No. CT 356
By: L. C. CRAIGIE, BRIG GENERAL, U.S.A.

must be frozen and any changes therein will be covered by further negotiations.

(d) Many detailed requirements have been established over the last few years, which tend to increase the cost of the construction of airplanes. It is understood that the Government will allow latitude and leniency on such requirements in order to minimize loss by the Contractor as long as safety is not effected.

(e) Special provisions shall be included in the termination clause making allowable, in the event of termination, any costs incurred prior to, as well as after, the above Specification changes.

7. With the large scale termination of work since VJ-Day, this Contractor has of necessity had to revise its plan of operation and we wish to advise that this airplane, in accordance with the revised proposal contained herein, would be constructed in our Columbus, Ohio Plant instead of in Buffalo, New York. It is requested, therefore, that suitable revisions be made in the Contract. Delivery of the airplane, set-up, serviced, and ready for initial flight, at the Contractor's Plant, can be accomplished fourteen (14) months after receipt of firm go-ahead, as proposed in paragraph 2 of this letter.

Respectfully,

CURTISS WRIGHT CORPORATION
Airplane Division - Buffalo Plant

Edwin J. Ducayet
Contract Manager

Enclosure

cc. AAFPR

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Enclosure (A) to Curtiss letter,
EJDrsm - 849 dated October 30, 1945

October 30, 1945

Subj: Contract [illegible]

	Est. Cost 2 Models	Est. Cost Mock-up		Est. Cost 1 Airplane	Total Est. Cost for Project
Material	4,600.00	9,989.00		399,588.00	414,177.00
Labor	18,786.00	54,826.00	1.32	731,016.00	804,628.00
Overhead	31,937.00	106,911.00	19%	1,425,481.00	1,564,329.00
SUB COST	55,323.00	171,726.00		2,556,085.00	2,783,134.00
Engineering Labor @ 1.70	9,520.00		1.70	800,000.00	809,520.00
Engineering Overhead	9,520.00		100%	800,000.00	809,520.00
Tools Material				31,077.00	31,077.00
Tools Labor			1.32	200,155.00	200,155.00
Tools Overhead			19%	390,302.00	390,302.00
Tunnel Tests	15,000.00				15,000.00
Flight Tests				15,332.00	15,332.00
TOTAL COST	89,363.00	171,726.00		4,792,951.00	5,054,040.00

[redacted]

CLASSIFICATION CHANGED To

DEC 1945

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Enclosure (B) to Curtiss letter,
AMDsm - 849 dated October 30, 1945

October 30, 1945

LIST OF PROPOSED AND TYPICAL MODELS FOR
CURTISS-WRIGHT CORPORATION RESEARCH LABORATORY

Model No. 1 — A .14-scale low-speed stability model shall be constructed by the Contractor and tested in the [illegible] Brothers Wind Tunnel or equivalent for the purpose of determining low-speed stability and control characteristics

[illegible] time [illegible]

Model No. 2 — A [illegible] high-speed model shall be constructed by the Contractor and tested in the 24 foot wind tunnel Tunnel for the purpose of determining high speed effects on stability, control, and other aerodynamic characteristics.

Testing time - 500 hours, at Government expense.

Model No. 3 — A high speed semi-span horizontal tail, [illegible] scale, wind tunnel model shall be constructed by the Contractor and tested in the 16 foot high speed wind tunnel of the [illegible] Aeronautical Laboratory for the purpose of determining low-speed control characteristics at high Mach number. Testing time shall be Government furnished.

Model No. 4 — A 2-foot chord airfoil wind tunnel model shall be constructed by the Contractor and tested in the [illegible] tunnel of the Langley Aeronautical Laboratories for the purpose of obtaining optimum flap and aileron position for landing and cruising. Testing time shall be Government furnished.

Model No. 5 — Two 3 inch chord airfoil wind tunnel models shall be constructed by the Contractor and tested in the Curtiss-Wright Corporation Research Laboratory high speed wind tunnel for the purpose of determining airfoil section characteristics and aileron and spoiler characteristics at high Mach number.

Testing time - 200 hours

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QT

WOV V URRR NR 198 WD P P

FROM ATSC WRIGHTFLD OHIO 212326Z

TO CG AAF ATT ACAS-4 WASHDC

GRNC

TSESA-4-11-240 REURTEL AFDMA-1 1037 PD DTD 8 OCT 1945 PD DISCUSSIONS CONDUCTED WITH CURTISS WRIGHT AND PROPOSALS RECEIVED FOR ALL WEATHER FIGHTER TO REPLACE XA-43 PD CURTISS HAS SUBMITTED MODIFICATIONS TO THIS PROPOSAL SO THAT DESIGN IS NOW CONSIDERED SATISFACTORY PD HIGH SPEED IN SEA LEVEL IS 56 MPH HIGHER THAN SPECIFIED IN TENTATIVE MILITARY CHARACTERISTICS PD RADIUS OF ACTION REQUIREMENT AT BEST OPERATION ALTITUDE IS MET CMA BUT RADIUS AT 10000 FEET IS 150 MILES DEFICIENT B THIS DEFICIENCY IS NOT CONSIDERED A SERIOUS DETRIMENT TO THE UTILITY OF THE AIRPLANE AND AT PRESENT STAGE OF THE ART IT IS DOUBTFUL IF HIGH SPEED CAN BE COMBINED WITH LONG RANGE AT LOW ALTITUDE PD TO

EXT. 72332
COPIES SENT TO:
ACTION- AND
INFO-

WA24

QT

WOV V URRR NR 198 WD P P

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TL

TSESA-4-11-240 AFDMA-1 1037 8 1945 XA-43 56 10000 150 XA-43 $500000 XA-43

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1 452.02 10 Aeronautics Planes, Types 1946-47- D.C. [redacted] 27

SAVE

HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

28 NOV 1945

MEMORANDUM FOR THE CHIEF OF AIR STAFF:

SUBJECT: Military Characteristics for Aircraft and Guided Missiles

PROBLEM PRESENTED:

Establish Military Characteristics for types of aircraft required for the Post-War Air Forces.

DISCUSSION:

1. In the Spring of 1945, it became evident that the war would soon be over and that characteristics should be developed for post-war airplanes. After considerable work and coordination with all concerned, new sets of characteristics for bombardment and fighter types of airplanes were issued during July and Aug 1945.

2. In Sep 1945, the Assistant Chief of Air Staff - A raised doubt as to the soundness of certain of these characteristics. Due to this, all characteristics and the program for the Post-War Air Forces were reviewed.

3. Presentations on Military Characteristics of airplanes have been made to the Air Staff, General Spaatz, General Streett and his staff, General Lemay, and to a representative group of senior Ground Forces officers. The consensus of opinion from these presentations was in general agreement in both principle and detail. However, a few specific recommendations for improvements were made, and these have been incorporated in the revised characteristics submitted herewith. General Spaatz and others made three dominant points:

a. All characteristics should be as forward looking as practical.

b. Individual performance items of Military Characteristics should not be lowered to a previously established characteristic as a matter of principle.

c. In order to force development of the greatest effectiveness for the new characteristics should be well beyond present achievements, particularly the [illegible]

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4. In the attached characteristics, bombardment types have been reclassified into three (3) classes: light, medium, and heavy. This is believed necessary in order to stop the endless process of naming newer and heavier types "Super Very Heavy Bomber," "Very Super Very Heavy Bomber," etc. Under this new classification:

a. Light Bombers would have the primary mission of bombing in cooperation with Ground Forces and would be any bomber with less than 1,000 miles combat operating radius at design bomb load (4,000 lbs).

b. Medium Bombers would be the work horse of the Strategic Air Forces, functionally, and would be any bomber with a combat operating radius between 1,000 and 2,500 miles at design bomb load (10,000 lbs).

c. Heavy Bombers would be used in a small VLR force and would be any bomber with a combat operating radius of over 2,500 miles at design bomb load.(10,000 lbs).

5. Separate characteristics for Reconnaissance airplanes are not submitted due to the current policy of adapting bomber and fighter airframes and power plants to fill the specialized needs of Reconnaissance aviation. This policy has been proven sound in the past and there is no apparent reason why it should be altered at this time. Concentration of available funds and effort in the development of the basic types of military aircraft will tend to produce optimum performance in the specialized types such as Reconnaissance airplanes.

6. In view of the stringency of funds, it may not be desirable at this time to actually procure experimental Medium Bombers, Heavy Bombers and perhaps others. We have a very adequate airplane in the B-29 and its successors: B-44, B-45, etc. The B-35 and B-36 will practically meet the requirements in range of the (VLR) Heavy Bomber. The power plants for both airplanes are very far behind the development of airframes and, in addition, we have yet to solve armament, fighter escort, and other problems incident to bomber operations at 5,000 miles radius. It is believed far more advantageous at this time to put available funds into power plants, particularly jet engines, and other developments along lines where we are weakest.

RECOMMENDATIONS:

1. That the attached Military Characteristics be approved and returned to A-3 for processing.

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2. That, as soon as possible consistant with budgetary negotiations, a determination be made of which set of characteristics will be activated for experimental contracts.

1 Incl
Military Characteristics

Hoyt S. Vandenberg

HOYT S. VANDENBERG
Lt. General, U.S.A.
Assistant Chief of Air Staff - 3

Approved: 11/23/45
Lovelace
Lt Gen USA

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HEADQUARTERS ARMY AIR FORCES
ASSISTANT CHIEF OF AIR STAFF - 3
REQUIREMENTS DIVISION

SUBJECT: Military Characteristics of Aircraft. (All-Weather Fighter)

To: Assistant Chief of the Air Staff - 4

The following principal characteristics of the All-Weather Fighter are approved.

ALL-WEATHER FIGHTER AIRCRAFT

A. Class - High performance fighter, capable of diversified operations in all kinds of weather.

B. Mission - The destruction of enemy air forces and of tactical targets under all weather, day and night conditions.

C. Requirements -

1. Performance -

(a)	High speed at 35,000 ft	525 mph
(b)	High speed at Sea Level	550 mph
(c)	Climb to 35,000 ft	12 minutes

Remarks: The above requirements are to be with full internal fuel, normal design armament, radio and accessories installations. War emergency rating may be used to reach the above requirements.

(d) Combat Radius of Action at 10,000 ft - 800 miles
at best operational altitude - 1000 miles

Remarks: Maximum combat radius of action will be based on climb to best operational altitude, then cruise out at best operational altitude to the target and engage in combat over the target for 15 minutes at Military Rating and 5 minutes at War Emergency Rating. Cruise back at best operational altitude and arrive over home base with fuel for 30 minutes operation at minimum consumption at an altitude of 5,000 ft. Combat radius of action at 10,000 ft will be based on climb to 10,000 ft, then cruise out 500 miles and return at 10,000 ft, and arrive over home base with fuel for 30 minutes operation at minimum consumption at an altitude of 5,000 ft. The above requirements are to be met under the same load conditions as specified for high speed and climb, with the addition of the necessary external fuel to realize the combat radius of action.

(e) Performance priorities - If after all requirements have been met, additional performance can be realized, it is desired that consideration be based on: (a) more speed and (b), more range.

(f) Flying characteristics - The highest degree of controllability and maneuverability possible is desired. Ability to accomplish sustained dives at steep angles is required throughout the altitude operating range.

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2. Armament -

(a) Automatic Rocket Fire - To meet future requirements for fighter aircraft, a rocket installation completely housed with in the aircraft capable of automatically firing high velocity rockets which are suitable for air-to-air and air-to-ground combat shall be developed.

(b) Guns - The minimum requirement for aircraft weapons is a gun with the reliability and ease of maintenance of the caliber .50 M-3, and with the ballistic characteristics and destructive ability of the caliber .50. Guns will be flexibly mounted so as to provide 15° of movement in any direction from the longitudinal axis of the airplane. Automatic gun-laying will be incorporated to provide master control for all guns firing in the same direction. A minimum of four forward firing guns and two rearward firing guns is required. Aircraft should be designed and constructed to permit the interchangeability of installation between caliber .50 or comparable guns, and the 20mm cannon.

(c) Ammunition - Sufficient ammunition to provide twenty seconds of fire per gun for forward firing guns and ten seconds of fire per gun for rearward firing guns is required.

3. Gunsight - The best available computing and automatic ranging gunsight which is adaptable for use in connection with air-to-air firing, air-to-ground firing, dive bombing and rocket firing is required.

4. Ground Attack Installations - Provisions are required for the installation of a minimum of two bombs in all standard sizes up to 1000 lbs. Provisions shall also be made for the installation of a minimum of eight rockets. Consideration should be given to the versatility of these and other ground attack installations in conjunction with the external fuel tank provisions so that as many alternate combinations as possible may be used.

5. Armor - The crew shall be protected from .50 cal armor piercing fire from the front and at all angles not greater than 10° to the longitudinal axis of the airplane, except as follows: with the airplane in a normal attitude of horizontal flight, windshield armor glass need only extend upward to a position where the average pilot's head will be protected from forward horizontal fire when sitting in the normal position against the back of the seat with the shoulder straps fastened. The crew shall be protected from .50 cal armor piercing fire from the rear at all angles not greater than 30° to the longitudinal axis of the airplane. The mission of the airplane demands that engineering be undertaken to provide flak and splinter protection to the extremely vulnerable portions of the power plant. Provisions will also be made for the installation of removable bottom armor for protection of the pilot and the power plant.

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6. Crew - Pilot and radar observer.

7. Fuel -

(a) Internal - All internal fuel will be in tanks capable of self-sealing with the type of fuel carried.

(b) External - Total fuel required externally for maximum combat radius of action problems will be only that amount required to climb to altitude from points of take off and cruise to initial arrival over target. There will be provision for carrying external fuel at a sufficient number of bomb suspension points to meet maximum combat requirements. Such provisions must be capable of use at all operational altitudes.

8. Equipment -

(a) Cabin pressurization - Automatic pressurization will be provided and maintained at a safe differential of pressure.

(b) Automatic pilot - An automatic pilot is required.

(c) Oxygen system - A pressure demand system will be installed in accordance with existing specifications.

(d) Crew comfort -

(1) Provision for at least one quart of thermos contained liquid foods is required for each crew member of aircraft assigned to missions of four to six hour duration. Provisions of two quarts per crew member is required for aircraft assigned to missions of more than six hours duration. These containers will be mounted with hose "leads" for dispensing of the liquids to the crews.

(2) A hammock type seat, or seat of equivalent comfort, with arm rests, is required.

(3) Provisions shall be made for maximum extension of the pilots legs for comfort.

(4) An adequate crew relief system will be provided.

(e) Radio - The latest type of communications and radar equipment suitable for this type aircraft will be installed. Facilities required are as follows:

(1) Ground-to-air and air-to-air communications.
(2) Long range navigational equipment.
(3) Identification friend or foe.
(4) Warning, interception and short range navigational equipment.
(5) Air controlled blind landing equipment.

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(f) Camera - A gun camera and radar scope camera will be installed.

(g) Instruments - All instruments necessary for the proper performance of the mission of the aircraft are required. Consideration will be given to wind screen projection of all the instruments that are necessary when tracking an enemy aircraft under instrument flying conditions.

(h) Heating system -

(1) An air conditioning system is required for the pilot and the radar observer compartments.

(2) Heating of all airfoil surfaces (except propellers) sufficient to keep these surfaces free from ice formations is required. Propeller deicers are required on all aircraft using propellers.

(i) Flight brake - A means of rapid deceleration of aircraft upon closure with the enemy will be provided.

(j) Crew escape - Provision for emergency ejection of crew members will be considered.

(k) Taxi light - A taxi light will be installed.

(l) Fire extinguisher - A fire extinguishing system will be provided.

9. Structure and Design Features -

(a) Visibility - The forward downward visibility over the nose when the pilot's eye is aligned with the gunsight will not be less than 12°.

(b) Aircraft will be capable of being towed through the nose gear.

(c) Maintenance - Ease of field maintenance, repair, and replacement of parts will receive major consideration. Design and construction of the aircraft should be such that the time required to change a single power unit under field conditions shall not exceed one hour. Conduits and control systems shall be arranged and designed so that they may be connected and disconnected quickly.

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(d) Consideration should be given to the incorporation of suitable mounting facilities for attaching rocket boost units for assisted take-off. These mounting mechanisms should contains a device for quick release of the rocket units by the pilot; they should furthermore be automatically recessible into the aircraft structure upon release of the rocket units.

(e) Fire prevention - Emphasis must be placed on reduction of fire hazards through engineering design. Fire extinguishing systems must be easily operated in flight to control engine fire. A maximum reduction of fire probability through battle damage must be attained by careful engineering.

(f) Simplicity of design and suitability to quantity production should be emphasized.

FOR THE COMMANDING GENERAL:

Alfred R. Maxwell

ALFRED R. MAXWELL
Brigadier General, United States Army
Chief, Requirements Division
Office of Asst Chief of Air Staff - 3

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TSEGA-4/GET:hw
Ext. 3-3124

28 November 1945

PRIORITY

A.T.S.C.

ACAS-4

GEORGE E. PRICE, Col., A.C.
Chief, Airc. Proj. Section

TSEGA-4-11-280 CONTRACT W33-038-AC-6266. SUPPLEMENTING CURTEL TSEGA-4-11-240 DATED 21 NOVEMBER 1945 ON THE SUBJECT OF CONVERSION OF THE CURTISS-WRIGHT CONTRACT W33-038-AC-6266 FROM THE ZA-43 TO THE ALL WEATHER FIGHTER, THE FOLLOWING PERTINENT INFORMATION IS SUPPLIED. FIRST, AS SET FORTH IN CURTEL TSEGE-2-9-52 DATED 10 SEPTEMBER 1945, THE ENGINEERING DIVISION DOES NOT DESIRE TO CONTINUE THE ZA-43 PROJECT FOR THE FOLLOWING REASONS. THIS PROJECT WAS INITIATED WITH ACCEPTION OF SOME COMPROMISE IN RANGE AND BOMB LOAD. SUBSEQUENT INFORMATION ON WINDMILLING DRAG OF JET UNITS TOGETHER WITH A CORRECTION IN THE METHOD WHICH WAS USED IN RANGE CALCULATION, FURTHER REDUCED THE RANGE OF THE ZA-43 TO 500 MILES BELOW AAF MINIMUM ESTABLISHED IN MILITARY CHARACTERISTICS FOR ATTACK AIRPLANES DATED 17 NOVEMBER 1944. THE RANGE FALLS APPROXIMATELY 1000 MILES SHORT OF MILITARY CHARACTERISTICS FOR ATTACK AIRPLANES DATED 23 JULY 1945, WHICH WERE BEING PROPOSED BY GCAR AT THE TIME [illegible] CELLATION OF THE PROJECT WAS REQUESTED. THE COMPLETION OF THIS PROJECT WOULD REQUIRE APPROXIMATELY ONE-FOURTH OF THE REMAINING 1946 FUNDS ALLOCATED FOR DEVELOPMENT OF BOMBARDMENT TYPE AIRCRAFT. IN THE LIGHT OF THE COMPROMISES AND EXPENDITURES INVOLVED, IT IS NOT BELIEVED THAT THE ZA-43 AIRPLANE REPRESENTS SUFFICIENT IMPROVEMENT IN THE ART OF AIRPLANE DESIGN TO WARRANT CONTINUATION OF THE PROJECT. SECONDLY, A CONSIDERABLE PORTION OF THE ENGINEERING DESIGN AND MOCK-UP ALREADY ACCOMPLISHED ON THE ZA-43 CAN AND WILL BE

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Contract W33-038-AC-6266
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33-038 (AC-6266)

TRSM-4/CURTISS

28 November 1945

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CONT'D. APPLIED TO THE PROPOSED ALL WEATHER FIGHTER. THIS IS POSSIBLE DUE TO THE FACT THAT THE ALL WEATHER FIGHTER CONFIGURATION IS BASICALLY A SCALED-DOWN VERSION OF THE XA-43 PLUS THE FACT THAT A NUMBER OF ITEMS SUCH AS STRUCTURAL, AERODYNAMIC, MECHANICAL, PERFORMANCE AND WEIGHT STUDIES ARE DIRECTLY APPLICABLE AND COMMON TO BOTH TYPES. THE PROPOSED MILITARY CHARACTERISTICS FOR AN ALL WEATHER FIGHTER ARE MET BY THE CURTISS PROPOSAL WITH THE EXCEPTION OF RADIUS OF ACTION AT 10,000 FEET WHICH IS APPROXIMATELY 150 MILES SHORT. IT IS NOT BELIEVED BY THE ENGINEERING DIVISION THAT THIS DEFICIENCY IN RADIUS AT ONE ALTITUDE WOULD PRESENT ANY SERIOUS PROBLEMS. THE ENGINEERING DIVISION IS SATISFIED TECHNICALLY WITH THE PROPOSED ALL WEATHER FIGHTER. THIRDLY, IT IS A DEFINITE FINANCIAL ADVANTAGE TO THE RESEARCH AND DEVELOPMENT PROGRAM TO AMEND THE EXISTING CONTRACT TO CALL FOR AN ALL WEATHER FIGHTER INSTEAD OF THE XA-43. THIS PROCEDURE WOULD RESULT IN OBTAINING AN ALL WEATHER FIGHTER WITHOUT AN OUTLAY OF FISCAL YEAR 1946 FUNDS, WHICH IS IMPOSSIBLE UNDER THE CURTAILED RESEARCH AND DEVELOPMENT PROGRAM. IT IS EVIDENT FROM THE ABOVE THAT REVISING THE EXISTING CURTISS CONTRACT PRESENTS THE OPPORTUNITY TO PROCEED WITH AN ALL WEATHER FIGHTER NOT OTHERWISE POSSIBLE. THEREFORE, AUTHORIZATION TO PROCEED ALONG THESE LINES IS REQUESTED. SIGNED ENGINEERING DIVISION.

Copies for
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AC43-4
Mr. Bentsen & D-2

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1 45.AV Changes to Specifications-Planes 1941-42, Vol I [redacted] 25

SAVE

HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

DEC 1945

MEMORANDUM FOR AC/AS-4:

SUBJECT: Military Characteristics for Aircraft.

1. Attached hereto are new "Military Characteristics for Aircraft".

a. Your attention is invited to the new classifications for aircraft, particularly bombers, and the descriptive terminology used, as follows:

(1) Heavy Bomber: A high speed, high altitude, long range, land airplane. Heavy Bombers would be used in a small VLR force and would be any bomber with a combat operating radius of over 2,500 miles at design bomb load (10,000 lbs).

(2) Medium Bomber: A high speed, high altitude, medium range, land airplane. Medium Bombers would be the work horse of the Strategic Air Forces, functionally, and would be any bomber with a combat operating radius between 1,000 and 2,500 miles at design bomb load (10,000 lbs).

(3) Light Bomber: A high speed, high altitude, land airplane. Light Bombers would have the primary mission of bombing in cooperation with Ground Forces and would be any bomber with less than 1,000 miles combat operating radius at design load (4,000 lbs).

(4) Interceptor Fighter: A high speed, high performance, high altitude, land airplane.

(5) All Weather Fighter: A high performance fighter, capable of diversified operations in all kinds of weather.

(6) Penetration Fighter: A high performance, all purpose, day fighter.

(7) Medium Helicopter: A low speed, medium range helicopter.

(8) Heavy Helicopter: A low speed, long range helicopter.

[redacted]

ADDRESS REPLY TO COMMANDING GENERAL, ARMY AIR FORCES, WASHINGTON 25, D. C.

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Memo for AC/AS-4, subj: "Mil. Characteristics for Aircraft"

(9) Rescue Transport: A high performance, long range land airplane.

(a) Light Helicopter (Airborne): A low speed, short range helicopter.

b. The above listed classifications of aircraft will be considered standard for future reference.

2. These characteristics have been approved by the Chief of Air Staff. (see Incl 1).

3. The following "Military Characteristics for Aircraft", previously issued are voided for all future development purposes:

a. For Heavy Bombardment Aircraft, dated 12 October 1939; 25 April 1944; 17 November 1944; and 23 July 1945.

b. For Medium Bombardment Aircraft, dated 23 July 1945.

c. For Attack Type Aircraft, dated 17 November 1944, and 23 July 1945.

d. For Day Fighter, dated 15 July 1944, and revised 11 Sept. 1944.

e. For Night Fighter Aircraft, dated 23 August 1944.

4. Your attention is further invited to recommendation No. 2 of the attached Memorandum to the Chief of Air Staff.

Alfred R. Maxwell
ALFRED R. MAXWELL
Brig General, USA
Chief, Requirements Division
Office of Assistant Chief of Air Staff-3

1 Incl:
Memo for the C/AS, dated 23 Nov 45, subj: Mil char for Aircraft and Guided Missiles, w/9 incls as indicated in Para 1a.

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Request for Re-Allocation of Funds

Budget and Fiscal Office

1

AC/AS-4, Research and Engineering Division Gen. Crawford/MhL/bkw/3563

1. As a result of information obtained from tactical commanders subsequent to the end of hostilities, it has been determined that the XA-43 is now obsolete in comparison with other attack type aircraft such as the proposed XA-44. However there is now a definite need for an all weather fighter. At the present time there is no contract for such a fighter but the Curtiss XP-87 proposal which utilizes some of the work already done on the XA-43 does satisfy this new requirement.

2. Curtiss is willing to enter into a fixed price contract for one (1) XP-87 airplane, models and data, without increase in amount of funds presently allocated on the XA-43 letter contract in spite of the fact that $700,000 has already been spent on the XA-43 and that their price analysis indicated they will lose approximately $500,000 on the new contract.

3. It appears that conversion of the unexpended portion of the funds allocated for the XA-43 to the purchase of the XP-87 would save the government the $700,000 already spent. In addition, this is the only method by which the all-weather fighter requirement can be fulfilled as all funds in the 1946 budget have already been allocated.

4. In view of the foregoing discussion, it is requested that approval be given tc entering into a new contract with Curtiss for XP-87 utilising the unexpended portion of the 1945 funds now allocated for purchase of the XA-43.

ALDEN R. CRAWFORD
Brigadier General, U.S.A.
Chief, Research & Engineering Div.
Office of Asst. Chief of Air Staff-

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1 P-87 Experimental 16
Air. Br., Eng. Div.
R+D, Material

Request for Re-Allocation of Funds

AC/AS-4, Research and Engineering Division 19 Dec 45

2
Budget and Fiscal Office Col White/lmh 2259

1. This office has been notified informally by BOWD that concurrence in the proposal as submitted cannot be granted. Formal reply will follow.

2. The cancellation of contracts involving prior years funds and the utilization of unexpended balances for new contracts in the current fiscal year is contrary to War Department policy. Such action would be definitely construed as circumventing the intent of Congress in making appropriations for a specific fiscal year.

3. However in the subject case, since it involves a single contractor, there appears to be no objection to issuing a change order on the XA-43 contract to secure the XP-87 airplane, thereby effecting a more economical use of Government funds and at the same time securing an airplane with advanced performance specifications.

4. It is therefore recommended that change order be written on the present XA-43 contract to cover the proposal as outlined in Comment #1.

E. H. WHITE
Colonel, Air Corps
Deputy Chief
Budget and Fiscal Office

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XPF 7 Experimental 15

Aviation Engineering
R+D Materiel

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MOTTER AC/AS-4, RESEARCH & ENGINEERING DIVISION

28 DECEMBER 1943 Capt. A. E. Ferry/mrc

1

COMMANDING GENERAL, AIR TECHNICAL SERVICE COMMAND
WRIGHT FIELD, DAYTON, OHIO

SUBJECT IS XA-44 AND XP-67 PROJECTS. FOR THEIR SOON CRAWFORD HICKEY ARNOLD. PROPOSED REALLOCATION OF THE XA-46 AND XA-43 FUNDS FOR PROCUREMENT OF MAJESTIC AIRCRAFT UNDER A NEW CONTRACT IS RECOMMENDED. MOTTER, AUTHORIZATION IS GRANTED TO UTILIZE PRESENTLY UNSPENT FUNDS OF THE XP-46 AND XA-43 CONTRACTS ON THE SUBJECT PROJECTS BY CHANGE ORDERS. BY THIS METHOD A XA-44'S MAY BE PROCURED IN LIEU OF 2 XA-43'S ON THE PRESENT XA-43 CONTRACT AND 1 XP-67 IN LIEU OF THE XA-43 ON THE XA-43 CONTRACT.

ALFRED J. CRAWFORD, BRIGADIER GENERAL, USA

AFDSC-4 AFDSC-2 AFDSC

[redacted]

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ATSC Form No. 80.502 (2 NOV 44)

1 JAN 45-2M

Major R. H. Mott
TSTEX/ced (5-4141)

R F [redacted]

ARMY AIR FORCES
HEADQUARTERS
AIR TECHNICAL SERVICE COMMAND

Wright Field,
Dayton, Ohio
28 December 1945

TECHNICAL INSTRUCTIONS

SERIAL NO: TI-2087

SUBJECT: Procurement of XP-87's

TO: Engineering Division

1. Problem Presented:

a. To procure one (1) XP-87 airplane in lieu of the remaining XA-43 airplanes by change order on the present contract for the procurement of XA-43 airplanes, utilizing the present unspent funds of the contract.

2. Factual Data:

a. Proposed reallocation of the XA-43 funds for procurement of the subject aircraft under a new contract is disapproved.

b. Authorization has been granted to utilize presently unspent funds of the XA-43 contract on the subject project by change order.

3. Authority:

a. CG, AAF. By WAR 90317, subject: "XA-44 and XP-87 Projects", dated 27 December 1945, received from Crawford signed Arnold, Wash.

4. Action Desired:

a. That the Engineering Division accomplish that which is stated in Paragraph 1, Problem Presented, above.

b. These Technical Instructions supersede and cancel TI-2113, Add. #1.

c. This project carries a 2-C priority.

By command of Lieutenant General TWINING:

C. E. THOMAS, Jr.
Brigadier General, U.S.A.
Chief of Administration

cc: Procurement Division
Maintenance Division
Supply Division
Flight Test Division

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HqATSC Form No. 10-514 (Rev 1 May 45)

SAVE PAPER

HEADQUARTERS
ARMY AIR FORCES
AIR TECHNICAL SERVICE COMMAND

WRIGHT FIELD, DAYTON, OHIO

REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO ATTENTION OF FOLLOWING OFFICE SYMBOL.

SUBJECT:

TO:

3,000,000.00

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GENERAL CRAWFORD

24 January 1946

Major Bussey/bkw/6210

Fighter Aircraft Development Funds
Including XA-43

1. ~~One~~ Letter contract for Phase 1 of Curtiss XA-43 project was issued on 20 November 1944 for $353,800 plus $13,000 fixed fee or a total of $366,800. Final contract was a proved 24 ~~November~~ May 1945.

2. Letter contract for Phase 2 of the XA-43 was issued on 25 May 1945 for approximately $8,500,000 for three (3) flight and one (1) static test articles. At this time only $5,500,000 was available for this project from 1945 funds and it was anticipated that the additional $3,000,000 would come from 1946 funds. An advance payment of $2,916,865 was made at that time.

3. Subsequent supplement to the letter contract for Phase 2 reduced the amount of this contract to $5,500,000 for two (2) flight articles, one (1) with complete equipment and one (1) stripped.

4. With regard to finances for Curtiss XP-87, $4,300,000 is still available from the $5,500,000 initially set up for the XA-43 contract. It is planned to obtain one (1) XP-87 flight article for this money. Wright Field presently anticipates an expenditure of $2,800,000 for a second XP-87, making a total of $7,600,000 for two (2) XP-87's.

5. $6,500,000 is set up from 1946 funds for a second all weather fighter of the XP-87 category. Two (2) flight articles are to be obtained for this amount. The reduced cost over the XP-87 is partially explained by the fact that the XP-87 will be the work hours and ideas pertaining to the particular problems involved in this new and specialized airplane can be applied to this newer proposal. WH

6. Wright Field is considering two (2) penetration fighters from 1946 funds. The first of these fighters will be the best fighter from the present competition and it is anticipated that a full fledged contract in the amount of approximately $5,000,000 will be let for two (2) flight articles. The second penetration fighter will be the No. 2 airplane in the present competition and it is anticipated a contract will be let for only Phase 1 for approximately $375,000. It is believed this

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GENERAL CRAWFORD

24 January 1946
Major Bussey/bkw/6210

Fighter Aircraft Development Funds
Including AA-43

second contract will be extended to include two (2) flight articles when 1947 funds become available. With respect to the interceptor airplanes, consideration is also being given by Wright Field to the issuance of two (2) or three (3) Phase 1 contracts from 1946 funds for approximately $300,000 each. These airplanes will be the best of the present interceptor competition and it is anticipated that at least two (2) of these contracts will be extended to include flight articles from 1947 funds.

7. The above monies for fighter aircraft development may not agree with those which you have on your sheet. The Fighter Branch of the Aircraft Projects Section at Wright Field from whom these figures were received state that they have been subject to considerable revision but that they are the latest figures to date.

JACK A. GIBBS
Colonel, Air Corps
Chief, Aircraft Branch

[redacted]

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[redacted]

[illegible] Ltd. [illegible]

[illegible] Secretary, [illegible]

To: [illegible] Telecommunication Service Limited, [illegible]
[illegible] (Attention: [illegible])

1. Authority is hereby granted to procure a second [illegible] circuit from the Montreal via Sept-Iles to the [illegible] as outlined in the above letter.

[illegible] A. [illegible]

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File 41 [redacted] F

HEADQUARTERS
AIR TECHNICAL SERVICE COMMAND

SUBJECT: Supplement, dated 22 May 1945, to Letter Contract designated Contract No. W 33-038 ac-6266

TSERPS3B:RCH:jba
Wright Field, Dayton, Ohio
4 January 1946

TO: Curtiss-Wright Corporation
(Airplane Division)
Columbus 16, Ohio

Amendment No. 6 to Supplement, dated 22 May 1945, to Letter Contract W 33-038 ac-6266

1. Subject Supplement, as heretofore amended, placed an order with you for the supplies or services therein described.

2. It is now desired to amend the subject Supplement, as heretofore amended, in the manner and to the extent provided in Exhibit "A" hereto.

3. If the foregoing is acceptable to you, kindly so indicate by signing the original and two (2) copies of this Amendment and return the same to the Contracting Officer forthwith, whereupon subject Supplement shall be deemed amended accordingly.

4. This Amendment has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act 1941 and Executive Order No. 9001, December 27, 1941.

THE UNITED STATES OF AMERICA

BY: [signature]
D. K. Mac LEMAN, Major, Air Corps
(Contracting Officer)

ACCEPTED Jan 31, 1946

CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION)
(Contractor)

[AFFIX CORPORATE SEAL]

BY: [signature]
(Name and Official Title)
E. J. Duvayet, Contracts Manager
Representative

[redacted]

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Ltr. 41

JAN 31 1946

EXHIBIT "A"
TO
SUPPLEMENT, DATED 22 MAY 1945,
TO LETTER CONTRACT NO. W 33-038 AC-6266

Article I - The subject Supplement, as heretofore amended, is hereby further amended by deleting paragraphs 1 to 12, inclusive, thereof, the point of inspection and acceptance and f.o.b. point specified therein, and the description of the type contract contemplated appearing therein, and by inserting in lieu thereof the following comprising paragraphs 1 to 11, inclusive, a specification of the point of inspection and acceptance and f.o.b. point and the description of the type contract contemplated, it being understood that, except as provided in Articles II and III of this Exhibit, the rights and obligations of the Government and the Contractor shall be the same as if paragraphs 1 to 12, inclusive, of the subject Supplement, as heretofore amended, the designation of the point of inspection and acceptance and f.o.b. point and the description of the type contract contemplated had originally been written as now amended, viz:

"1. An order is hereby placed with you for the furnishing to the Government of the following supplies or services:

See Exhibit 'I' attached hereto and hereby made a part hereof.

"2. Except as otherwise expressly provided to the contrary herein, you are directed, upon the effective date of this Letter Contract, as originally written, to proceed immediately to procure the necessary materials, and to commence the manufacture of the supplies or performance of the services, called for in paragraph 1 and to pursue such work with all diligence to the end that the supplies may be delivered or services performed at the earliest practicable date.

"3. All applicable articles (other than the article 'Termination at the option of the Government') now required by Federal Law, Executive Order, or War Department Procurement Regulations to be included in contracts for supplies or services of the kind herein described are incorporated herein by reference. There is also incorporated herein by reference the article prescribed by Paragraph 365.1A of War Department Procurement Regulations in effect at the date of this Supplement.

"4. By your acceptance hereof, you undertake without delay to enter into negotiations with the War Department looking to the execution of a definitive contract which will include all applicable articles than required by Federal Law, Executive Order and War Department Procurement Regulations to be included in contracts for supplies or services of the kind herein described. The definitive contract will also contain a detailed delivery schedule and prices, terms and conditions as agreed to by the parties, which may or may not be at variance with the provisions of this order. It is expected that such definitive contract will be placed with you prior to 1 March 1946.

"5. You are not authorized to expend or obligate, in furtherance of your performance hereunder, more than $5,419,865.52 in the aggregate. Pending the execution of a definitive contract, each expenditure, order, subcontract

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43 Attach 2 a

or commitment made by you in furtherance of your performance hereunder, if for an amount that shall exceed either five per cent (5%) of the amount last above stated or $25,000.00, whichever is less, for tools, dies, jigs, fixtures, materials, supplies, parts, equipment, engineering assistance or reproduction or other license rights will be subject to written approval by the Contracting Officer. No contract, regardless of the amount thereof, shall be made by you with any other party for furnishing any of the completed or substantially completed articles, spare parts or work herein called for, without the written approval of the Contracting Officer as to sources.

"6. Termination - (a) In case a definitive contract is not executed by the date specified in paragraph 4 hereof, (or any subsequent date at any time mutually agreed upon) because of the inability of the parties to agree upon a definitive contract, this order will terminate on the stated date or such subsequent date, as the case may be.

"(b) The Government may at any time terminate this order in whole or in part for its convenience by giving you written notice of such termination.

"(c) In the event of any termination pursuant to either paragraph 6 (a) or paragraph 6 (b) of this order, you and the Contracting Officer will attempt to agree by negotiation upon a settlement estimated by the parties to be the aggregate amount (less payments previously made to you) of the costs incurred by you in the performance of this order and the amounts paid or to be paid by you or for your account in settling with the approval of the Contracting Officer your obligations for commitments made in the performance of this order. In case of termination pursuant to paragraph 6 (b), such negotiated settlement may include a reasonable allowance for profit. Any such negotiated settlement shall be embodied in a Supplemental Agreement.

"(d) If you and the Contracting Officer are not able to agree upon such a negotiated settlement within 90 days after the effective date of the termination (or within such longer period as at any time may be mutually agreed upon), the Government binds itself (without duplication of any of the following payments or of payments previously made) to reimburse you (1) for the costs incurred by you in the performance of this order, (2) for any amounts paid by you or for your account in settling with the approval of the Contracting Officer your obligations for commitments made in the performance of this order, and (3) for expenditures made and costs incurred by you with the approval of the Contracting Officer after the date of the termination for the protection of Government property and for other necessary purposes in connection with the settlement of this order. In lieu of reimbursing you for expenditures made by you in settling any of your obligations for commitments, the Government, in the discretion of the Contracting Officer, may assume such obligations or any of them. The total of such reimbursement (and of all payments previously made), together with the amount of any obligations assumed, shall not exceed the amount specified in the first sentence of paragraph 5. If such termination shall take place pursuant to paragraph 6 (a) of this order no allowance of profit will be made to you. If termination shall take place

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for the convenience of the Government pursuant to paragraph 6 (b) of this order, such allowance of profit will be made to you with respect to the work done by you prior to the effective date of the termination as the Contracting Officer may find to be reasonable under all the circumstances.

"(e) The Government may permit you to sell or retain at prices or on terms agreed to by the Government any equipment, completed supplies, materials or work in process and the proceeds of any such sale, or such agreed prices, shall be paid or credited to the Government in such manner as the Contracting Officer may direct.

"(f) Upon payment or reimbursement to you pursuant to paragraph 6 (c) or 6 (d) of this order, title to all equipment, completed supplies, work in process, materials, plans, information, and other things, for which you are so paid or reimbursed (except such property as may be sold or retained by you as above provided) will vest in the Government (if title thereto has not already become vested in the Government). The Government will also become entitled to any rights under any commitment which it may assume, or for the settlement of which it shall have reimbursed you.

"(g) Any dispute which arises under this paragraph 6 regarding a matter of fact (including any dispute (1) as to whether termination has in fact taken place for the convenience of the Government or because of the inability of the parties to agree upon a definitive contract, or (2) as to the extent of any allowance of a profit in the event of a termination for the convenience of the Government) will be treated and resolved as a dispute under the 'Disputes' article incorporated in this order by reference.

"(h) Partial payments on account of any amount admittedly due to you pursuant to this paragraph 6 may be made by the Government at any time in the discretion of the Contracting Officer.

"7. After your acceptance hereof, partial and advance payments, in accordance with regulations from time to time applicable, may be made to you upon your application.

"8. Any claim arising under this order may be assigned subject to the terms of the Assignment of Claims Act of 1940 unless the subject matter of this order has been classified as secret, confidential or restricted, and any claims arising under this order shall not be subject to reduction or set off for any indebtedness of the assignor to the United States arising independently of this order.

"9. This instrument is authorized by and has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

"10. The Articles entitled 'Reproduction and License Rights', Para Form 1B, dated 17 February 1944 (Modified), and 'Authorization and Assistance'

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Para Form No. 10C, dated 5 April 1945, attached hereto are hereby made a part hereof.

"11. The Contractor agrees to and does hereby grant to the Government the right to reproduce, use and disclose for any Governmental purpose all or any part of the reports, drawings, blueprints, data and technical information to be delivered by the Contractor to the Government under this contract; provided, however, that nothing contained in this sentence shall be deemed to grant a license under any patent now or hereafter issued.

Point of inspection and acceptance and f.o.b. point: Columbus, Ohio.
Type contract contemplated: Fixed Price."

Article II- Nothing contained in this Amendment No. 6 shall invalidate or create any default with respect to any action taken or omitted to be taken by either party in the performance of or in connection with the subject Supplement, as amended (including, without limiting the generality of the foregoing, any use by the Contractor of any Government bills of lading and/or any transmission by the Contractor of telegrams, cablegrams and radiograms at Government rates) which action or omission to act was at the time proper under the provisions of the subject Supplement, as amended, applicable thereto. Any of the articles called for under Article I of this Amendment No. 6, which prior to the date of said Amendment have been furnished by the Contractor to the Government in accordance with the subject Supplement, as amended, shall be deemed to have been delivered under Article I above, if called for thereby. Under the terms of this Amendment No. 6, the Government releases to the Contractor, subject to the provisions of Article I above, all right, title and interest acquired under the provisions of paragraph 5 of the subject Supplement, as originally written, in and to all tools, dies, jigs, fixtures, materials, supplies, parts and equipment referred to in said paragraph 5, excluding, however, such property as shall have been or shall be incorporated in supplies delivered to and accepted by the Government.

Article III- Nothing contained in this Amendment No. 6 shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies or perform any work, as to which a Notice of Termination is in effect at the effective date of this Amendment, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for by this Amendment or otherwise referred to herein; provided, however, that any such Notice of Termination shall be deemed to have been issued under the subject Supplement, as heretofore amended, and as amended by this Amendment No. 6.

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attach to #3

EXHIBIT "I"
TO
SUPPLEMENT, DATED 22 MAY 1945,
TO LETTER CONTRACT NO. W 33-038 AC-6266

(a) Item 1 - As described in Item 1 of subject Supplement, dated 22 May 1945, to Letter Contract No. W 33-038 ac-6266, as amended by Amendment No. 1 thereto, provided, however, that all work under this Item 1 shall cease on or before 30 October 1945.

Item 2 - As described in Item 2 of subject Supplement, dated 22 May 1945, to Letter Contract No. W 33-038 ac-6266, as amended by Amendment No. 1 thereto, provided, however, that all work under this Item 2 shall cease on or before 30 October 1945.

Item 3 - As described in Item 3 of subject Supplement, dated 22 May 1945, to Letter Contract W 33-038 ac-6266, as amended by Amendment No. 1 thereto, provided, however, that all work under this Item 3 shall cease on or before 30 October 1945.

Item 4 - One (1) AAF Model XP-87 airplane to be constructed in accordance with the Contractor's preliminary Specification No. 9566 dated 15 September 1945 including Revision "A" dated 1 January 1946, hereby made a part hereof, and all applicable engineering data, drawings, and reports in accordance with Contractor's Report No. 29-Z-1 dated 1 January 1946, hereby made a part hereof.

Item 5 - One (1) complete Mock-up of the AAF Model XP-87 Airplane described in Item 4 above.

Item 6 - Wind tunnel models of the AAF Model XP-87 airplane described in Item 4 above as specifically listed in Contractor's Report No. 29-Z-1 dated 1 January 1946, hereby made a part hereof.

(b) All work performed pursuant to Items 1, 2 and 3 of paragraph (a) above shall be utilized by the Contractor, to the extent practicable, in the performance of the work described in Items 4, 5 and 6 of paragraph (a) above.

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ARTICLE REPRODUCTION AND LICENSE RIGHTS

The Contractor agrees to, and by the execution of this contract does, grant, sell and convey to the Government, a non-exclusive, irrevocable and royalty-free right and license (a) to make, have made, use for all Governmental purposes and sell or otherwise dispose of in accordance with law, any and all articles of the type made or developed by the Contractor in the performance of this contract and any modifications or improvements thereof hereafter made, under any and all patent or other rights now or hereafter owned or controlled by the Contractor or under which the Contractor has the right (without obligation to make payment to others) to grant licenses and (b) to practice and cause to be practiced, and to make, have made, use and sell articles embodying, any and all discoveries, inventions or improvements first reduced to practice or made by the Contractor, its representatives or employees in the performance of this contract, under any and all patent or other rights based upon such discoveries, inventions or improvements. The right and license hereby granted shall extend throughout the United States and its territories, and (insofar as the Contractor has the right to grant such licenses therein) throughout all foreign countries, and shall remain in full force and effect during the full term of the patent or other rights under which the grant to the Government is or shall be made as herein set forth; except that as to the rights referred to in clause (a) hereof, the license herein granted shall be in effect only during any period of national emergency as declared by Congress or the President (whether or not involving War) or during any period of hostilities in any war in which the Government is now or may hereafter be engaged plus six (6) months thereafter, provided that contracts entered into before the end of such period may be completed and any articles on hand at the end of such period may be used, sold or disposed of without restriction. The Contractor agrees (1) to make to the Government, prior to final settlement under this contract, a complete disclosure of all discoveries, inventions and improvements made or first reduced to practice in the performance of this contract (2) to designate in writing which of said discoveries, inventions and improvements have been or will be covered by applications for Letters Patent filed or caused to be filed by the Contractor (3) to furnish to the Government, upon request, copies of any applications for Letters Patent filed or caused to be filed by the Contractor with respect to any such discoveries, inventions or improvements (4) to grant to the Secretary of War or his duly authorized representative, upon request, a power to inspect the papers involved in the prosecution of any such application for Letters Patent, (5) to execute or to procure the execution of all papers necessary to enable the Government to obtain (subject to a non-exclusive, royalty-free license retained by the Contractor) Letters Patent covering such of said discoveries, inventions or improvements as are not covered or to be covered by applications for Letters Patent filed or caused to be filed by the Contractor and (6) to execute or procure and deliver to the Government such confirmatory licenses as the Government may request under patents under which the Government becomes entitled to License Rights as herein provided.

Amendment No. 6 to
Supplement, dated 22 May 1945, to
Letter Contract W 33-038 ac-6266

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TASCONT Form No. 11Q
(12 May 45)

ARTICLE.....Authorization and Assistance

(a) For the purpose set forth in Section 6 of the Royalty Adjustment Act 1942 (Public No. 768, 77th Cong.; 35 U.S.C. 94), insofar as said Section 6 refers to the Act of June 25, 1910, as amended (35 U.S.C. 68), and for no other purpose whatsoever, the Government shall, without prejudice to its rights of indemnification if any, be deemed to have given its authorization and consent to the use and manufacture, in the performance of this contract or of any subcontract hereunder, (1) of any patented invention embodied in the structure or composition of any article the delivery of which is accepted by the Government under this contract and (2) of any patented invention utilized in machinery, tools or methods the use of which necessarily results from compliance by the Contractor or the using subcontractor with (i) specifications or written provisions now or hereafter forming a part of this contract or (ii) specific written instructions given by the Contracting Officer for the purpose of directing the manner of such performance.

(b) The Contractor shall diligently and promptly report to the Contracting Officer in reasonable written detail (i) each claim of patent infringement asserted with respect to; and (ii) the identity and apparent pertinence of each adversely-held domestic patent having a bearing or apparent bearing upon, the subject-matter or performance of this contract, which said claim or bearing has heretofore or shall hereafter prior to final settlement come to the attention of the Contractor's legal representatives or executive agents.

(c) In case the rates or amounts of any royalties, which are directly or indirectly chargeable to the Government under this contract, are adjusted pursuant to the provisions of the Royalty Adjustment Act 1942 (Public No. 768, 77th Cong.; 35 U.S.C. 89) or in any other manner, the prices herein shall be reduced to the extent that the Contractor receives the benefit of such adjustment, or fails to take the benefit thereof after the Government has given the Contractor notice in writing not to make the payment involved and the Contractor shall pay or credit, as the Contracting Officer may direct, the amount of such price reduction. Nothing contained in this contract shall be deemed to constitute an approval by the Government of the rates or amounts of any royalties chargeable to the Government hereunder, or to prejudice or impair the right of the Government or any department or agency thereof to adjust the rate or amount of such royalties.

Amendment No. 6 to
Supplement, dated 22 May 1945, to
Letter Contract W 33-038 ac-6266

PARO Form No. 10C (4-6-45)
(PR 3585)

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7 February 1946
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XP-87 Airplane

Conference held in Armament Laboratory on 5 February 1946.

Purpose: Discussion of armament installation in XP-87 Airplane.

Personnel attending conference:

Capt. B. P. Blasingame - - - - Armament Lab.
Capt. J. W. Nelson - - - - - - Armament Lab.
Capt. A. L. Thayer - - - - - - Armament Lab.
Capt. C. B. Thornton - - - - - Aircraft Projects Section
Lieut. J. D. Aronson - - - - - Armament Lab.
Lieut. J. W. Bjorkman - - - - Armament Lab.
Mr. P. M. Birk - - - - - - - - Curtiss-Wright Corporation
Mr. J. V. Burke - - - - - - - Armament Lab.
Mr. R. T. DePew - - - - - - - Radar Lab.
Mr. H. O. Kempton - - - - - - Curtiss-Wright Corporation
Mr. H. C. Mondy - - - - - - - Radar Lab.
Mr. S. M. Skeist - - - - - - - Armament Lab.
Mr. J. H. Sproule - - - - - - Armament Lab.
Mr. W. Tydon - - - - - - - - - Curtiss-Wright Corporation
Mr. J. Yolles - - - - - - - - Radar Lab.

The layout drawings for the armament installation in the subject airplane were examined by personnel from Armament Lab. and Aircraft Projects Section. The following decisions relative to the armament installation were made:

1. The APG-3 type radar will be used with the nose turret installation in lieu of the APG-16. The nose turret will consist of four 20mm. guns traveling 60° in traverse and mounted in the conical turret which revolves 360° about the longitudinal axis of the airplane. This installation will give a hemisphere of 120° coverage. The tail turret instead of being a revolving spherical turret as in the nose, will probably consist of a small ball turret arrangement and will mount two .50 caliber type M-3 machine guns.

2. The layout drawings of the cockpit installation of the periscopic sight were left with Armament Lab. personnel in order that an installation can be worked out whereby the periscope could be mounted behind the radar observer instead of in front of him. The bomb installation was discussed with Mr. Neff and Mr. Materese, Bomb Section, Armament Lab., and is considered satisfactory except for a few minor changes in sway braces and bomb attachment points.

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AAF-401 (19 OCT 44)
452.1 Permits, 1941-47, Vol. I
SAVE
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APPLIC
(2)
REVICTORY BUY UNITED STATES WAR BONDS AND STAMPS

ARMY AIR FORCES
HEADQUARTERS
AIR TECHNICAL SERVICE COMMAND

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO ATTENTION OF FOLLOWING OFFICE SYMBOL
TSESA (TSESA-4)

TSESA-4/OBT:hw
WRIGHT FIELD, DAYTON, OHIO
8 February 1946

SUBJECT: Curtiss All Weather Fighter

TO: Commanding General
Army Air Forces
Washington 25, D.C.

Attention: ACAS-4

Central files
- 19

1. Consistent with standard procedure of the Engineering Division, ATSC, the following information pertinent to the Curtiss-Wright All Weather Fighter is supplied herewith:

a. Assignment of model number - XP-87.

b. Classification of project - "restricted" (performance - "confidential").

c. Project number - MX-745.

d. Authority for Purchase number - 221593 dated 15 May 1945.

e. Contract number - W33-038-AC-6266.

f. Date of contract approval - 25 May 1945.

g. Contract completion date of airplane - February 1947.

h. Number of articles on contract - one (1).

i. Estimated first flight date - February 1947.

j. Estimated date of delivery to Wright Field - March 1947.

k. The XP-87 airplane is a four engine jet propelled fighter designed to operate in all weather conditions. Power will be supplied by four Westinghouse 24C Units each giving a static thrust of 3000 pounds. The airplane will be equipped with a four-gun 20mm. nose turret and a two-gun .50 caliber tail turret, both of which will be remotely controlled by the use of a double-ended periscopic sight

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V-7390

WF Area A 1 DEC-44 45986

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CG, AAF, Washington 25, D.C.
Attention: ACAS-4
Curtiss All Weather Fighter
8 February 1946

and will include automatic gun laying radar equipment as a secondary method of firing. Total fuel capacity will be approximately 2600 gals. half of which is carried externally giving the fighter a combat radius of 1000 miles at best operational altitude. Calculated performance figures indicate a high speed at sea level of 600 MPH and time to climb to 35,000 ft. of 13.8 min. A thermal ice prevention system will be employed on all airfoil surfaces. Radar equipment will include automatic gun layers, search equipment, and all radar aids to navigation and blind flying. Crew will consist of pilot and radar observer, the observer being equipped with the minimum flight controls necessary to fly the airplane in case of emergency. The general dimensions of the airplane are 62 ft. 10 in. long, 60 ft. spread, 19 ft. high over the rudder. Design gross weight is 37,350 lbs. with an alternate gross weight of 49,900 lbs. including 1300 gals. of external fuel.

FOR THE COMMANDING GENERAL:

R S Carman, Col, A.C.

for GEORGE E. PECK
Colonel, Air Corps
Chief, Aircraft Projects Section
Service Engineering Subdivision
Engineering Division

R. S. CARMAN
Colonel, Air Corps
Chief, Fighter Branch
Aircraft Projects

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AT SC Form No. 80-922 (2 NOV 44) 1 JAN 45-2400

Major Jon H. Ober
bgh/TS TEX/5-6147
Wright Field, Ohio
16 February 1946

ARMY AIR FORCES
HEADQUARTERS
AIR TECHNICAL SERVICE COMMAND

TECHNICAL INSTRUCTIONS

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CHECK ONE: PERMANENT ☐ TRANSITORY ☐

SERIAL NO: TI-2087, Addendum No. 1

SUBJECT: XP-87 All Weather Airplane

TO: Engineering Division

1. Problem Presented:

a. To amend TI-2087 to provide for the procurement of two (2) XP-87 airplanes.

2. Authority:

a. CG, AAF by 1st Ind. basic 1/16/46 dated 31 January 1946, subj: As above, from AEDRE-4F, AC/AS-4.

3. Action Desired:

a. That the Engineering Division take the necessary action to accomplish that stated in paragraph 1, Problem Presented.

BY THE COMMAND OF LIEUTENANT GENERAL TWINING:

JOHN W. SESSUMS, JR.
Colonel, Air Corps
Chief of Administration

cc: Procurement Division
Maintenance Division
Supply Division
Flight Test Division

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40 (File #1)

6 March 1946
TSESA-4/OBT:hw

XP-87 Airplane

87 File

On 28 February 1946 a conference between personnel of Curtiss-Wright and ATSC was held relative to the power plant installation in the XP-87 airplane.

Personnel attending the conference were as follows:

Maj. Hawkins	Power Plant Lab.
Capt. Johnson	Equipment Lab.
Capt. Thornton	Fighter Br., Airc. Proj. Sec.
Mr. Shimbler	Power Plant Lab.
Mr. Hulman	Power Plant Lab.
Mr. Stevens	Curtiss-Wright, Power Plant Engineer
Mr. Flesh	Curtiss-Wright, Project Engineer

Various questions relative to the installation of the 24C Unit were advanced by the Curtiss-Wright personnel, however, Power Plant Lab. was unable to give definite answers to most of these since the Army does not have an actual installation of a 24C Unit at this time.

The type of fuel around which the airplane is to be designed, was changed from JP-1 to JP-2 on the recommendation of the Power Plant Lab. since JP-2 fuel will ultimately become the Air Corps standard. This change will result in approximately 80 gallons of additional tankage and a corresponding increase in weight of the airplane.

The fuel system was reviewed by Power Plant personnel and was considered satisfactory with the recommendation that the size of the fuel lines be increased to accommodate the anticipated 10,000 lbs./hr. fuel flow in the event that afterburning is used on the 24C Jet Units.

The design of an emergency fuel system was also discussed, however, no definite decisions relative to this system were made.

Methods of detecting and fighting fires in the engine nacelles were discussed with Capt. Johnson of Equipment Lab. and it was recommended that the stainless steel shell be placed above the engine directly under the wing structure to protect the main wing spar in case of a nacelle fire. This shell is in addition to the usual stainless steel shroud around the tail pipe. It was recommended that two circles of fire detectors be installed, one at the forward mounting point on the engine and one at the junction of the tail cone and tail pipe directly behind the burner section of the engine. These detectors would activate a light in the pilot's cockpit in the event of excessive temperatures in these regions.

Methods of preventing ice from forming on the impeller blade tips were discussed and although Power Plant Lab. had no definite solution for this problem, it was mutually decided that an electrical anti-icing system would probably be the most feasible installation in this case.

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AAFEC-386-WF-8-8-45-250M

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No. of pages 6

ARMY AIR FORCES
MATERIEL CENTER
ENGINEERING DIVISION
MEMORANDUM REPORT ON

TSEAC6/NEN/dls

Date 12 March 1946

SUBJECT: Model Specification
Curtiss-Wright Aircraft Corporation
XP-87 Airplane

SECTION Aircraft Laboratory [redacted]

SERIAL No. TSEAC6-4302-55-1

Contract No. W33-038 AC-6266
Expenditure Order No. 439-256
Purchase Order No.

A. PURPOSE:

1. To comment on data submitted with D&DTR No. TSESA-4-916 dated 14 February 1946.

B. FACTUAL DATA:

2. The data consisted of one copy of C-W Report No. 9566 dated 15 September 1945, Revised 1 January 1946 - Preliminary Model Specification.

3. The data describe a low wing, four engine, jet propelled fighter, conventional in appearance. The power plants are Westinghouse type 24-C. The airplane employs a radar operated four-gun turret in the nose and a two-gun turret in the tail.

4. Reference is made to Memorandum Report No. TSEAL2-4305-18-2 dated 9 November 1945 which presented comments on previously submitted data on this airplane.

5. Design comments on the subject airplane are contained in Appendix 1 of this Memorandum Report.

6. Comments on the form and content of the Model Specification are contained in Appendix 2 of this Memorandum Report.

7. The data are being retained in the Aircraft Laboratory.

[redacted]

Atac Ltr. 29 Mar. '46
TSESA-4/087:lw

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Eng. Div. Memo. Rpt.
TSEAC6-4308-55-1
12 March 1946

[redacted]

C. CONCLUSIONS:

8. The comments and recommendations of Appendices I and II of this Memorandum Report should be forwarded to the contractor for appropriate action.

D. RECOMMENDATIONS:

9. It is recommended that paragraph 8 above be complied with.

[redacted]

Distribution:

TSESAL
TSEACS

[redacted]

Prepared by N. E. Nelson
(Name)

Approved by FRANK N. MOYERS, Colonel, A.C.
Chief, Aircraft Laboratory

Approved by FRED R. DENT, JR., Col., A.C.
Chief, Aircraft and Physical Requirements Subdivision

Concurrence:
for GEORGE E. PRICE, Colonel, A.C.
Chief, Aircraft Projects Section

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Eng. Div. Memo. Rpt.
TSEAC6-4302-55-1
12 March 1946

APPENDIX 1

Aircraft Laboratory Design Comments
on the Subject Airplane.

1. Aerodynamics

The performance as shown in the subject Model Specification appears to be satisfactory. Reference is made to Memorandum Report TSEAL2-4305-13-2 dated 9 November 1945 for more thorough discussion of the aerodynamic properties of this airplane.

2. Weights

The weight data as presented in the subject Specification appear reasonably correct.

3. Structures

There are no comments other than those contained in appendix 2 of this Memorandum Report.

4. Dynamics

a. Vibration

The engine mounting that is specified in the subject Specification meets the requirements of this type power plant and should be satisfactory.

b. Flutter

The contractor should be requested to submit symmetric and unsymmetric wing flutter calculations for the inner panel torsion modes in addition to the other flutter calculations specified in the Handbook of Instructions for Airplane Designers.

5. Mechanical

a. Wheels and brakes

The wheels and brakes as specified are considered satisfactory.

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[redacted]

b. Shock Absorbers and Geometry.

Although the information in the subject Specification relative to the landing gear is not complete, the data contained therein are satisfactory. No definite information as to the type of retraction system and shock absorber angles is given; however, since no deviation relative to the latter is listed, it is assumed that the geometry is in order.

c. Mechanism.

The electrical retraction of the landing gear into the nacelles housing jet engines will probably be critical. It is necessary that details be submitted for approval.

d. Hydraulics.

(1) If a hydraulic system is used in any part of the airplane all details of this system shall be in accordance with Specifications AN-H-2a and AN-P-74 and flight tests made in accordance with Specification AN-T-53.

(2) Applicable portions of Specifications AN-H-2a and AN-P-74 shall apply to the pneumatic system mentioned in the subject Specification but it shall be necessary that all details and a schematic of the system be reviewed by ATSC personnel prior to release for production.

[redacted]

[redacted]

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Eng. Div. Memo. Rpt.
TSEAC6-4302-55-1
12 March 1946

APPENDIX 2

Aircraft Laboratory Comments on the Form and Content of the Subject Model Specification.

1. The contractor has neglected to number the pages of the subject report, therefore, the following paragraphs will be referred to by paragraph number only.

2. Reference paragraph A-1.

Add to this list "Specification 40749 dated 29 December 1944".

3. Reference Group Weight Statement, Useful Load, Design and Alternate Load I-A.

The armament is listed in the wrong place in that all armament is flexible and is listed on these pages under fixed guns.

4. Reference Group Weight Statement, Useful Load, Condition I-D.

There is no weight listed for the external wing tip tanks.

5. Reference paragraph E-2d(1)(d)(2).

The gust load factors were not checked but were assumed to be in accordance with Specification C-1803-D inclucing Amendment 4.

6. Reference paragraph E-2e(1)(b).

The incidence, both root and tip and the dihedral shall be inserted in this paragraph.

7. Reference paragraph E-2e(2) and sub-paragraphs thereunder.

The contractor has failed to insert the pertinent engineering data necessary in all these paragraphs, such as areas, angular movements, spans, et cetera. These shall be inserted before the Specification can be considered satisfactory.

8. Reference paragraph E-2e(3)(b).

This paragraph should be rewritten to describe fully the control system showing in particular that it conforms to the requirements of the HIAD.

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Eng. Div. Memo. Rpt.
TSEAC6-4302-55-1
12 March 1946

9. Reference paragraph E-2e(3)(e).

The control locks shall not be located in the cockpit but shall be as close as possible to the control surface.

10. Reference paragraph E-2e(4)(a)(1).

The dimensions of the flaps shall be inserted.

11. Reference paragraph E-2e(4)(b)(1).

The dimensions of the air brakes shall be inserted.

12. Reference paragraph E-2e(5)(a).

The maximum fuselage cross sectional dimensions shall be inserted.

13. Reference paragraph E-4d(2).

Total fuel capacity of the fuel tanks shall be inserted in this paragraph.

14. Reference Appendix II-B, Deviation No. 1.

This deviation will be granted provided the bomb bay doors overlap the fuselage at the hinges and that there is sufficient support in the fuselage directly above this overlap. In addition, the doors should lock in the center where they meet. This is necessary since even though the bomb bay is small the collapse of these doors may effect the hydrodynamic properties of the airplane such as to cause it to dive.

15. Reference Appendix II-B, Deviation No. 7.

The contractor should be advised that the control system shall be duplicated in accordance with the requirements of the HIAD. This deviation is not granted.

16. Reference Appendix II-B, Deviation No. 14, and 8.

The project office should determine whether or not the contractor should be permitted to submit data in this fashion. Curtiss Report 29-Z-1 should be checked by Aircraft Laboratory when available.

17. The remainder of the deviations are satisfactory insofar as Aircraft Laboratory is concerned.

[redacted]

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10(b) - attached

4. This instrument has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

THE UNITED STATES OF AMERICA

BY: _____
STEPHEN LOVAS, Captain, Air Corps
Contracting Officer

ACCEPTED 27 March, 1946

Curtiss-Wright Corporation
~~Propeller~~ Division)
(Contractor)

BY: _____
(Name; Official Title)
Edwin J. Ducayet - Representative

AFFIX CORPORATE SEAL

Ref: R&R, TSBPA4-1
dated 20 March 1946
Captain Lovas

Amendment No. 9

W 33-038 ac-6266

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION-COLUMBUS PLANT

COLUMBUS 16, OHIO

22 March 1946
EMF:HF-1821E

[redacted]

Subject: Contract W33-038-AC6266
Model XP-87 Airplane
Power Plant Requirements

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: Engineering Division
Unit TSESA-4

Coordinated: AAF Plant Representative
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) Conference with Power Plant Laboratory personnel at Wright Field on 28 Feb. 1946 concerning Power Plant Installation in XP-87 Airplane.

1. During a recent conference, engineering representatives of this Contractor discussed with Major Hawkens and other Power Plant Laboratory personnel the requirements for the Westinghouse 24C Engines for use in the XP-87 airplane.

2. It is the purpose of this letter to list these requirements for use by the Air Materiel Command in defining these engines for the engine manufacture.

(a) The engine must be designed to use JP-2 fuel.

(b) A starter-generator is desired in lieu of the present starter motor. This will make the present generator pad on the rear side of the accessory gear case available for other purposes.

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Subject: [illegible]

2. [illegible]

(e) Provide for the mounting of a [illegible] pump and auxiliary drive off the hydraulic pump [illegible]. This is necessary because of the possibility of [illegible] either the generator drive or the hydraulic pump drive for the [illegible] pump if J47-GE engine is used.

(f) Provide alternate [illegible] that [illegible] provide [illegible] after installation [illegible].

[illegible] movable tail [illegible] with or without afterburner.

(g) Because of [illegible] section and pilot [illegible] thermocouple [illegible] differ at rest state.

(h) Disconnect engine [illegible] with the engine.

(i) [illegible] engine [illegible] engine [illegible] requirements for [illegible].

3. It is necessary that the [illegible] of the [illegible] with [illegible] in connection with the [illegible] these engines [illegible] will [illegible].

Respectfully,

[illegible]

[illegible]

[illegible]

[illegible]

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION-COLUMBUS PLANT

COLUMBUS 16, OHIO

27 March 1946

Subject: Contract W33-038 ac-6266

To: Commanding General
Air Technical Service Command
Wright Field, Dayton, Ohio

Attention: Unit TSEPS-3B

Reference:
(a) Curtiss ltr. WM:ar-319 dated October 30, 1945.
(b) Curtiss ltr. EJD:MM-19 dated January 10, 1946.
(c) Amendment No. 6 to Letter Contract W33-038 ac-6266 dated 22 May 1945.
(d) ATSC telegram TSEPA-1-3-110 dated February 21, 1946.
(e) ATSC ltr. TSESA:CEP:lh dated 8 February 1946.
(f) ATSC ltr. TSESA:DMA:DMS:in dated 5 February 1946.
(g) Curtiss ltr. WMF:HF-[illegible]E dated 22 March 1946.

Enclosure: (A) Standard Procurement Form No. 1 - Original and Two Copies.

1. As informally requested by ATSC and to summarize and draw together all pertinent data required to negotiate the formal contract amendment provided for in reference (g), the Contractor submits herewith its formal and complete proposal. This letter with its enclosures is to be considered our bid and replaces and supersedes previous information.

2. The items authorized and procured or to be procured by subject contract in accordance with references (c) and (d) and the original contract, as modified by understanding that additional airplane per reference (d) is to be delivered first, are listed and described on Page 3A of Enclosure (A). It should be noted that the first airplane procured has been made the second airplane to be built and delivered and it is therefore necessary to adjust prices accordingly, the total price for the two airplanes remaining unchanged as compared to previous quotations. Since the first airplane (Item 5 on Page 3A of Enclosure (A) should be used for the investigation of aerodynamic, structural and power plant characteristics, it is the Contractor's understanding that tactical and miscellaneous equipment with mounting and other installation provisions as outlined on Page 3A of Enclosure (A) will be omitted. Flight test instrumentation as called for under Part IV of Curtiss Specification 29-Z-1 shall be included in the first airplane.

3. The Contractor herewith quotes a total price of $[illegible],729,0[illegible]4.52 for accomplishing the work specified on Page 3A of Enclosure (A) on the basis of a fixed price contract and under the specific terms and conditions specified herein. Prices for each of the individual items are shown on Page 3A and detail price breakdowns for the items are shown on Page 6A. It should be noted that the detail price

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breakdowns are greater than the price for which we have agreed to accept the work as shown on Page 3A which is in accordance with Contractor's proposal, reference (a). This proposal is also on the basis that Phase I of the XA-43 work, as covered by the original contract, also be converted to fixed price, the price to be the estimated cost plus fixed fee already established by the contract. The fixed price quoted for Iters 2, 3 and 4 represents the estimated cost without profit or fee for the work covered by Items 2, 3 and 4 on Page 3A and is in accordance with figures contained in original proposal, reference (a). The price for Item 5 is as quoted in reference (a) but includes the cost of instrumentation quoted in reference (b). Tabulated below are the funds already allocated and also tabulated are the items for which additional funds must be authorized:

Basic contract - Phase I	$ 366,791.00
Letter Supplement as amended	5,419,[illegible].52
Total allocated	5,786,65[illegible].52
Additional funds required:	
Second airplane	2,872,200.00
Instrumentation for first airplane	70,188.00
Total	2,942,388.00
Total proposed contract price	$ 8,729,041.52

4. Since Iters 1 through 4 inclusive of Page 3A have already been completed, the contract shall provide for payment for these items at the prices quoted less any amounts received as reimbursements under the original CPFF contract. This payment shall become due and payable upon the signing of the contract and submittal of an invoice by the Contractor, which invoice is to include the credit due for reimbursement received. Payment for Items 5 and 6 shall be made upon completion of Contractor's flight test; payment for Item 7 shall be made upon completion of the mock-up and incorporation therein of any changes required as a result of mock-up board inspection by ATSC; and payment for the wind tunnel models, Item 8, shall be made upon completion of the models and delivery of same to various wind tunnels for testing. It is requested that the contract shall contain provisions for partial payments.

5. Delivery of the various items shall be as listed below. All of the following dates are on the basis that go-ahead was received for part of the work under the original contract, part of the work under reference (c) and that the remainder of the work will be authorized by the signing of a formal contract within thirty days from date of this letter.

Item 1 - Completed	Item 5 - March 31, 1947
Item 2 - October 30, 1945	Item 6 - May 31, 1947
Item 3 - October 30, 1945	Item 7 - June 15, 1946
Item 4 - October 30, 1945	Item 8 - September 1, 1946

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All of the above quoted deliveries are contingent on receipt of Government furnished equipment in sufficient time to meet deliveries quoted. Reference (g) furnished a partial list of Government furnished equipment with dates required and the remainder will be furnished as soon as data is available. Should any of the Government furnished equipment not be furnished in sufficient time to meet Contractor's delivery dates, a delay in delivery and increased cost will result and the contract shall provide that this shall be an excusable delay and the increased cost shall be reimbursed by the Government by Change Order.

6. The following specific items are conditions of our quotation and shall be included in the wording of the proposed contract:

a. No flight demonstration shall be included as it has been omitted from the price.

b. The quotations for both the first and second airplanes are on the basis of including therein only ten hours of functional flight testing for shakedown of airplane, power plant and test instrumentation. No demonstration, performance, guarantee compliance, etc. testing has been included. The Contractor does not consider that this is sufficient testing but submits its quotation on this basis as it is not in agreement with the provisions of references (e) and (f). It is understood, however, that a mutually agreeable flight test program will be negotiated and made the subject of a Change Order at a later date. This quotation is also submitted on the basis that initial flight tests will be conducted at the Contractor's Plant. Should it be necessary to conduct initial flights at some other airport this will be the subject of later negotiations.

c. No static test is included in the quotation other than the very limited amount included in the Contractor's Specification 29-Z-1.

d. The quotation is based on the usual type of equipment being Government furnished such as power units and accessories, radios, radar, instruments, front and rear gun turrets, etc. as listed in Contractor's detail specification.

e. Only the minimum amount of data shall be furnished, and certain data is not necessary to comply with the provisions of applicable government specifications. The exact data is included in Contractor's Specification 29-Z-1.

f. Labor and material escalator clauses shall be included in the contract.

g. Limitations shall be included in the Contract covering maximum penalties for failure to meet guarantees or other requirements of the Specification. These penalties shall be held to a minimum.

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To: Air Technical Service Command
Wright Field, Dayton, Ohio

h. Definite and clear limitation shall be included in the contract limiting the responsibility of the Contractor for changes resulting from flight test, wind tunnel test, failure to meet guarantees or other specification requirements. Many of the requirements are even at this time not clearly defined and it is understood that these requirements must be frozen immediately and any changes thereafter be covered by further negotiations.

i. Many detail requirements have been established over the last few years which tend to increase the cost of the construction of airplanes. It is understood that the Government will allow latitude and leniency on such requirements in order to minimize loss by the Contractor as long as safety of flight is not affected.

j. All standard clauses of the original contract shall remain unchanged except for those clauses modified herein or requiring change due to conversion from CPFF to Fixed Price.

k. This quotation has been prepared on the basis of present labor rates, giving consideration to normal merit and promotional increases. No allowances have been made for the influence of labor rate increases which the Contractor may be required to negotiate or may be directed by Government agencies. Should any such increases result, the Contract will provide for an equitable adjustment in price, both retroactive and prospective.

Very truly,

[illegible]
Airplane Division - Columbus Plant

E. J. Bryant
Contracts Manager

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45207 Design F [illegible] missile 18
R4647-VL [illegible] CONFIDENTIAL

AIR MATERIEL COMMAND

TSEMO (TSEPSL)

3 APR 1946

Military Characteristics of
All Weather Fighters.

Commanding General,
Army Air Forces,
Washington 25, D. C.

Attn: AC/AS-3, Requirements Division.

THRU: AC/AS-4, Armament Section, AFDRE-2B.

1. This office is in receipt of copies of the military characteristics for an all weather fighter. For the nose turret mentioned, an angular coverage of only 30°, included cone angle, is required. It is the opinion of the Armament Laboratory, Engineering Division, that for a turret to be directed by AI radar, this coverage is entirely inadequate. When the lead angle and time to synchronize are considered, the effective coverage is much less than 30°. Further, the restricted angular coverage will dictate that the pilot make a tail approach within the 30° if he is to fire effectively. This limit is much too severe. It is, therefore, suggested that the requirement be changed to require an included angle of at least 120°.

2. For the tail turret, an angular coverage of 120° is also suggested. In this position the gunner can be expected to be capable of moving the gun an angle large enough to be defensively effective. Due to synchronization and lead computer requirements will reduce the 30° to some smaller angle, rendering the airplane of any ability to defend itself from tail attacks.

FOR THE COMMANDING GENERAL:

[redacted]

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION-COLUMBUS PLANT

COLUMBUS 16, OHIO

C [redacted]

April 19, 1943

Subject: Contract #33-038-AC-3[illegible]
XP-67 Airplane - Modified performance with After-burning.

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: Engineering Division
Unit T-3ESSa-4

Through: AAF Inspector in Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

1. In discussion with Westinghouse representatives, this Contractor was informed that the addition of after-burning provisions to the Model 19 jet engine would result in an increase in thrust of approximately 40%. Bureau of Aeronautics A. N. No. Report #N-54 issued January 1943, entitled "Augmentation of the Thrust of Turbo Jet Engines by After-burning in the Tail Pipe", furnishes a method of calculating after-burning thrust.

2. Based on the above increases, the comparative performance of the XP-67 airplane at military rated thrust (2,000 H.P.@) with and without after-burning is estimated to be as follows.

	Military Power	Military Power Plus After-burning
Max. speed at sea level, mph:	411	438
Time to climb to 20,000 ft., min:	11.[illegible]	7.[illegible]
Time to climb to 40,000 ft., min:	19.1	6.2
Fuel used in climb to 35,000 ft., ltr:	1[illegible]	2430
Take-off distance over 50 ft. obstacle, ft:	2740	4130

3. It will be noted that the performance under military power without after-burning differs slightly from that figured and in Specification 7566, dated 1 January 1943. The difference in time to climb is due to a change in the weight, 1360 lbs. being used at the time the specification performance was figured while the latest figure based on the initial cruise weight of [illegible],3[illegible] lbs. The difference in take-off distance is due largely to a [illegible]

[illegible]
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April 19, 1946
AF-JC-20683

Subject: Contract W33-038-AC-256
XP-87 Airplane - Modified Performance
with After-burning.

[redacted]

3. Cont'd.

more up-to-date method of calculation.

4. The above figures are not to be interpreted in any manner as guarantees, inasmuch as, the power figures used are not guaranteed by the Engine Manufacturer, and a thorough understanding of power variation with altitude and effect on fuel consumption, has not been reached.

Respectfully,

CURTISS-WRIGHT CORPORATION
Airplane Division-Columbus Plant
Columbus 16, Ohio

R. C. Blaylock
Chief Engineer

Concurred in
O. Schofield

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36 (X #11

[illegible] of XA-37 Airplane

[illegible] 14 May 1946 1
[illegible] Section

30

[illegible] Intel Flight Test personnel visited the plant of [illegible] on 13 May 1946 for the purpose of again reviewing [illegible] of the XA-37 airplane, and to determine whether the changes [illegible] had been satisfactorily incorporated:

Aircraft Projects Section

[illegible] Thornton
[illegible]

Armament Laboratory

Capt. Suten
Mr. Luger
Mr. Fitzgerald

Flight Laboratory

[illegible]
[illegible]

Systems Engineering Lab.

Mr. Lorney
[illegible]

Flight Test Section

[illegible]
[illegible]
[illegible]

2. Comments on the mock-up inspection are as follows:

a. The interior cockpit exhibits a marked improvement over the original cockpit mock-up inspected three weeks ago, although the whole arrangement is [illegible] necessarily compromised by the periscope gun sight installation. A few minor changes in location of instruments and equipment were recommended by the inspecting party and were incorporated immediately. After all changes were made official photographs were taken, prints of which will be available in Fighter Br. within a day or two.

b. In the opinion of the project officer and the inspecting party, the cockpit, as evaluated during the course of inspection, represents the best [illegible] possible to attain consistent with the presently existing military [illegible] for all weather fighters. Therefore, the contractor was [illegible] to incorporate the cockpit in its present form in the complete airplane mock-up.

c. The airplane mock-up is approximately 75% complete at this time and the contractor estimates that the formal mock-up inspection can be held on or about [illegible] June 1946.

O. E. THORNTON
Captain, Air Corps
Fighter Branch
Aircraft Projects Section

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ROUTING AND RECORD SHEET AIR TRANSPORT SERVICE COMMAND

(CONTINUE ON OTHER SIDE)

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29 May, 1946

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C. 1 Cont'd

Weight Summary

Specification Airplane		49,310 lbs.
Addition of Spec Changes.	+	478 lbs.
Addition of Center Panel Slats	+	130 lbs.
Change from Four 37 to Two 40's	-	750 lbs.
Deletion of aft turret	-	1,089 lbs.
Addition of Tail Fairing	+	60 lbs.
		48,499 lbs.

Performance Summary

Anticipated military power and water injection or after-burning engine performance are based on A N C Memo NO[illegible]A-E/ASW/ [illegible] 4 March 1945

	Military	Anticipated Military Power & After Burning
[illegible]	[illegible]	[illegible]
	502 mph	560 mph
range		1875 miles

[illegible]

[illegible]

[illegible]

[illegible]

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[illegible]

Configuration Changes Considered

[illegible]

Weight Summary.

[illegible] Airplane		40,[illegible] lbs
Deletion of Aft Spar Plugs	+	410 lbs
Deletion of Mid Span Plugs	+	500 lbs
Fuselage Section Reinforcement	+	2,400 lbs
[illegible] Deletion		[illegible] lbs
[illegible]	+	40 lbs
[illegible]		3,000 lbs
[illegible]	+	40 lbs
[illegible] Total Weight	+	220 lbs
		[illegible] lbs

[illegible] Performance Summary

[illegible] (Normal Power)

[illegible]

[illegible] Increase 3,645 feet (Military Power)

[illegible] drag which is large at low [illegible] effect for [illegible] flat plate, it will require additional fuel [illegible] drag, increase in structural weight, increase in [illegible] drag, etc. would lower the airplane excessively

[illegible] Summary

[illegible] indicate a configuration which is much [illegible] the [illegible] installation. This would not increase the wing [illegible] but would, since the aft nacelle c.g. location [illegible] adequately compensate for the deletion of the aft

[illegible] Summary

[illegible] Airplane		41,910 lbs
[illegible] Increase due to [illegible]	+	45 lbs
[illegible] Spar Deletion	+	[illegible] lbs
[illegible] Center Panel Slat	+	130 lbs

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ATSC Form No. 10-504 (19 OCT 44)

452.1 Pursuit, 1946-47 Vol I 19

SAVE PAPER

VICTORY BUY UNITED WAR BONDS AND STAMPS

IN LIEU OF ADDRESS BOTH COMMUNICATION AND ENVELOPE TO ATTENTION OF FOLLOWING OFFICE SYMBOL

TSENG (TSESA-4)

ARMY AIR FORCES
HEADQUARTERS
AIR TECHNICAL SERVICE COMMAND

[redacted]

TSESA-4 PBK/mb

WRIGHT FIELD, DAYTON, OHIO

7 June 1946

SUBJECT: Suggested Changes in Military Requirements for All-Weather Fighter Airplanes.

X-452.1

TO: Commanding General,
Army Air Forces,
Washington 25, D. C.

Attention: ACAS/4 - R & E Division

1. When the characteristics for the All-Weather fighter were received, Air Materiel Command regarded the aircraft as a World War II night (and bad weather) fighter with certain improvements such as AGL turrets, fore and aft; blind landing equipment; and a substantial increase in performance.

2. Subsequent discussion of these characteristics AMC vs. AMC; AMC vs. ACAS-3 and ACAS-4; have indicated that considerable confusion exists regarding the All-Weather fighter.

3. One school of thought is that the All-Weather fighter should be built according to the concept in paragraph 1, i. e., a fighter intended to take-off, fight, and land at night and/or in bad weather. If such is the case, an airplane of reasonable size can be built to perform this mission, particularly if certain changes are made in the military characteristics:

a. There should be no rear turret. The weight is prohibitive for a fighter (1600 lbs. basic armament weight plus some 2700 lbs. in structure and fuel to balance out the effect of weight). The drag amounts to 9 mph requiring an additional 4345 lbs. of fuel and structure. It is the unanimous opinion of night fighter pilots stationed at Wright Field that rear guns on a night fighter are not desirable in any event. The line of reasoning is that if the tail warning indicates an enemy aircraft, the only reasonable defense is evasive action. They do not believe in opening fire with the two rear guns and giving the enemy aircraft (with his four or six guns) a perfect visual contact.

b. The rear armor requirement should be reduced from .50 caliber direct hit protection to protection against flak (1/2" aluminum). This is due to the very remote possibility of a successful rear attack by an enemy night fighter.

[redacted]

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HEADQUARTERS ARMY AIR FORCES [redacted]

TALLY NO. 7

FILE NO. R&D

ROUTING AND RECORD SHEET

SUBJECT: Military Characteristics for the All-Weather Fighter

TO: Requirements Division, AC/AS-3

DATE 8 April 1946

FROM: Research & Engineering Division, AC/AS-4 (AFDRE-2B)

COMMENT NO. 1
Mr.J.R.Bone/mr/43252

1. The military characteristics for the all-weather fighter require flexibly mounted guns having 15° of freedom in any direction from the longitudinal axis of the airplane. However, the time required to synchronize or stabilize AGL data, computer outputs, tracking rates, and lead angles restricts the effective turret coverage to a cone considerably less than the 30° cone provided by a 15° turret. Furthermore, a 15° restriction requires the pilot to make a tail approach within the 30° cone if he is to fire effectively.

2. Since the primary advantage of the turreted fighter is to provide a means for ti[illegible]ighter to attack from outside the tail zone, it is suggested that the requirement for fig[illegible]er turrets be changed to require an included angle of at least 120°.

3. At first thought, it might appear that a 120° turret on a fighter would impose excessive weight and drag penalties. However, little increase in weight is required since the same turret drives, gears and controls are required for 30° flexibility as for 120°. Also the extra coverage can be obtained in a turret of the barrel type design with little or no extra drag.

4. It is also recommended that the angular coverage of fighter tail turrets be increased to 120° for more adequate tail defense, as again, the synchronizing time and basic computer requirements reduce the effective coverage to some smaller angle which would make a 30° tail turret ineffective.

[redacted]
D. C. DOUBLEDAY
Colonel, Air Corps
Chief, Propulsion & Equipment Branch

[redacted]

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C.G., AAF [redacted]
Suggested Changes in Military Requirements
for the All-Weather Fighter Airplanes.
7 June 1945

4. The second school of thought is that the All-Weather fighter should be an "all purpose" airplane to operate as follows:

a. As a night and/or bad weather fighter, as in paragraph 1 above.

b. As an escort fighter, though by virtue of its size, weight and low speed, it would probably be severely outclassed by enemy fighters. This limitation has been cited as one reason for requiring rear armament. If a bomber cannot defend itself with numerous flexible guns, there seems to be little reason for having a tail-armed "fighter" flying formation with it. Inasmuch as this escort fighter concept has been based on a 1000 mile combat radius against the 900 mile combat radius for the penetration fighter, it seems unsound to continue considering the All-Weather fighter as an escort fighter.

c. As a ground support aircraft which would deliver support by fire from the front and rear turrets and by dive bombing.

(1) It is to be noted that:

(a) The aircraft is not equipped with optical or radar bomb sights for level bombing.

(b) It could be used as a dive bomber, but it would inevitably repeat the history of the A-24 and other dive bombers.

(2) Equipping the turrets for use against ground targets brings on the following:

(a) The AN cannot be used nor can the guns be aimed manually by means of the radar scope against ground targets due to ground interference.

(b) This necessitates adding an optical sighting system consisting of a dorsale and periscope running partially through the cockpit causing a 13 mph drag with a resultant increase of 3750 pounds in the gross weight of the airplane, if the range is to be held constant.

5. Exhibit A is an excerpt from a report from Curtiss-Wright which shows what gain in performance can be realized by eliminating

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C.G., AAF
Suggested Changes in Military Requirements
for the All-Weather Fighter Airplanes.
7 June 1946

[redacted] the tail turret and associated equipment from the XP-87 All-Weather fighter. In this study, the range requirement of 2000 miles was held constant and the high speed and gross weight allowed to vary. It will be noted that an increase of 9 mph in high speed is realized along with a saving of 4345 pounds in take-off gross weight. The time to climb to 35,000 feet would be cut from 17.5 minutes to 13.0 minutes by this reduction in weight. The rate of climb at sea level would increase from 4945 feet per minute to 5768 feet per minute. At 35,000 feet the rate of climb would increase from 720 feet per minute to 900 feet per minute.

7. In view of the foregoing, the following recommendations are made:

a. The term "All-Weather Fighter" be changed to "Night Fighter" and that the airplane be built in accordance with the concept of its mission as outlined in paragraph 3 above.

b. The rear turret be eliminated from the military requirements.

c. Requirements for armor protection to the rear be reduced from .50 caliber protection to flak protection only.

FOR THE COMMANDING GENERAL:

L C Craigie

Incl.
Exhibit A.

[redacted]

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EXHIBIT A

XP-87 ALL-WEATHER FIGHTER

A. First Study [redacted]

This study includes changes as agreed upon at Wright Field conference 15 May, 1946 including corrective design changes to meet C_1 max. and longitudinal stability requirements, using 24C units, and a 20 mm. tail turret.

1. Configuration Change.

   a. Incorporation of Detail Specification changes.

   b. Extend fuselage nose from fuel tank compartment forward 20 inches.

   c. Move wing aft 20 inches.

   d. Increase horizontal tail 23 sq. ft.

   e. Move fuel and tankage 9.5 inches aft.

   f. A c.g. range of 18% to 22.7% shall be maintained for take-off and stability.

   g. Full span slats, flaps or equivalent high lift devices will be necessary.

   h. The increase of wing area from 600 to 636 sq. ft. (all this as an addition to the wing tip).

   i. Increase fuel and fuel tank capacity.

   j. Apply structural limitations for high speed with wing tip tanks.

2. Weight Summary.

Spec. Airplane	49,810 lbs.
Addition of full span flaps or slats to improve C_1 max.	500 lbs.
Addition of Detail Specification Weight Change Items.	745 lbs.
20" Fuselage nose extension	65 lbs.

[redacted]

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XP-87 All-Weather Fighter [redacted]

A. 1. Cont'd.

Structural weight increase for these changes.	590 lbs.
23 sq. ft. tail addition	115 lbs.
Addition of 36 sq. ft. wing area to compensate for added weight.	800 lbs.
Addition of fuel to meet range (due to weight increase).	665 lbs.
Additional fuel tankage for above	100 lbs.
TAKE-OFF GROSS WEIGHT	53,390 lbs.
COMBAT GROSS WEIGHT	40,705 lbs.

3. Performance Summary.

V max	590 m.p.h.
Range	2,000 miles

T. O. Distances over 50 ft. obstacle:

With full span slats or flaps, military power, standard day.		6,160 feet
	at	53,390 lbs.
Without slats or full span flaps, military power, standard day.		6,845 feet
	at	51,930 lbs.
With center section slats and present flaps, military power standard day.		6,392 feet
	at	51,930 lbs.
With water injection, Army hot day, full span slats.		5,670 feet
	at	53,390 lbs.

B. Second Study

This study incorporates the changes as agreed upon at Wright Field conference 15 May, 1946 except for the elimination of the tail turret entirely with it's corresponding radar, retaining the 240 units and meeting the changes to improve our longitudinal stability and C_{l} max. requirements.

[redacted]

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XP-67 All-Weather Fighter [redacted]

B. Cont'd.

1. Configuration changes.

a. Tail turret will be eliminated and replaced by tail fairing.

b. Center panel slats or equivalent lift devices.

c. Relocate, electrical equipment, radio, radar, miscellaneous to aft end of fuselage to meet balance requirements.

2. Weight Summary.

Spec. Airplane	49,810 lbs.
Addition of Detail Spec. weight change items.	418 lbs.
Addition of tail fairing	60 lbs.
Addition of C. P. slats	130 lbs.
AIRPLANE WEIGHT WITH ADDITIONALS	50,418 lbs.
Deletion of Tail Turret -	1,089 lbs.
Reduction of Fuel -	287 lbs.
TAKE-OFF GROSS WEIGHT	49,042 lbs.
COMBAT GROSS WEIGHT	36,855 lbs.

3. Performance Summary.

V Max.	599 m.p.h.
T. O. Distance	6,100 feet
Range	2,000 miles

[redacted] V-33641

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Amendment No. 10 to
Letter Contract W 33-038 ac 6266

Curtiss-Wright Corporation
Columbus, Ohio

APPROVED: _____ 1946
By Direction of the Secretary of War under the Provisions of Public Law 703, 77th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, dated 27 December 1941.

H. A. SHEPARD
Colonel, Air Corps
Deputy Chief, Procurement Division

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HEADQUARTERS
AIR MATERIEL COMMAND

T3RPS3B-AAC,mlc
Wright Field, Dayton, Oh
27 May 1942

Subject: Letter Contract dated 4 May 1942
designated Supplement to W 33-038 ac-[illegible]

[illegible] Corporation
(Airplane Division)
Columbus 16, Ohio

Amendment No. 10 to
subject Letter Contract

1. Subject Letter Contract, as heretofore amended, placed an order with you for the supplies or services therein described.

2. It is now desired to increase the amount you are authorized to expend or obligate thereunder from $5,419,969.52, as set forth in paragraph 4 thereof, to $8,502,145.52.

3. If the foregoing is acceptable to you, kindly so indicate by signing the three numbers of this Amendment and return same to the Contracting Officer forthwith, whereupon subject Letter Contract shall be deemed amended accordingly, subject to the written approval of the Secretary of War or such individual as said Secretary may designate.

4. This instrument has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 880, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

NOTE. Type or print names under all signatures.

THE UNITED STATES OF AMERICA

BY _____
W. A. DAVIS, Lt. Col., Air Corps
Contracting Officer

ACCEPTED 27 May, 1942

[illegible] CORPORATION
[illegible] DIVISION
(Contractor)

By _____
Edwin J. Ducayet - Representative

APPROPRIATE SEAL

[illegible] AIR FORCE DIVISION
MAY 27 1942

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The Finance Officer, U. S. Army, Court Square Building, 2 Lafayette Street, New York, New York, is designated as the officer to make payments in accordance with this contract.

The sums to be expended by the Government hereunder are chargeable to the following allotments, the available balances of which is sufficient to cover the same.

210,

AFP 1.37691, 221103

Ref R&R from TSFFA 1,
Captain Lomas dated 7 Aug, 1942

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/S

[redacted]

AIR TECHNICAL SERVICE COMMAND
CLASSIFIED CABLE AND RADIO MESSAGE - AERONAUTICAL BOARD OFFICE

INCOMING MESSAGE

June 19, 1946

2143Z

FROM: WASHINGTON

TO: ATSCWPO

IN REPLY REFER TO: [illegible]

WAR 91451 [illegible] from Brereton [illegible] subject is revision to Military Characteristics of aircraft [illegible] dated 23 November 1945. Reference [illegible] to Air Material Command letter [illegible] MG (TSEAG), similar subject, dated 7 June 1946 AVO to Commanding Officer Wright Field on 17 June 1946 regarding this subject. Action is being taken in this office to revise - Features - Military Characteristics [illegible] will be high performance right and left hand tail turret [illegible] for the tail turret will be deleted; however [illegible] retained as presently shown in the Military Characteristics. The Director of Fire of the Front Aircraft Installation will be increased. [illegible] amount of increase in the Field of Fire in the Front Hemisphere installations has not as yet been definitely decided, it appears [illegible] will be for a 9° decrease [illegible]. A brief explanation [illegible] of this zone will be forwarded in the near future.

ACTION: ATSC

CX-IN 714 F (19 June 46) 1355Z vm

Lu ama wire
TSESA-6-272
dtd. 24 June 46

Copy No. 1

DISTRIBUTIONS:
1. Action TSENG (TSEAG4)
2. Cable Secy.

[illegible]

Only such extracts as are absolutely necessary will be made [illegible] CONFIDENTIAL. This copy will be safeguarded with the greatest [illegible] will be returned to CLASSIFIED CABLE AND RADIO SECTION without delay.

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TSESA-4/OBT:hw
Ext. 3-6395

26 June 1946

Air Materiel Command

GEORGE S. PRICE, Col., A.C.
Chief, Airc. Proj. Section

COMMANDING GENERAL
WRIGHT FIELD
WASHINGTON 25, D. C.
ATTENTION: [illegible], MAJOR PERRY

R ESA-6-335 DUPLICATE CONTRACT W 33-038-AC-6266. THE MOCK-UP DATE FOR THIS CURTISS-WRIGHT : 37 FIGHT AND INCLEMENT WEATHER FIGHTER HAS BEEN SET AS 16 JULY 1946. THE MOCK-UP WILL BE CONDUCTED IN TWO PHASES. PHASE ONE WILL BE FOR THE PURPOSE OF OBSERVANCE OF MOCK-UP BY OFFICIAL OBSERVERS AND OTHERS WHO WILL NOT BE DIRECTLY CONCERNED WITH DETAIL CHANGES AND WILL BE HELD ON THE DAY OF 16 JULY 1946. PHASE TWO CONSISTING OF THE DETAIL ENGINEERING INSPECTION WILL THEN BEGIN ON 17 JULY 1946, AND RUN THRU 20 JULY OR AS LONG AS IS NECESSARY. IT IS REQUESTED THAT THIS OFFICE BE ADVISED OF THE NAME, RANK AND CLASSIFICATION OF ALL PERSONNEL WHO WILL ATTEND THE MOCK-UP FROM YOUR OFFICE AND THE BUAERO. THE MOCK-UP WILL BE HELD AT THE CONTRACTOR'S PLANT, COLUMBUS, OHIO. SIGNED ENGINEERING DIVISION.

Copies to:
Gen. Wright
TSEPS-6D

File: Contract AC-6266 TSRPL-6D 37

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AF Form 33 (30 MAY 44) HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO.	
FILE NO.	

SUBJECT: Military Characteristics for the All-Weather Fighter

TO: Research & Engineering Division, AC/AS-4 DATE 27 JUN 1945

FROM: Requirements Division, AC/AS-3 COMMENT No. 2
Capt Ellis/mal/72384

1. During the past two months, a large amount of correspondence and numerous conferences have been held concerning the armament requirements for the All-Weather Fighter. To date, the only decision rendered has been to delete the requirement for the tail turret.

2. The main problem, of how large a cone of fire should the nose turret possess, has not been settled because the following questions are unanswered:

a. What is the optimum offset firing position of fighter to bomber when all factors, such as the following, are considered:

(1) The ballistic wind effect.

(2) The effect on the stability of the airplane when the gun barrels are moved three or four feet into the slipstream at a large angle.

(3) The mechanical limitations of the turret and the radar equipment.

(4) The effect that a large, heavy turret in the nose will have on the configuration and performance of the airplane.

b. Is it reasonable to expect a fighter to have a forward cone of fire large enough to enable the fighter to stay outside of the effective tail cone of a bomber?

c. If the fighter cannot stay outside of the bomber's effective tail cone, would it be feasible and desirable to have the fighter's radar equipment control the airplane instead of a turret and thus require only fixed guns?

3. Your comments and those of the Air Materiel Command are requested concerning the questions listed in paragraph 2. Specifically requested is a statement, in degrees, of the optimum cone of fire, plus any over-travel necessary to give the mechanism time to be tracking properly when the optimum point is reached.

4. Until such time as the information requested above is furnished, the 30° cone of fire already required will remain unchanged. However, the following amendments to the Military Characteristics of Aircraft (All-Weather Fighter) dated 23 Mar 1945, are approved:

a. Paragraph A: Class - High Performance Night and Inclement Weather Fighter.

b. Paragraph B: Mission - The execution of night fighter and intruder missions during periods of darkness and during periods of inclement weather.

c. Paragraph C 2 (b): Guns - The minimum requirement for aircraft weapons is

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AF HQ-33 (20 MAY 44) HEADQ RTERS ARMY AIR FORCES

TALLY NO	
FILE NO.	

ROUTING AND RECORD SHEET

SUBJECT: Military Characteristics for the All-Weather Fighter

TO:

DATE 27 JUN 194[illegible]

COMMENT No. 2 (Con't)

FROM: Capt Ellis/mal/72284

a gun with the reliability and ease of maintenance of the caliber .50 M-3, and with the ballistic characteristics and destructive ability of the caliber .60. Guns will be flexibly mounted so as to provide 15° of movement in any direction from the longitudinal axis of the airplane. Automatic gun-laying will be incorporated to provide master control for all guns. A minimum of four (4) forward firing guns is required. Aircraft should be designed and constructed to permit the interchangeability of installation between caliber .60 or comparable guns and the 20 mm cannon.

d. Paragraph C 2 (c): Ammunition - Sufficient ammunition to provide 20 seconds of fire per gun is required.

for Jasper N. Bell
ALFRED R. MAXWELL
Brig Gen., USA

AFRDH A.E. Bailey
A/C [illegible]
C/M [illegible]
Elec [illegible]
AFRDP [illegible]
Ftr [illegible]

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[illegible]
Airplane Division-Propeller Plant
Columbus 16, Ohio

[illegible], 1946

Notes on conference of 27 June 1946 at Curtiss-Wright Columbus between representatives of the Air Materiel Command, Westinghouse Electric Co., and Curtiss-Wright concerning installation of Westinghouse 24-C Turbo-jet engines in the XP-87 Airplane

Those Present

J. M. Herald	Air Materiel Command
L. L. Ahern	Air Materiel Command
W. A. Mechenney	Westinghouse
[illegible] C. Benedict	Westinghouse
[illegible] Lyden	Curtiss-Wright
[illegible] Klesh	Curtiss-Wright
L. Stevens	Curtiss-Wright
H. Conover	Curtiss-Wright
E. Kempton	Curtiss-Wright
[illegible] Collins	Curtiss-Wright

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Agenda and Discussion

1. Scheduled deliveries and model of engines to be installed in XP-87.-

   No one present was definitely sure of the engine models to be allocated to the XP-87. The Army will make further checks to determine definitely the allocation.

   It was the opinion of Mr. Ahern that all engines would be 24C-4A's and that the first 5 engines allocated to Curtiss-Wright would be experimental.

   Mr. Mechenney was of the opinion that 16 engines were to be allocated to the XP-87 of which 10 were to be experimental and might include 24C-4A's and 6 were to be production 24C-4B's.

2. Mock-up engine -

   Mr. Benedict stated that Curtiss-Wright was scheduled to receive the last mock-up of seven now under construction sometime in September, 1946. The model configuration of this mock-up is unknown. The first mock-up for the Navy will include the emergency fuel system and right-hand side accessory location.

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3. Drawings, installation and operational data -

a. Engine configuration (up to date drawings needed)-

Westinghouse is concentrating on producing complete sets of drawings for the 24C-4B production engines. The first set, for right-hand side accessory location are expected to be available approximately August 1. Complete sets of outline drawings will not be made for the -4A's or the experimental -4B's, but piping drawings and other detail drawings showing differences from the production -4B's will be supplied. Separate outline drawings of engine accessories are now being prepared, the fuel pump drawing will be available by approximately July 1. Other detail drawings showing changes from the present drawings will be sent piecemeal to Curtiss-Wright to expedite installation information until the production drawings are available.

It was agreed that a Curtiss-Wright engineer would be sent to Westinghouse approximately the week of July 8 to trace out and discuss the changes in engine configuration between the present drawings, the -4A, the experimental-4B and the production -4B.

b. Rotation of accessory housings: R.H. and L.H. desired-

Accessory gear case configuration will be approximately as shown in present drawings and installation manual. Rotation of drives will be as shown in installation manual. Right-hand side and left-hand side locations will be as though the presently shown configuration were simply rotated with the engine to right or left. Curtiss-Wright requested that of the first 4 engines allocated 2 right-hand accessory engines and 2 left-hand be provided and that future deliveries be in pairs, left and right-hand.

c. Number, location and direction of rotation, structural integrity of gear housing and horsepower of accessory mountings -

On either left-hand side or right-hand side gear case location the relative accessory location from top to bottom will be the same, as follows:

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Accessory	Location	Approx.drive rating
Fuel pump and governor	Top-rear	15 HP
Hydraulic pump	Top-front	15 HP
Generator	Center-rear	38 HP
Tachometer generator	Special pad front	1 HP
Oil pump	Bottom-rear	15 HP
Emergency fuel pump	Bottom-front	15 HP

Mr. Benedict stated that he had no doubt concerning the ability of the accessory gear case to support these accessories structurally.

Mr. Benedict discussed the emergency fuel system and it was felt by all that the system met Army requirements in all respects except for manual selection for testing. It may be possible to incorporate this provision without too great modification or development. Curtiss-Wright recommended the acceptance by the Army of the Westinghouse emergency fuel system as now developed. The Army will check the requirements with Westinghouse.

Mr. Benedict was to send envelope dimensions for the emergency fuel pump to Curtiss-Wright on Friday, June 28. He felt from inspection of the mock-up that sufficient clearance was provided in the installation to accomodate this pump.

Because of the close clearances provided in the installation for the tachometer generator, it was felt that a right-angle adapter might be installed on the drive pad with a flexible drive shaft to the tachometer generator, which would then be located at a position where clearance was adequate. Curtiss-Wright is to study this suggested arrangement.

It appears that it may be necessary to move the engines slightly aft from their present location to provide clearance for the hydraulic pump. Curtiss-Wright is to study this item.

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d. Oil dilution-hopper in tank -

Mr. Benedict stated that Westinghouse will recommend that AN-O-C oil be used, a low congealing point oil which should not require dilution or heating. The Army is to check the suitability of this oil and advise whether any further anti-congealing provisions must be made.

e. Water injection, afterburning or flash power -

Water injection, afterburning, or flash power ratings will be made available in the initial stages of production. Curtiss-Wright pointed out that "emergency" power ratings were very desirable for take-off on hot days.

f. Fire seal - bulkhead location -

Both Westinghouse and Army representatives recommended a compartment fire-seal bulkhead at the entrance to the combustion chamber. The Army representatives did not believe the heater muff to be a satisfactory seal as regards battle protection.

g. Nacelle anti-icing provision -

It was agreed that no engine and duct anti-icing provisions would be made until the results of NACA tests and Army developments were known and methods were recommended by the Army.

h. Emergency fuel system -

It was recommended that the Westinghouse fuel system as now developed be used. See (c) above. The Army is to discuss their requirements with Westinghouse and notify Curtiss-Wright of approval.

i. Tail pipe extension -C.F.E. or C.P.E -

It was recommended by Westinghouse that the tailpipe be C.F.E.. Concurrence was given by Curtiss-Wright and Army representatives. However, Westinghouse may still be asked to manufacture the tailpipe as a direct vendor to Curtiss-Wright.

Mr. Benedict is to send recommended dimensions of tailpipe extension to Curtiss-Wright.

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[illegible] July 2, 1945

[illegible] plans as yet to use any [illegible]. However, the power plant [illegible] recommended to Curtiss-Wright that the fuel system be designed for JP-2 fuel and this has been done. Because of higher specific gravity of [illegible], present AL-37 tankage will be adequate for grueling.

The Army is to discuss this question with Westinghouse and will have the right of their decisions and recommendations.

k. Oil cooler required on -41 model -

Although on some installations heat transfer from tank alone may provide sufficient cooling, Westinghouse is providing a duct type cooler in the same [illegible] as the -41 cooler, extending 6½" forward of the [illegible] support.

l. [illegible] between -41 and -43 models -

[illegible] above. Curtiss [illegible] to Westinghouse to determine [illegible].

4. Performance curves - up to date -

New performance curves will be supplied by Westinghouse approximately during the middle of July. The military power curves will probably be little changed from those in the present manual. Altitude performance may be somewhat better than that now shown.

5. Oil flow rate-expansion space -

Mr. Wagner stated that the oil flow rate is approximately 600 gallons per hour. One gallon expansion space is recommended.

6. Oil consumption at various RPM's -

The variation of oil consumption with RPM has not yet been determined. Tests will be conducted and curves will be available approximately in the middle of December. At present Westinghouse recommends using 1 gallon per hour oil consumption regardless of RPM and provision of 2 gallons reserve.

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c. Power loss vs compressor bleed-off quantity -

Mr. Benedict stated that in his opinion approximately 1½ to 2 percent loss in thrust would be sustained for each 1 percent bleed-off by weight.

There will be no compressor bleed-offs on the experimental engines. On the production engines 8 bleed-off points will be provided, located symetrically around the aft end of the diffuser section. Each bleed-off point will have approximately 2 lbs/min capacity. The bleed-off ports will consist of square pads with approximately 1/2" diameter ports. Ports cannot be used individually because of danger of unsymetrical airflow through compressor. Therefore, ports must be manifolded, with each port restricted to give the desired total flow with each port contributing an equal amount. Some oil will be present from front bearing leakage, but its extremely small proportion relative to airflow should cause no concern. Vapors will accumulate in pressurization system after a false start, and their scavenging should be given consideration.

d. Windmilling RPM and drag -

e. Idling RPM and thrust at various altitudes and airspeeds -

Answers to the above questions are urgently needed by Curtiss-Wright to determine starting requirements, generator operation speeds and performance with one or more engines inoperative.

Mr. Benedict expected flight test results to become available by approximately the middle of December for the 24 engines. These tests would also include locked rotor tests. In the meantime Mr. Benedict promised Curtiss-Wright the results of tests on the 19b engine as soon as possible. (Tentatively, sometime in July). Mr. Benedict stated that he believed that 4000 RPM would be the normal idling RPM for any altitude.

f. Power curves based on compressor entrance conditions -

Mr. Benedict stated that these curves would become available in approximately two weeks.

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c/

g. Thrust vs tail pipe position -

Curtiss-Wright representatives asked if variable exit tailpipes would be available, with attendant advantages for "flash power" ratings, lower cruising fuel consumptions, and increased acceleration from low to high thrust.

The Westinghouse representatives stated that no arrangement had yet been released nor was any expected for initial production 24C-4B's, despite the advantages. One of their main difficulties is to obtain automatic operation as requested by the Navy. They believe that a manual arrangement could be made without too much difficulty.

No calculated curves of thrust vs tailpipe area are available.

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GEM CRAWFORD/EEH/mr/4262

Subject: Military Characteristics of All Weather Fighters (AFDRE-2)

1st Ind.

Headquarters, Army Air Forces, Washington 25, D. C., 12 July 1946

To: Commanding General, Air Material Command, Wright Field, Dayton, Ohio.
Attention: [redacted] (MCREX)

1. The requirement for the tail turret has been deleted from the Military Characteristics for the all weather fighter aircraft.

2. A decision as to the size of the forward cone of fire for the all weather airplane has not as yet been settled, due to the lack of answers to the following questions:

a. What is the optimum effect firing position of fighter-to-bomber fire based on the following factors:

(1) Ballistic wind effect on projectile and lead angle.

(2) Effect on stability and performance of the airplane when gun barrels are moved three (3) feet or more into the slipstream at large angles.

(3) Mechanical limitations of turret and radar equipment and the practicability of nose turrets in jet fighters having large airscoops placed at the nose section of the airplane.

b. Is it reasonable to expect a fighter to be able to stay outside of the effective tail cone of a bomber? If so, can accurate fire with a turret having a forward cone of fire large enough to permit these tactics be obtained?

c. If the fighter cannot stay outside of the bomber's effective tail cone (due in part to tail warning and evasive action on the part of the bomber pilot), is it feasible or desirable to have a fighter's radar equipment control the airplane having fixed guns instead of a gun turret with the possibles that the turret presents in weight or drag?

3. Pending clarification of the above problems, the thirty (30) degree cone of fire already required in the Military Characteristics will remain unchanged.

4. It is directed that your comments and answers to the questions in paragraph 2 be forwarded to this Headquarters at the earliest possible

OFFICE SYMBOL	1. AFDRE-2	2.	3.	4.	5.
GRADE AND SURNAME OF COORDINATING OFFICERS				[redacted]	

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Gen Groves/ESH/ec/4362

[redacted]

Subject: Military Characteristics of [redacted]
All Nuclear Projects

date. Further, that any requests of whether to designate the optimum case of fire in degrees based on engineering considerations, including over-burst necessary to give the detonation which is to be selected presently before the optimum point is reached, be forwarded to this headquarters at the same time.

By command of General [redacted]

[redacted]
Brigadier General, USA
Chief, Executive & Engineering Division
Office, AC/AS-4

NR 3 Apr
13 JUL 1946
AA
MIL. SECTION

[redacted]

OFFICE SYMBOL	1. AFDRE-2	2. AFDRE-4	3.	4.	5.
GRADE AND SURNAME OF COORDINATING OFFICERS	[redacted]	[redacted]			T-84878
	[redacted]	[redacted]			
	[redacted]	Wm McTague		T-2	

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HEADQUARTERS ARMY AIR FORCES

WASHINGTON, D. C. [redacted]

23 November 1945
(Revised 16 July 1946)

SUBJECT: Military Characteristics of Aircraft (All-Weather Fighter)

TO: Assistant Chief of the Air Staff - 4

1. The following principal characteristics of the All-Weather Fighter are approved:

ALL-WEATHER FIGHTER AIRCRAFT

A. Class - High Performance Night and Inclement Weather Fighter.

B. Mission - The execution of night fighter and intruder missions during periods of darkness and during periods of inclement weather.

C. Requirements -

1. Performance -

(a)	High speed at 35,000 ft.	525 mph
(b)	High speed at Sea Level	550 mph
(c)	Climb to 35,000 ft.	12 minutes

Remarks: The above requirements are to be with full internal fuel, normal design armament, radio and accessories installations. War emergency rating may be used to reach the above requirements.

(d) Combat Radius of Action at 10,000 ft. - 600 miles
at best operational altitude - 1000 miles

Remarks: Maximum combat radius of action will be based on climb to best operational altitude, then cruise out at best operational altitude to the target and engage in combat over the target for 15 minutes at Military Rating and 5 minutes at War Emergency Rating. Cruise back at best operational altitude and arrive over home base with fuel for 30 minutes operation at minimum consumption at an altitude of 5,000 ft. Combat radius of action at 10,000 ft. will be based on climb to 10,000 ft., then cruise out 600 miles and return at 10,000 ft., and arrive over home base with fuel for 30 minutes operation at minimum consumption at an altitude of 5,000 ft. The above requirements are to be met under the same load conditions as specified for high speed and climb, with the addition of the necessary external fuel to realize the combat radius of action.

(e) Performance priorities - If after all requirements have been met additional performance can be realized, it is desired that consideration be based on : (A) more speed and (b), more range.

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Military Characteristics of Aircraft
"All-Weather Fighter Aircraft"
23 November 1945 (Revised 16 July 1946) [redacted]

(f) Flying characteristics - The highest degree of controllability and maneuverability possible is desired. Ability to accomplish sustained dives at steep angles is required throughout the altitude operating range.

2. Armament -

(a) Automatic Rocket Fire - To meet future requirements for fighter aircraft, a rocket installation completely housed within the aircraft capable of automatically firing high velocity rockets which are suitable for air-to-air and air-to-ground combat shall be developed.

(b) Guns - The minimum requirement for aircraft weapons is a gun with the reliability and ease of maintenance of the caliber .50 M-3, and with the ballistic characteristics and destructive ability of the caliber .60. Guns will be flexibly mounted so as to provide 15° of movement in any direction from the logitudinal axis of the airplane. Automatic gun-laying will be incorporated to provide master control for all guns. A minimum of four (4) forward firing guns is required. Aircraft should be designed and constructed to permit the interchangeability of installation between caliber .60 or comparable guns and the 20 mm cannon.

(c) Ammunition - Sufficient ammunition to provide twenty seconds of fire per gun is required.

3. Gunsight - The best available computing and automatic ranging gunsight which is adaptable for use in connection with air-to-air firing, air-to-ground firing, dive bombing and rocket firing is required.

4. Ground Attack Installations - Provisions are required for the installation of a minimum of two bombs in all standard sizes up to 1000 lbs. Provisions shall also be made for the installation of a minimum of eight rockets. Consideration should be given to the versatility of these and other ground attack installations in conjunction with the external fuel tank provisions so that as many alternate combinations as possible may be used.

5. Armor - The crew shall be protected from .50 cal. armor piercing fire from the front and at all angles not greater than 10° to the longitudinal axis of the airplane, except as follows: with the airplane in a normal attitude of horizontal flight, windshield armor glass need only extend upward to a position where the average pilot's head will be protected from forward horizontal fire when sitting in the normal position

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against the back of the seat with the shoulder straps fastened. The crew shall be protected from .50 cal. armor piercing fire from the rear at all angles not greater than 20° to the longitudinal axis of the airplane. The mission of the airplane demands that engineering be undertaken to provide flak and splinter protection to the extremely vulnerable portions of the power plant. Provisions will also be made for the installation or removable bottom armor for protection of the pilot and the power plant.

6. Crew - Pilot and radar observer.

7. Fuel -

(a) Internal - All internal fuel will be in tanks capable of self-sealing with the type of fuel carried.

(b) External - Total fuel required externally for maximum combat radius of action problems will be only that amount required to climb to altitude from points of take off and cruise to initial arrival over target. There will be provision points to meet maximum combat requirements. Such provisions must be capable of use at all operational altitudes.

8. Equipment -

(a) Cabin pressurization - Automatic pressurization will be provided and maintained at a safe differential of pressure.

(b) Automatic pilot - An automatic pilot is required.

(c) Oxygen system - A pressure demand system will be installed in accordance with existing specifications.

(d) Crew comfort -

(1) Provisions for at least one quart of thermos contained liquid foods is required for each crew member of aircraft assigned to missions of four to six hour duration. Provisions of two quarts per crew member is required for aircraft assigned to missions of more than six hours duration. These containers will be mounted with hose "leads" for dispensing of the liquids to the crews.

(2) A hammock type seat, or seat of equivalent comfort, with arm rests, is required.

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[illegible] Characteristics of Aircraft
"All Weather Fighter Aircraft"
20 November 1945 (Revised 16 July 1946)

(3) Provisions shall be made for maximum extension of the pilot's legs for comfort.

(4) An adequate crew relief system will be provided.

(e) Radio - The latest type of communications and radar equipment suitable for this type aircraft will be installed. Facilities required are as follows:

(1) Ground-to-air and air-to-air communications.
(2) Long range navigational equipment.
(3) Identification friend or foe.
(4) Warning, interception and short range navigational equipment.
(5) Air controlled blind landing equipment.

(f) Camera - A gun camera and radar scope camera will be installed.

(g) Instruments - All instruments necessary for the proper performance of the mission of the aircraft are required. Consideration will be given to wind screen projection of all the instruments that are necessary when tracking an enemy aircraft under instrument flying conditions.

(h) Heating system -

(1) An air conditioning system is required for the pilot and the radar observer compartments.

(2) Heating of all airfoil surfaces (except propellers) sufficient to keep these surfaces free from ice formations is required. Propeller deicers are required on all aircraft using propellers.

(i) Flight brake - A means of rapid deceleration of aircraft upon closure with the enemy will be provided.

(j) Crew escape - Provision for emergency ejection of crew members will be considered.

(k) Taxi light - A taxi light will be installed.

(l) Fire extinguisher - A fire extinguishing system will be [illegible]

4. Structure and Design Features -

(a) Visibility - The forward downward visibility over the nose [illegible] the pilot's eye is aligned with the gunsight will not be less than 12°.

(b) Aircraft will be capable of being towed through the [illegible]

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Military Characteristics of Aircraft
"All Weather Fighter Aircraft"
23 November 1945 (Revised 16 July 1946)

[redacted]

(c) Maintenance - Ease of [redacted], repair, and replacement of parts will receive major consideration. Design and construction of the aircraft should be such that the time required to change a single power unit under field conditions shall not exceed one hour. Conduits and control systems shall be arranged and designed so that they may be connected and disconnected quickly.

(d) Consideration should be given to the incorporation of suitable mounting facilities for attaching rocket boost units for assisted take-off. These mounting mechanisms should contain a device for quick release of the rocket units by the pilot; they should furthermore be automatically recessible into the aircraft structure upon release of the rocket units.

(e) Fire prevention - Emphasis must be placed on reduction of fire hazards through engineering design. Fire extinguishing systems must be easily operated in flight to control engine fire. A maximum reduction of fire probability through battle damage must be attained by careful engineering.

(f) Simplicity of design and suitability to quantity production should be emphasized.

FOR THE COMMANDING GENERAL:

(s) Alfred R. Maxwell
ALFRED R. MAXWELL
Brig. General, USA
Chief, Requirements Division
Office of Asst. Chief of Air Staff-3

7 Aug. 1946- Distribution by Aircraft Projects Section, TSEEA, Engineering Division.

25	AC/AS-4	1	TSEPE
1	TSDZO - Att. Mr. Fiala	1	TSEPR
1	TSEEG	1	TSEAM
1	TSENG-1	1	TSEPF
1	TSESE	1	TSEAA
1	TSEAR	1	TSEAP
	1 TSEPA	1	TSXCW
3	TSELT	1	TSOME
2	TSEUT2C	1	Hamilton-Standard Prop., E. Hartford, Conn.
2	AAF Prov. Gr. Command	1	General Electric, Schenectady, N.Y.
3	TSEAC (1 Design Br., 1 Mr. Lippman)		
1	TSEPP	1	Curtiss-Wright Prop. Div., Caldwell, N.J.
1	TSEPS	1	Aeroproducts Div., Dayton, Ohio
1		1	Wright Aero., Paterson, N.J.
1	Allison Div., Indianapolis, Ind.	1	Pratt & Whitney, E. Hartford, Conn.

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HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

IN REPLY REFER TO:

16 July 1946

SUBJECT: Military Characteristics for Aircraft, All-Weather Fighter.

TO: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio
Attention: Engineering Division (ISESA-4)

1. Reference is made to your letter dated 7 June 1946, subject: "Suggested Changes in Military Requirements for All-Weather Fighter Airplanes." With specific reference to paragraph 7-b of 7 June letter, the rear turret requirement was eliminated by message WAR 91651, 18 June 1946.

2. The following additional changes to subject military characteristics are approved by AC/AS-3:

a. Paragraph A: Class - High Performance Night and Inclement Weather Fighter.

b. Paragraph B: Mission - The execution of night fighter and intruder missions during periods of darkness and during periods of inclement weather.

c. Paragraph C 2 (b): Guns - The minimum requirement for aircraft weapons is a gun with the reliability and ease of maintenance of the caliber .50 M-3, and with the ballistic characteristics and destructive ability of the caliber .60. Guns will be flexibly mounted so as to provide 15° of movement in any direction from the longitudinal axis of the airplane. Automatic gun-laying will be incorporated to provide master control for all guns. A minimum of four (4) forward firing guns is required. Aircraft should be designed and constructed to permit the interchangeability of installation between caliber .60 or comparable guns and the 20 mm cannon.

d. Paragraph C 2 (c): Ammunition - Sufficient ammunition to provide 20 seconds of fire per gun is required.

3. The recommendation that rear armor plate protection be reduced from .50 caliber to flak protection only is disapproved.

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Ltr to CG, AAF,(ASSA-4), 16 July 46, subj: Mil. Char. for A/C, All-Weather Fighter.

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4. It is requested that all of the above changes be incorporated into a revision of Military Characteristics for Aircraft, All-Weather Fighter Aircraft, dated 23 November 1945, and that distribution of the revision be made to all holders of copies of this document.

By Command of General SPAATZ:

Ralph R. Graichen

RALPH A. GRANFORD
Brig. General, U.S.A.
Chief, Research & Engineering Division
Office, Asst. Chief of Air Staff - 4

1st Ind. TSESA:as

Hq. AMC, Wright Field, Dayton, Ohio, 19 August, 1946

TO: Commanding General, Army Air Forces, Washington 25, D. C., Attn. AC/AS-4

1. Inclosed are twenty-five copies of the Military Characteristics on "All-Weather Fighter Aircraft," as revised 16 July 1946.

FOR THE COMMANDING GENERAL:

by John W. Carlton

GEORGE E. PRICE, Lt Colonel
Colonel, Air Corps,
Chief, Aircraft Projects Section,
Service Engineering Subdivision,
Engineering Division.

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Hist. Summary, 1946-47, Vol. I

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HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	
FILE NO.	

SUBJECT:	Cockpit Installation of the P-87 Curtiss All-Weather Fighter
TO	Research and Engineering Division, AC/AS-4
DATE	23 JUL 1945
FROM:	Requirements Division, AC/AS-3
COMMENT No.	1
	Lt Col Mahurin/mbj/72284

1. A representative of this office who participated as a member of the Mock-Up Board at the Curtiss-Wright Factory, Columbus, Ohio, noted with consternation that the instrument panel of the P-87 was over-shadowed by a wealth of the same size and similar function instruments and dials. A photograph of the mock-up instrument panel is attached for consideration. It was stated by a representative of the Instrument Laboratory at Wright Field that a request had come in from combat theaters that engine instruments be of individual nature, i.e., one tachometer for one engine, one fuel pressure gauge for one engine, etc. Such an installation will require four individual tachometers for a four-engined aircraft, six for a six-engined aircraft, etc. The Curtiss P-87, being a four-engined aircraft, has four tachometers, four turbine inlet temperature gauges, four fuel pressure gauges, four bearing temperature gauges, and four oil pressure gauges. This appears to be a needless duplication.

2. As a result, the instrument panel of the P-87 seems completely out of proportion. It is obvious that the pilot will be needlessly confused by quadruplicate engine instrument installations where duplicate installations would suffice. In this particular instance, substituting dual indicating instruments for the single indicating type will mean the removal of ten engine instruments from the control panel.

3. Apparently the change in instrumentation arose from instances in which the wrong engine was feathered during an emergency. It was felt that installation of individual instruments would reduce the probabilities of such an error. In the case of a reciprocating engine, it is possible to take corrective action with the advent of a mechanical failure. Proper use of cowl flaps, mixture controls, propeller pitch and manifold pressures can be employed to correct engine trouble under certain conditions. However, with the jet engine, the only corrective action to be taken is to shut the engine off. In most cases it is not imperative to shut the engine off immediately so there should be no need to worry about inadvertently cutting the wrong engine.

4. It is requested that the contractor be directed to replace all individual engine instruments with the dual indicating type.

3 Incls
2 ea tos

for Leslie O Peterson
ALFRED R. MAXWELL
Brig General, USA
Chief, Requirements Division

APPRN (A/C)

APPRP (For)

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F-1

ARMY AIR FORCES
AIR MATERIEL COMMAND
ENGINEERING DIVISION
MEMORANDUM REPORT ON [redacted]

TSESA-4/OBT:hw

Date 30 July 1946

SUBJECT: Mock-Up Inspection
XP-87 Airplane

OFFICE Aircraft Projects Section Contract or Order No. W33-038-AC-6266

SERIAL No. TSESA-1299 Expenditure Order No. 430-256

A. PURPOSE:

1. To report the results of the Mock-Up Inspection of the Curtiss-Wright XP-87 airplane, two of which are being procured on contract W33-038-AC-6266.

B. FACTUAL DATA:

1. The mock-up was held at the contractor's plant, Columbus, Ohio, on July 16 - 19, 1946.

2. Personnel attending the mock-up were as follows:

Mock-Up Board

Lt. Col. W. M. Mahurin——————Hq. AAF, ACAS-3
Maj. G. W. McLaughlin——————Hq. AAF, ACAS-4

Maj. F. E. Blum——————Maintenance Div., A.M.C.

Lt. Col. J. L. Brownewell——————Aircraft Lab., AMC
Col. R. S. Garman——————Aircraft Proj. Sec., Fighter Br.
Mr. O. B. Thornton——————Aircraft Proj. Sec., Fighter Br.

Committee Members

Maj. W. B. Sellers——————Procurement Division, AMC
Mr. J. R. Austin——————Procurement Division, AMC

Mr. L. H. Johnson——————Maintenance Division, AMC

Mr. E. M. Polk——————Aircraft Laboratory, AMC
Mr. H. Headland——————Aircraft Laboratory, AMC
Mr. J. Gramer——————Aircraft Laboratory, AMC
Mr. J. L. Carrell——————Aircraft Laboratory, AMC

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Eng. Div. Memo. Rpt. No. TSESA-1299
Mock-Up Inspection - XP-87 Airplane
30 July 1946

Mr. J. A. Weatherford----------Equipment Laboratory, AMC
Mr. J. F. Randak, Jr.----------Equipment Laboratory, AMC
Mr. L. V. Larson----------Equipment Laboratory, AMC

Mr. L. B. Peltier----------Power Plant Laboratory, AMC
Mr. R. B. Keusch----------Power Plant Laboratory, AMC
Mr. J. E. Deremer----------Power Plant Laboratory, AMC

Mr. C. Castellano----------Aero Medical Laboratory, AMC

Mr. V. G. Lager----------Armament Laboratory, AMC
Mr. E. E. Rorer----------Armament Laboratory, AMC

Mr. R. T. Downey----------Systems Engineering Lab., AMC

Capt. J. E. Woodard----------Personal Equipment Lab., AMC

Mr. J. M. Herald----------Airc. Proj. Sec., Fighter Br.

OFFICIAL OBSERVERS

Brig. Gen. A. R. Maxwell----------Hq. AAF, ACAS-3
Col. G. H. Austin----------Hq. AAF, ACAS-3
Col. D. E. Bailey----------Hq. AAF, ACAS-3

Maj. R. Mickey, U.S.M.C.----------BuAero, Washington
Cmdr. E. P. Aurand, U.S.N.----------BuAero, Washington

Mr. J. M. Dannaher----------Ordnance Staff
Mr. A. W. Knisley----------Aviation Ordnance Engr. Office

Lt. Col. W. A. Davis----------Procurement Div., AMC

Col. E. J. Kendricks----------Aero Medical Laboratory, AMC
Lt. Col. A. P. Gagge----------Aero Medical Laboratory, AMC

Mr. C. L. Hall----------Airc. Proj. Sec., Fighter Br.

3. The mock-up was of very good workmanship, complete in detail and entirely adequate for the purpose intended. Many layout and detail drawings were arranged on the walls inclosing the mock-up area and were very useful to the Committee members. Curtiss-Wright engineers who were in charge of specialized departments were available within the mock-up inclosure at all times and cooperated in every way possible with the Committee members.

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4. While many features of the mock-up were commented upon favorably by members of the Mock-up Board, this report will be confined to changes and studies recommended by the Committee members in order to improve the utility and serviceability of the airplane.

C. CONCLUSIONS:

1. The mock-up was complete, well constructed and adequate for the purpose intended.

2. Certain design changes are necessary to improve the utility and serviceability of the airplane.

D. RECOMMENDATIONS:

1. It is recommended that the contractor be furnished copies of this report.

2. It is recommended that the contractor make the changes and studies recommended in Exhibit "A" to this report.

Prepared by O. B. Thornton
O. B. Thornton

Approved by R. S. Garman
R. S. Garman, Col., A.C.
Chief, Fighter Branch

Approved by John N. Carter for
GEORGE E. PRICE, Col., A.C.
Chief, Airc. Proj. Section

Distribution:
Curtiss-Wright Corp.
AAF PFO, Dayton
ACAS-4 (3 cys)
ACAS-3
BuAero Gen. Rep. (4 cys)
Procurement Div.
Maintenance Div.
Ordnance Staff
Avia. Ord. Engr. Office
Quality Control Sec., Proc. Div.
Aero Medical Laboratory
Aircraft Laboratory
Armament Laboratory
Equipment Laboratory
Personal Equipment Laboratory
Power Plant Laboratory
Systems Engineering Laboratory
Equipment Br., Airc. Proj. Sec.
Fighter Br., Airc. Proj. Sec.

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Eng. Div. Memo. Rpt. No. TSESA-1299
Mock-Up Inspection - XP-87 Airplane
30 July 1946

EXHIBIT "A"

A. Aircraft Laboratory, Mechanical Br. -

1. Provide adequate space around hydraulic reservoir to allow filling with a one gallon can as required by Specification AN-H-2B. Size, detail design and mounting of reservoir to be in accordance with Specifications AN-H-2B, and AN-R-7A.

2. Make provisions in the hydraulic system to prevent inadvertent operation of the up and down locks due to back pressures, surges, or thermal expansion. The five port selector valve is a suggested means of correcting this condition.

3. Provide a suitable means of locking the selector valve handle in neutral position when the gear is down and weight is on the main wheel strut.

4. Submit final drawings of hydraulic system to Air Materiel Command for approval and assurance of conformance with Specification AN-H-2B.

5. Study a method of designing the landing gear fairing doors to prevent jamming due to mud thrown up while taxiing. No action necessary on "X" models.

B. Aircraft Laboratory, Inspection Section. -

1. Provide an external emergency release for the canopy. Also provide flush hand grips to lift canopy clear after it has been released. Label external release in accordance with Specification 98-24105S.

2. Study and make space provisions for dual control system for use on production airplanes. No action required on "X" models.

3. In the canopy redesign the canopy should be designed so as to move aft without first moving up.

4. Install measuring and leveling provisions in accordance with Specification AN-M-18.

5. Provide for adequate drainage of the lower sections of all engine cowling.

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6. Control locks on the control column rather than at the control surface are satisfactory on this airplane by previous decision of Air Materiel Command.

7. A deviation from the Handbook requirement for steps and grips to supplement the servicing ladder is hereby granted by the Air Materiel Command.

8. Hinge the fuselage door located just aft of the bomb bay on the forward side. Door may be relocated if necessary to accomplish.

C. Aircraft Laboratory, Special Projects Unit. -

1. Add fore arm guards and upholstery to the ejection seat as specified in Memorandum Report No. TSEAC11-4543-7-2, Addendum 1 dated 1 May 1946.

2. Provide two hand grips for each ejection seat in accordance with the above specification.

3. The foldable hand grips on the ejection seat will be replaced by loop type grips.

4. The hand grips need not be capable of locking in the ejection position since a different type hand grip will be used.

5. Incorporate a canopy release to be located apart from the seat ejection trigger since the loop type handle will be used.

6. Provide adequate clearance between the pilot's seat and the control wheel when the seat is ejected.

7. Relocate the trigger of the left hand ejection seat to the right hand grip of that seat.

8. Make provisions to move the seat to the most bottom aft position before ejection.

9. Limit the weight of all items to be ejected with the seat to a total of 300 pounds.

10. Study a method of relocating the shoulder strap adjustment lever and the vertical seat adjustment lever on the re-mock-up of the cockpit.

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11. Bundle all connections between the pilot and the airplane for the anti-G suit, oxygen hose, head set and microphone cords into a single cable in order to make possible the later incorporation of a Government furnished quick disconnect plug for all these services.

12. Design the catapult such that the top end, when fully extended, shall be able to swing from the line of ejection to 30° aft of vertical without interference when the seat is not in place.

13. Extend the top of the launching rails to a point at least eight inches above the centerline of the catapult trunnion.

14. Select the ejection and back angles of the seat in accordance with Memorandum Report No. TSEAC11-4534-7-2, Addendum 1, dated 1 May 1946.

15. Re-mock-up the ejection seat in compliance with the above comments and install in the re-mock-up of the airplane cockpit.

D. Equipment Laboratory, Mechanical Branch. -

1. Provide for defrosting and defogging of the canopy by discharging a portion of the pressurization and ventilating air over the canopy.

2. Install as test equipment on the "X" airplanes a CO_2 fire extinguishing system to discharge into the engine compartment.

3. Study a method of providing a fire wall between engines in the same nacelle and submit to Air Materiel Command for approval.

4. Install a vapor and liquid type bulkhead to isolate combustibles from hot surfaces of the engine.

5. An access door to enable a ground crew member to extinguish an engine fire will not be required due to the installation of a CO_2 system.

6. Provide a fitting on the pressurized cabin to make possible the testing of the cabin seal on the ground.

7. Relocate the hand fire extinguisher to a higher position and provide a more substantial hold-down clamp.

8. Study the feasibility of using a conductive coating on the windshield for de-icing and defogging and submit results to Air Materiel Command for approval.

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Exhibit "A" to Eng. Div. M.R. No. TSEPE-1199
Mock-Up Inspection - XP-87 Airplane
30 July 1946

9. Study a method of de-icing the slat on the inboard section of the wing for use on production models. No action required on "A" models.

10. Submit calculations on heat requirements for de-icing, to be coordinated with TSEPE-8, Equipment Laboratory, Air Material Command.

E. Equipment Laboratory, Instrument Unit. -

1. Revise Appendix "C" in Model Specification to provide fluorescent instruments for night fighting.

2. Authority is granted for the contractor to use dual instruments for all engine indications except for turbine inlet temperature. Since turbine inlet temperature is the most critical indication, it is considered advisable to retain the single instruments for this one indication.

3. Change method of mounting the vertical gyro in order to make the caging knob readily accessible.

4. Delete the radio compass indicator from the upper right side of the cockpit and relocate the pilot's radio compass indicator in a central position on the instrument panel.

5. Interchange tachometers with tail pipe indicators. This change contingent upon the outcome of the contract deviation to permit use of dual instruments.

6. Authority is granted for the contractor to use standard dual tachometers in lieu of Type [illegible] single indicating instruments.

7. Mark all instruments and wiring to air corps and in compliance with Specification No. [illegible]

8. Make provisions for [illegible]

9. Relocate the landing gear warning light [illegible]

F. Equipment Laboratory, Electrical Unit. -

1. Install [illegible]

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Exhibit "A" to Eng. Div. M. R. No. TSEA-1299
Mock-Up Inspection - XP-87 Airplane
30 July 1946

2. Install over-voltage relays Type C-1, Specification 32553, and a red light (44A18454) in the generator control circuit. Locate the relays as close as possible to the generator control switches.

3. Install wide speed range generators Type Q-2 in lieu of high speed Type Q-1 generators. The generators may be remotely mounted, however, installation drawings should be submitted to the Air Materiel Command for approval.

4. Relocate the external power receptacle to a position in the nose wheel well, preferably close to the towing lug on the nose wheel strut.

5. Install Type FLLL Burndy current limiters in the generator circuits in lieu of reverse current circuit brakers.

6. Install regulators and reverse current relays for each generator in the same compartment. Install ventilating systems to each compartment.

7. Install AAF 32276A regulators in lieu of AN-3080-1 regulators.

8. Install an AN-3380 relay in the battery circuit.

9. Install a locking bar across the rear of the battery. The bar should be a quick disconnect type.

10. Revise the battery sump jar installation to permit servicing without requiring the removal of the batteries.

11. Install wing tip position lights AN-3053-1C on the wing tip tanks for the "X" model airplanes. The installation should be designed to disconnect the lights in the wing tip when the tanks are installed and automatically connect the wing tip lights when the tanks are dropped or not installed.

12. Install upper and lower fuselage lights and two tail lights with flashing mechanism, in accordance with Drawing TSEA-46-21.

13. Delete the recognition lights and switches.

14. Install switch guards conforming to Drawing No. 45A21662 on the generator control switches.

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15. Install Type C-8 ultraviolet lamp assemblies in lieu of C-5. A later change may be requested to provide infa-red lighting in lieu of ultraviolet.

16. Install some means of protection for the inverters to prevent mud, dirt, water, etc., from being thrown on them by the wheel.

17. Install a 100 VA 3-phase inverter as a stand-by for instrument operation.

18. Install an AN-3039-3 vapor-proof lamp assembly in the bomb bay in lieu of AN-3036-1 lamp assembly. This change contingent on directives from the Requirements Division defining the bomb carrying characteristics of all night fighters.

F. Power Plant Laboratory, Installations Unit. -

1. Submit design proposals for segregation of engines as requested in a previous comment.

2. Provide an access door to the fuel strainer.

3. Provide a method for anti-icing of the lips of the engine nacelle, and the air inlet to the thermal anti-icing system when requirements are furnished by the Air Materiel Command.

4. Coordinate with the engine manufacturer the requirements for detents and markings on the throttle quadrant.

5. Provide either a well ventilated fuselage fuel cell compartment or a liquid vapor tight compartment except for drainage provisions.

6. Provide a method of insuring adequate drainage of fuselage fuel cell compartments.

7. Provide a method of locking the fuel control levers.

8. Provide fuel capacity markings on cockpit fuel system diagrams for all fuel tanks.

9. Submit detail drawings and data on the design of the air inlet shut-off valve to Air Materiel Command for approval when more power plant information is available.

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10. Study the requirements for supporting the aft end of the tail pipe to determine if adequate support is provided.

11. Provide a method for drainage for the compressor compartments in the nacelle.

12. No induction air screen need be provided on the "X" model airplanes since it is anticipated that this screen will be incorporated in the engine design.

13. Study a method of draining the excess fuel accumulated in the tail pipe from false starts and submit to the Air Materiel Command.

14. Design the thermal anti-icing waste gate in such a way that it will not open into the jet wake.

15. Use AN-H-24 hose assemblies for engine fuel and oil connections in place of self-sealing hose.

16. Submit a report of the theoretical analysis of the induction system to Air Materiel Command for approval.

17. Study the various methods for hoisting fuel tip tanks into place and coordinate tank structural design with methods of hoisting.

C. Power Plant Laboratory, Accessories Unit.-

1. Maintain an isobaric cabin level of 8000 feet. Use a cabin pressure regulator with a changeover from 2.75 psi to 2.3 rge for combat conditions.

2. Provide a method of distributing the cooling air around the cockpit and provide manually controlled valves in order that the pilot can control this distribution.

3. Provide an ultraviolet opaque canopy.

4. Change the Model Specification to read "environmental temperature" rather than "dry bulb temperature".

5. Study the possibility of exhausting the wing de-icing air at the trailing edge of the wing or nacelle rather than at the cabin conditioning system exhaust.

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6. Change the coolant air exhaust to exhaust overboard rather than into the fuselage.

H. Armament Laboratory. -

1. Change the total allocated weight for the fire control system in the Model Specification to 3000 pounds as indicated by the breakdown below:

Weight of Turret - 2297 lbs.	Weight of Equipment in Cockpit -- 165 lbs.	Weight of Equipment in Airplane -- 548 lbs.
Armament (Guns & Ammuni.) (Empty) - 1165 lbs.	Controls & Panel - 30 lbs.	Turret - 473 lbs.
Turret & Radar - 1132 lbs.	Radar - 25 lbs.	Automatic Pilot (tie-in) - 75 lbs.
	A-1 Sight - 85 lbs.	
	Automatic Pilot (tie-in) - 25 lbs.	

2. Provide space in the nose wheel well of the radio compartment for the installation of radar computor, axis converter, motor-generator or hydraulic pump, automatic pilot computor and accessories.

3. A definite directive limiting the mission of the airplane to night and inclement weather operation has been received from Washington.

4. Allow space provisions for the installation of a pilot's radar indicator. This indicator to be specified by Air Materiel Command.

5. Reserve all space on the instrument panel to the right of the radio compass for armament equipment.

6. Submit copies of final drawings on armor plate installation to Air Materiel Command for approval. A request for deviation from the .50 caliber armament requirement for this airplane has been initiated.

7. The present wing tip bomb rack installation is satisfactory.

8. The Air Materiel Command will study the requirement for indicator lights for each of the bomb shackles, however, any change to the present installation is contingent on the clarification of bombing requirements of these airplanes by the Requirements Division.

9. Air Materiel Command will study the requirements for indicator lights for the production models as in the previous comment.

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10. Provide access holes in the bomb rack for reaching the cocking lever. However, no action is required until clarification of the bomb requirements by the Requirements Division.

11. Make provisions for carrying the maximum number of bombs in the bomb bay, contingent on the clarification of bombing requirements by the Requirements Division.

12. Provide for the installation of an A-1 timer, contingent on the clarification of bombing requirements by the Requirements Division.

13. Install a Type B-3A bomb interval control circuit, contingent on the clarification of bombing requirements by the Requirements Division.

14. Provide hand holds in the frame of the adapter at the side of each bomb rack, contingent on the clarification of bombing requirements by the Requirements Division.

15. Reserve all space to the right of the radio compass control for bombing equipment and switches.

16. Provide switches for electrically releasing the wing racks, one for normal release and one for salvo.

17. Provide a separate door control salvo, contingent on the clarification of bombing requirements by the Requirements Division.

18. Air Materiel Command will study the feasibility of level bombing with the use of the A-1 sight.

19. Provide sway braces adjustable for various size bombs carried on each bomb rack, contingent on the clarification of bombing requirements by the Requirements Division.

20. Study the possibilities of using the C-6 electric hoist rather than the two mark 7 hoists.

I. Systems Engineering Laboratory. -

1. Relocate instrument panel and cockpit lights on the right hand side of the cockpit so as not to interfere with the operation of the navigator's radio controls.

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[redacted]

Exhibit "A" to Eng. Div. M.R. No. TSEOA-1299
Mock-Up Inspection - XP-87 Airplane
30 July 1946

2. Delete the radio operator's radio compass indicator and relocate the pilot's indicator in a central position on the instrument panel in accordance with the previous comment.

3. Delete all components of VHF Homing Adapter AN/ARA-8.

4. Provide space and weight provisions for tail warning radar equipment. Data on the weight and size of the tail warning equipment will be furnished by Air Materiel Command.

5. Provide as large a map board as is convenient, contingent on the rearrangement of the cockpit.

6. Rearrange equipment in radio compartment to provide space for the installation of radio set AN/ARC-19.

7. Locate interphone amplifier AN-26A/AIC in the cockpit floor on the right hand side.

8. Install an interphone jack box in the radio compartment for ground testing.

J. Aero Medical Laboratory. -

1. Study the possibility of relocating part of the oxygen supply to prevent the loss of all oxygen by one burst of gunfire.

2. Relocate pilot's oxygen regulator to a more accessible position.

3. Install standard pressure gage, AN 5761-1, in place of high pressure bail-out gage as shown on mock-up.

4. Locate oxygen pressure gage, AN 5761-1, and oxygen flow indicator, AN 5829-1, to a more accessible position.

5. Change Model Specification by adding two check valves, Style "D", Part No. AN6033-1, in Item No. "2".

6. Provide a method of manually dumping cabin pressure.

7. If the service ceiling of the airplane in the lightest condition is more than [illegible], or if not, all Type "A-" pilots be trained to deal with pilot light [illegible] in the event of failure.

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Exhibit "A" to Eng. Div. M.R. No. TSCS.-1299
Mock-up Inspection - XP-87 Airplane
30 July 1948

8. Install a Type K-4 pressure regulating valve and associated equipment for pilot and navigator in the forward side of the console.

9. Change Model Specification by adding, "A type K-4 pressure regulating valve and associated equipment shall be installed in accordance with Specification 41095".

10. Relocate first aid kit to a more accessible position.

11. The angle of incidence of the windshield is satisfactory as presently designed.

12. Canopy and seat release handles will be redesigned in accordance with previous comment.

13. Adequate foot room in the cockpit will be maintained by lowering the ejection seat foot release a maximum of two (2) inches.

14. Provide a streamlined fairing on the front end of the console panel and throttle compartment.

15. Arm rest guards on the ejection seat will be redesigned in accordance with previous comment.

16. Pressure cabin schedule will be revised in accordance with previous comments.

K. Personal Equipment Laboratory. -

1. Sufficient space will be provided for clearance for A-6 type flying boot by lowering the ejection seat foot rest a maximum of two inches.

2. Ejection seat trigger mechanism will be redesigned so as to remove the danger of inadvertently tripping in accordance with the previous comment.

3. Location of the pilot's radio jack box is considered satisfactory contingent on a redesign of the cockpit.

4. Provide adequate room between the throttle quadrant console and the right rudder pedal for the A-6 type flying boot.

5. Provide necessary clearance between the control wheel and the ejection seat as covered by previous comment.

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Exhibit "A" to Eng. Div. M.R. No. TSES1-1399
Mock-Up Inspection - XF-87 Airplane
30 July 1946

6. The foot rest on the ejection seat will be modified in accordance with previous comment.

7. The canopy will be redesigned so as to move aft without moving up in accordance with previous comment.

L. Maintenance Division. -

1. Access doors for the fuel strainers will be provided in accordance with previous comment.

2. Trunk type positive lock latches will be provided on the lower engine cowling.

3. A study shall be made of the possibilities of providing an access door into the air intake duct for servicing the engine starters on production models. No action required on "A" models.

4. Provide access doors in engine nacelles for servicing spark plugs.

5. Install AN-H-24A hose with flare type detachable end fittings as described in previous comment.

6. Install external canopy release mechanism as described in previous comment.

7. Stencil the aft fuselage servicing door, "No Baggage in this Compartment".

8. CO_2 fire extinguishers to be installed on the "X" models as covered by previous comment.

9. Install a fitting for testing the cabin seal as per previous comment.

10. The headrest as shown in present mock-up is considered satisfactory.

11. Front mount all instruments on the instrument panel to facilitate easy removal.

12. Provide a parking brake system with a manually operated control.

13. Canopy will be redesigned in accordance with previous comments to open aft without first moving up.

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Exhibit "A" to Eng. Div. M.R. No. TSEAA-1299
Mock-Up Inspection - XP-87 Airplane
30 July 1946

14. Install a manual override of the canopy mechanism for internal or external operation.

15. Provide sufficient access doors in the upper side of the fuselage over the fuel compartment to service selector valves and other mechanisms in that area.

16. Install four ammeters in accordance with previous comment.

17. Install a spare inverter in accordance with previous comments.

18. Install a positive safety lock on the landing gear lever in accordance with previous comment.

19. Relocate the position of the release lever on the control column and provide for positive stowage.

20. Replace present generator with Q-2 400 Amp. generators in accordance with previous comment.

21. Relocate hydraulic reservoir to facilitate service in accordance with the previous comment.

22. Install dual indicating instruments for all engine operations.

23. Relocate generator switches and rearrange generator panel in accordance with previous comments.

24. Provide an external receptacle with the capacity for carrying the maximum starting load in accordance with previous comments.

25. Relocate power receptacle in accordance with the previous comment.

26. Provide an extension light between the pilot and the co-pilot for use in night navigation.

27. Install a hydraulic pressure gage in the cockpit indicating pressure in the braking system.

28. Provisions for towing the airplane by the nose wheel will be made.

M. Aircraft Projects Section. -

1. Study the emergency operation of the canopy to provide:

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Exhibit "A" To Eng. Div. M.R. No. TSESA-1299
Mock-Up Inspection - XP-87 Airplane
30 July 1946

a. Sliding of canopy aft of pilot's seat before releasing.

b. An emergency source of power.

c. A canopy release divorced from the seat ejection controls.

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15 Permits, 1946-47, Vol. I

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO.	
FILE NO	

SUBJECT: Bomb-bay in P-87 Curtiss All-Weather Fighter

TO: Research & Engineering Division, AC/AS-4

FROM: Materiel Division, AC/AS-3

DATE: 30 JUL 1946

COMMENT No. 1

Lt Col Mahurin/mbj/72284

1. A representative of this office who participated as a member of the Mock-Up board at the Curtiss-Wright Factory, Columbus, Ohio, noted with dissatisfaction that the P-87 incorporated an internal bomb-bay. Discussion with the Chief Designing Engineer revealed that the Engineering Staff of Curtiss-Wright was also dissatisfied with the bomb-bay installation. The characteristics for the all-weather fighter, dated 23 November 1945, stipulate that provisions are required for the installation of a minimum of two bombs in all standard sizes up to 1000 lbs. However, these same characteristics stipulate that these and other external attack installations, in conjunction with fuel tank provisions, should be considered so that as many alternate combinations as possible can be used. Evidently due to an oversight at the Curtiss-Wright Factory, the connection between the external fuel tank provisions and the bomb provisions was overlooked.

2. As it now stands, the P-87 is a very large and very heavy airplane. With the addition of an internal bomb-bay, various other auxiliary devices must be added to further increase the weight which is now critical. Switches, intervalometers, lights, bomb-bay door timers, sway braces and bomb hoists must be included to fullfill the specifications set by handbook requirements. The current installation does not meet the handbook requirements. Also, there is but one provision for aiming the bombs other than the A-1 gunsight. The present bomb installation could not be used for dive bombing and must only be used for level bombing. It appears that level bombing would be totally unsatisfactory in the daytime with the current type of sighting, not to mention at night. If this type of bomb installation is to be used for dive bombing, it will require the addition of some types of sighting to bring the bomb outside the fuselage structure before release.

3. There are two radio sets in the P-87 that are considered extraneous equipment. One, the Shoran, can be used only for a given point location and the other, Liaison, can be used for beyond-the-line-of-sight communication. The Shoran set requires the use of an experienced operator who must devote much of his time to its operation. It can be used to drop bombs from level flight but only if the aircraft is in the two hundred mile range from the ground station. This piece of equipment weighs approximately 300 pounds. The liaison set comes into its own when the aircraft is beyond the line of sight from the station. This set can be used during periods of radio interference, but it then requires coding by the CW key. In such a case the airplane can return to base before the pilot or radio operator can code a message and key it to the home station. This set weighs approximately 110 lbs. If these two sets are deleted, it will make a total saving of 410 lbs.

4. This office requests that your Division call the contractor's attention to the provisions stated in the all-weather fighter characteristics of 23 November 1945, with special attention directed to the implication connecting external fuel tank provisions to bomb provisions. It is further requested that the contractor be directed to delete the following

To Central Files

Date 8-26

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HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO.

FILE NO.

SUBJECT: Bomb-Bay in P-87 Curtiss All-Weather Fighter

TO: Research & Engineering Division, AC/AS-4

DATE 20 JUL 1945

COMMENT No. 1(cont'd)

FROM: Requirements Division, AC/AS-3

4. (cont'd)

a. Bomb provisions in the bomb-bay incorporating these provisions into external bomb carrying capacities.

b. The liaison and Shoran Radio Sets.

Alfred R. Maxwell

ALFRED R. MAXWELL
Brig General, USA
Chief, Requirements Division

AFREM (A/C) [illegible]

AFREP (Ftr) [illegible]

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HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

IN REPLY REFER TO:

AMSE-2C
31 July 1946

[redacted]

SUBJECT: Cockpit Installation of the P-80 Jet-Propelled All-Weather Fighter

TO: [illegible]

Attention: Chief of Air Information - [illegible]

1. The present instrument panel of the P-80 mock-up at the Curtiss-Wright factory incorporates instruments of individual nature, i.e., one tachometer for each engine, etc. In a recent flight test of the P-80 it was found that a much more desirable arrangement of instruments would be possible if the instruments were grouped by functions engine instruments in one group, etc. This would result in a more logical arrangement of instruments and would also facilitate dual flying. [illegible]

2. This headquarters is making [illegible]

3. [illegible]

ENG-RECEIVING DIV

[illegible]

[illegible]

[illegible]

[illegible]

[redacted]

ADDRESS REPLY TO THE CONTROLLING GENERAL, ARMY AIR FORCES, WASHINGTON 25, D. C.

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453.1 Pursuit, 1946-47, Vol I [redacted] 13

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	7
FILE NO.	AEQ

SUBJECT: Cockpit Installation of the P-87 Curtiss-Wright All-Weather Fighter

TO: AC/AS-3, Requirements Division

DATE 31 July 1946

COMMENT No 2

FROM: AC/AS-4, Research & Engineering Division

Capt Herradine/rw-2731

1. The attached copy of letter to Air Materiel Command was based on Comment 1 above.

Thomas A. Broughton, Col. AC
for D. C. DONDIEDAY
Colonel, Air Corps
Chief, Propulsion & Equipment Branch

1 incls.
1. n/c
2. n/c
3. Cy ltr to AMC.

Central Files
5 Aug 46 - FF REM
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AFDRD/Aircraft Sec/Lt Col Puckett/mal/71508
Typed Date: 18 Aug 1948

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AUG 22 1948

SUBJECT: Military Characteristics of Service Type Aircraft

TO: Commanding General, Strategic Air Command, Selling Field No. 2, N. O.
cc to: cc/, Tactical Air Command, Langley Fld, Va.
cc/, Air University, Maxwell Fld, Montgomery, Ala.
cc/, Air Training Command, Gulfport, Miss.
cc/, Air Defense Command, Mitchel Field, N. Y.

1. Military Characteristics of service type aircraft are periodically revised so that full utilization of new technical developments may be realized and that performance requirements will be in line with the operational requirements of each type aircraft. Furthermore, such action insures that research and engineering, together with industry, will always be progressive.

2. If we are to maintain our present position of air supremacy, we must encourage ideas from all sources relative to aircraft and equipment development. It is possible and desirable for any Air Force, Service, or any personnel belonging thereto to recommend military characteristics of aircraft and equipment to fill current requirements or even to recommend establishment of new requirements. In this connection, your attention is invited to a revision of AF Regulation 95-5, which is included as [illegible]. This new regulation clearly outlines the action which can be taken by our Army, Service, or individual in regard to recommending changes to current or establishment of new military characteristics.

3. For the purpose of this letter and the action required hereby, we need concern ourselves only with the military characteristics for aircraft. In keeping with the authority contained in AF Regulation 95-5, this Headquarters is most desirous of disseminating information to all interests as to what new service military characteristics for aircraft are, what type of aircraft are now being developed, together along with the performance figures for the most promising types, and the progress being made in development to, and what the limitations are to each new type. It is the feeling of this Headquarters that only by such full knowledge can we be assured the proper kind of equipment will be available when required in the future. With the advent of jet propulsion, the high speeds attainable, the operation of an Air Force over extended areas, coupled with the speeds of even current aircraft, the element of vulnerability, these problems are overwhelming. Hence, only the most promising types can be developed and given [illegible] in such way [illegible] possible. The purpose of this letter is to solicit from all [illegible] service military characteristics suitable and in preparation, [illegible] of service type aircraft. In order that [illegible]

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Eng 22-99.6

Ltr to OC, AAF, subject: Military Characteristics of Service Type Aircraft

4. It is requested that your Headquarters establish a project to make a thorough study of the aircraft with which you are particularly concerned from the viewpoint of mission requirements, performance requirements, armament and equipment requirements (particularly defensive armament), and escort requirements. Your comments and recommendations plus new or revised characteristics for the aircraft with which you are concerned should be submitted as soon as possible in order that your ideas can be considered in the writing of military characteristics for the coming year.

5. In order to assist you in your preparation of new characteristics and in arriving at your answers to the problems involved with aircraft peculiar to your command, there are attached, hereto, Tab "A" and Tab "B". Tab "A" contains a copy of all current military characteristics for aircraft. A study of these characteristics will picture what is being required in the development of all AAF service aircraft. Tab "B" contains pertinent information regarding the most promising aircraft now being designed under current military characteristics and, in most cases, goes into some detail as to the military characteristics and, in most cases, goes into some detail as to the problems with which we are confronted at this time and will be confronted in the future. This information includes, in most cases, certain ideas on the mission of these aircraft, certain thinking in terms of what the future mission should be, plus certain ideas on the features of certain types, particularly bomber types. It is not to be construed that the aforementioned thinking is in any way final for the purposes of this study. It is not desired that this endeavors along these lines. Conference with the answer and solution to these problems should result from the study to be initiated by your Headquarters.

BY COMMAND OF GENERAL SPAATZ:

HQ. A A F
22 AUG 1948
MAIL & RECORDS SECTION

HERBERT B. LOHAT
Major General, U. S. Army
Deputy Chief of Air Staff for
Research and Development

Incl 1 - Tab "A"
Incl 2 - Tab "B"
Incl 3 - Tab "C"

* This letter to be held classified by the AC of S, Operations, Command and Control and the Director of Research and Development of the subject nature is already covered with them by separate correspondence.

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OFFICE					
SURNAME	[redacted]	[redacted]	[redacted]	D.R.D.	
DATE					

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3 452.02 Aeronautics-Performance-Misc. 8
1942-47-Box 2

INDEX

Part I	Bombardment Aircraft
Part II	Fighter Aircraft
Part III	Reconnaissance Aircraft
Part IV	Transport and Liaison Type Aircraft
Part V	Air-Rescue Aircraft

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Introduction

1. As an aid in conducting the required study, consideration should be given to several salient principles as follows:

a. Fighter escort is mandatory to achieve successful bombing missions in the face of enemy air opposition.

b. In general, aircraft powered by turbines (jet or prop) will be needed as requirements for speed and range increase. This type engine offers the best hp output in the foreseeable future.

c. The turbine and prop combination should be further engineered for increased ranges and increased speeds.

d. The transition to trans and supersonic speeds offers a barrier of considerable importance and when attained, will undoubtedly alter tactical and strategic employment methods.

2. This Tab is an attempt to lay down certain basic information regarding Army Air Forces aircraft design and development and to picture some of the most pressing of the problems connected therewith. It by no means covers each and every bit of information which might be of use in the conduct of the desired study to be carried on by your Headquarters. It is intended, however, to plant seeds of thought which it is hoped will generate constructive answers not only to the problems enumerated herein but also answers to other problems which have not been mentioned or which have escaped the attention of this Headquarters.

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FIGHTER AIRCRAFT

1. During the past five years the overall mission of fighter aviation has become so complex that several specialized types of fighters will be required. Therefore, to the already existing day and night fighters was added the interceptor and serious thought is being given to adding a fourth type, such as the parasite fighter.

2. A brief discussion of each of these above named types follows:

a. Penetration fighter.

(1) The mission of the penetration fighter has remained basically the same, i.e., it is still the "work horse" of the fighter force and will comprise the largest part thereof. The mission of the penetration fighter can most readily be explained by stating it will perform such functions as did the P-47 and P-51 types during the past war. At the present time the P-80 might be considered as an interim penetration fighter even though its radius falls far short. Soon the force will be augmented by the P-84 and P-86 types which also are high speed, short range, aircraft. All of the above three types were developed under the military characteristics which were superseded late last year by those presently in existence. The following is a short performance summary of two proposals for penetration fighters which have been presented under the present characteristics:

(a) <u>MacDonnell XP-88</u>

Speed Sea Level	641 mph
Speed 35,000 ft.	604 mph
Rate of Climb (SL)	6,510 FPM
Rate of Climb (Alt.)	1,207 FPM
Radius of Action	955 miles
Gross Combat Weight	16,245 lbs.

(b) <u>Lockheed XP-90</u>

Speed Sea Level	629 mph
Speed 35,000 ft.	584 mph
Rate of Climb (SL)	6,080 FPM
Rate of Climb (Alt.)	762 FPM
Radius of Action	782 miles
Gross Combat Weight	15,700 pounds

(2) Some of the problems to be considered in the preparation of future military characteristics are:

(a) The inherent inability of the jet engine to operate efficiently at low altitudes, which might seriously

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curtail the Air/Ground cooperation missions of this fighter. At the present stage of development, if an increase in internal fuel capacity is desired the size of the aircraft increases out of proportion.

(b) The large speed differential between jet fighters and conventional bombers will make complete escort difficult. In this connection, new proposals listed for jet bombers indicate cruising speeds such that jet fighter escort will be feasible.

(c) It is expected that at near sonic velocities the pilots physical limitations will present some difficulties along with the problem of high speed boil-cube.

(d) The high speed and large turning radii of jet aircraft may make some sort of electronic searching device necessary in order to keep the enemy in "sight".

b. All-Weather Fighter.

(1) The all-weather fighter is an out-growth of the night fighter which will also be capable of operation in all types of inclement weather. It is not intended that this fighter be capable of competing, under clear weather conditions, with small interceptor type fighters. For the next two or three years the P-82 will be utilized as an interim all-weather fighter. It will be equipped with either an SCR-720 or an AN/APG-1 radar set. The following two proposals made under the present military characteristics have been selected for investigation:

(a) Curtiss P-87

Speed Sea Level	505 mph
Speed 35,000 Ft.	545 mph
Rate of Climb (SL)	3,380 FPM
Rate of Climb 35,000 Ft.	980 FPM
Radius of Action	940 miles
Gross Combat Weight	36,800 lbs.

(b) Northrop P-98

Speed Sea Level	496 mph
Speed 35,000 Ft.	566 mph
Rate of Climb (SL)	4,180 FPM
Rate of Climb 35,000 Ft.	720 FPM
Radius of Action	1,000 miles
Gross Combat Weight	40,000 lbs.

(2) One of the main problems to be considered in the formulation of new characteristics of the all-weather fighter is the defensive armament requirements. One solution is to delete all requirements for any rearward firing guns and to depend [redacted]

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for defense upon speed and maneuverability used in conjunction with a tail warning device. The other solution is to require a rearward firing turret which is electronically controlled. The most obvious objection to the latter solution is that the firing of the rear turret would afford an attacking night fighter a perfect visual fix. Another problem, and one upon which your comments are specifically requested, is the degree of flexibility, if any, a forward firing turret should have. In this connection, a study is presently underway to determine the aerodynamic effect caused by guns protruding at large angles into the slipstream at high speeds. It will be noted that the present military characteristics require 15° of movement for the forward turret. However, this figure was selected "out of the hat" as a good starting point for a requirement for controllable turrets in fighter aircraft.

e. Interceptor Fighter.

(1) The interceptor has been conceived as a highly specialized, purely defensive airplane. With the advent of very long range bombers and airborne missiles, it becomes mandatory to provide local defense of vital areas. At the present time the only aircraft that can be considered even as an interim interceptor is again the P-80 aircraft which, even though it falls short of the present military characteristics, is still the best available.

(2) Proposals under the existing military characteristics have been accepted and the following is a short, incomplete, performance description of each:

(a) Republic XP-91

Speed at 50,000 ft. Max.	705 mph
Speed at 50,000 ft. Continuous	600 mph
Endurance	23.3 minutes
Time to Climb to 50,000 ft.	Approximately 2 minutes
Gross Weight	17,150 pounds

(b) Vultee XP-92

Speed at 50,000 ft. Max.	700 mph
Speed at 50,000 ft. Continuous	560 mph
Endurance	37.8 minutes
Time to Climb to 50,000 ft.	Approximately 2 minutes
Gross Weight	13,016 pounds

Both of the above aircraft will be powered with rocket propellant and jet propellant in combination, relying on the rocket for high speed and climb, and the jet unit for cruising.

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AF[illegible] Form No. 10-505 (3 Jan 45)
(Old AF[illegible]SC Form No. 43)

COORDINATION
DIRECTOR OR DEP.
AIR INSPECTOR
MGT. CONTROL
TSEOA (TSNOA-4)
CHIEF OF ADMN.
SPECIAL STAFF
CHIEF, ENG. & PROC.
CHIEF, SUPPLY & MAINT.
PERS. & BASE SERV. DIV.
MAINT. DIV.
SUPPLY DIV.
ENGINEERING DIV.
O. B. Thornton
PROCUREMENT DIV.
RE ADJUST DIV.
OTHER

[redacted] AIR MATERIEL COMMAND

TSEOA-4/ORRthw

9 September 1946

Contract W33-038-AC-6266
XP-87 Airplane

Curtiss-Wright Corporation
Airplane Division--Columbus Plant
4300 East Fifth Avenue
Columbus 16, Ohio

TSAGS NO 4

Reference: Conference between personnel from Curtiss-Wright, Westinghouse, and Air Materiel Command, 27 June '46.

1. In accordance with request made by the contractor during the reference conference, the following information relative to the emergency fuel system and other engine problems is forwarded for information and compliance.

a. Due to the lack of service experience on control systems for the Westinghouse Type 24C engine, it is considered advisable that an emergency control system be installed at least in the "X" model airplanes. The emergency system must duplicate the power control in the following features:

(1) Emergency pump.

(2) Assurance of clean fuel delivered to the emergency pump.

(3) Fuel control valve with altitude compensation.

(4) By-pass line for unloading emergency pump during periods of inoperation of the emergency system.

(5) Sufficient fuel lines to suitably connect the emergency system to the engine.

(6) Check valves located in the discharge from the emergency control and in the discharge from the power control in order that fuel delivery will be accomplished from only one system at a time.

2. It is desired that the fuel control valve be connected with parallel linkage to the power lever in order that single lever control

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may be provided. A method will be provided for automatically energizing the emergency system during take-off only. If it is impossible to obtain an altitude compensating device for use in connection with a fuel control valve by the time of anticipated flight tests, a waiver will be granted for the use of the system described above, without altitude compensating means.

3. A schematic diagram of a proposed emergency fuel system is attached hereto for information.

4. Use of AN-O-6 oil will not obviate oil dilution provisions if -67°F starting requirements are to be met since it is not satisfactory for starting below -40°F.

5. Initial research of gas turbine icing is now in progress at NACA Aircraft Engine Research Laboratory, Cleveland, Ohio. Two projects are expected to yield design information for ice free operation of both axial and centrifugal compressor type gas turbines. The tentative general specification for gas turbine engines holds the engine manufacturer responsible for ice protection of the compressor inlet screens and first stages of the compressor. Hence design requirements will be provided for the engine manufacturer when available unless research indicates that airframe design is necessary. Ice protection for the air inlet lips is required in this airplane as was agreed upon during the Mock-Up Inspection.

6. Inasmuch as Westinghouse has no data on engine performance using either JP-1 or JP-2 fuel, the contractor's proposal to design the fuel system for JP-2 fuel naming 100/130 octane fuel as an alternate is approved. Care should be taken in the design of the fuel system to assure that all lines are of sufficient size to deliver the necessary fuel flow when the lighter 100/130 octane fuel is being used in place of JP-2 fuel.

FOR THE COMMANDING GENERAL:

for R B Smith
GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

1 Incl: 2w Incl. for file.
Fig. 1 - Schematic diagram of a proposed emergency fuel system.

Copies to:
C-W, Dayton
AAFOIC, C-W
Power Plant Lab.

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AAC Form No. 10-3
419 Mar 43

ROUTING AND RECORD SHEET

Use this form for inter-office correspondence with [illegible]

Use [illegible] width of sheet [illegible]

SUBJECT: Contract AC-6266 — XP-87 Wind Tunnel Testing [illegible]

TO: TSEAC, Aircraft Lab.

FROM: TSEOA-4, Fighter Br. [illegible]

1. In a conference held in General Craigie's office [illegible] Curtiss-Wright personnel indicated that they are very concerned over the fact that no high speed wind tunnel program is set up for the XP-87 [illegible] cient aerodynamic information at Mach numbers up to .8, in the N.A.C.A. basic research program. The contractor's representatives suggested General Craigie to consider the advisability of attempting to change the N.A.C.A.'s program of not testing specific airplane models in order that information pertaining to dive brake design, nacelle distortion and other items could be obtained.

2. It is requested that your Laboratory initiate a short study of the XP-87 plane to determine whether or not sufficient data are available from N.A.C.A. basic research and to recommend a course of action [illegible] the contractor's suggestion that the Engineering Division contract [illegible] to get a high speed model of the XP-87 airplane tested. It is requested that your comments on this matter be forwarded to TSEOA-4 as soon as possible [illegible] at the latest.

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GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

MX-745

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WF-4-16 JUNE 44 1 M3

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AMC Form No. 10-3
(10 March 43)

ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

Use this form for inter-office correspondence within headquarters.

Use authorized office symbols to designate addressor and addressee.

Use entire width of sheet, both sides.

Number all comments consecutively.

SUBJ: Contract [redacted] — [illegible]

TO	FROM	DATE	COMMENT NO.
[illegible]	[illegible]	[illegible]	[illegible]

1. It is believed that the problem presented by [illegible] be solved by consideration of the material and [illegible] or of any single wind tunnel or wind tunnel project of the type [illegible] be undertaken by the Engineering Division.

2. The full problem has been to insure that the limited facilities are employed in a way to provide the maximum quantity of data of the greatest practical amount for future projects. [illegible] and the Bureau of Aeronautics concerned with the Navy to establish a systematic "program" on the best available [illegible] held that such an approach would satisfy all of the requirements [illegible] Navy contractors, but it was hoped that this [illegible] amount of useful data, applicable to the greatest number of [illegible] length of time.

3. It was further agreed that the [illegible] of the [illegible] programs, called the "High-Speed Tests", "Stability" and "Special" programs, would require utilization of practically all the available high-speed wind tunnel time, thus restricting the amount of testing possible in specific categories. A portion of the tunnel time was to be reserved for testing of general [illegible] components, not covered by the general program, but it was [illegible] that any particular airplane be "designed in the wind tunnel", [illegible] as a military necessity.

4. However, as the development of new types [illegible] and secret tip-model test programs, they have been [illegible] systematic program with the aim of accelerating [illegible] been thrown open to the AAF and Navy for testing of [illegible] designs. The most striking example of this is the recent [illegible] Bullet airplane case to test specific models of [illegible] technique. It behooves the Engineering Division to make the fullest use of these tunnel facilities, wherever possible, to satisfy the requirements of individual projects.

5. The fact that the Curtiss-Wright Corporation does not consider the present high speed programs fully adequate for their needs on the XP-87 airplane, and believes that specific high-speed wind tunnel tests must be accomplished on models of that airplane for its successful development should be considered with the understanding that the XP-87 is perhaps the most conventional fighter airplane now being designed under AMC contract. Any argument which is advanced by Curtiss-Wright in the interests of tests of its airplane could be matched or bettered by almost every other contractor with fighter aircraft under design. The simple and unfortunate fact is that the aircraft now being developed are so numerous and complex, and the facilities for aerodynamic tests are so limited that no contractor may look forward to wind tunnel support in the manner to which he had been accustomed.

[redacted] Cmt. 1 - 16 Oct. '46

WF-L-16 JUNE 46 1 MD

Ltr. 15 Oct. '46

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Cmt. 2 - 25 Oct. '46

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION-COLUMBUS PLANT

COLUMBUS OHIO

27 September 1946

EJD/af-h87

Subject: Contract W33-038 ac-6266
XP-87 Airplanes

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: Unit TSBPS-3B

Reference: (a) Curtiss ltr. (EJD/af-165) dated 27 March 1946.

Enclosure: (A) Description of Work.
(B) Price Breakdown.

1. This letter is for the purpose of summarizing and restating agreements reached during negotiations conducted between Contractor's personnel and Air Materiel Command's personnel from 8 May 1946 to 16 September 1946. Although the Contractor is not in full accord with some of the agreements reached and set forth herein, particularly the price, this letter constitutes the Contractor's acceptance of the terms and conditions as agreed during negotiations. Although the Contractor is accepting the work on a fixed price basis at the figures indicated herein, it is believed that an estimated loss of approximately Four Hundred Fifty Thousand Dollars ($450,000) will be encountered. This loss is contributed almost in its entirety to the extremely low overhead rate insisted upon by the Army. A brief resume of the general circumstances surrounding this contract are believed to be in order at this time. Subject contract of a cost-plus-fixed-fee nature covering the Phase I development of the XA-43 type airplane was awarded to the Contractor. This work was completed and a letter supplement to the Contract was awarded covering Phase II or the actual design and construction of two (2) XA-43 type airplanes still on a cost-plus-fixed-fee basis. Due to changed military requirements, it was deemed desirable by the Army to modify the specification and work was therefore stopped on the XA-43 and changed to the XP-87. Work on this model airplane is currently progressing, the mockup having been completed and design and construction work started. The prices and deliveries contained herein are on the basis of the original proposal and do not include any changes in design which may affect the price or delivery which have been requested and approved subsequently.

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2. Enclosure (A) lists all of the items procured under the subject contract, as amended and supplemented by various letter contracts. No consideration has been given in the price for the cost of many dummy parts which will have to be installed in place of the tactical and miscellaneous equipment omitted from the first airplane. The cost of such work will be the subject of later negotiations. This applies particularly to the nose turret for which a mockup turret will have to be installed for flight test. Enclosure (A) also tabulates the prices for each of the various items as agreed during negotiations. Detail breakdowns of the prices are included on Enclosure (B). It is understood that the original cost-plus-fixed-fee contract covering Phase I of the XA-43 work will be converted to fixed price. The prices quoted in Enclosure (A) for the XA-43 work represent the actual cost of the work plus the fixed fee applicable only to the Phase I portion.

3. Since items 1 through 4 inclusive of Enclosure (A) have already been completed, the contract shall provide for payment for these items at the price quoted less any amounts received as reimbursements under the original cost-plus-fixed-fee contract. No G.A.O. suspensions have been made on the cost-plus-fixed-fee work. The payment for these items shall become due and payable upon the signing of the contract and submittal of an invoice by the Contractor, which invoice is to include the credit due for any reimbursements already received.

4. Delivery of the various items shall be as listed below. All of the following dates are on the basis of our original proposal and do not give consideration to any delays which have resulted from design changes required by the Air Materiel Command. Any delays resulting from these changes will be covered along with our proposal on the effect of the changes on cost.

Item 1 - Completed	Item 5 - March 31, 1947
Item 2 - October 30, 1945	Item 6 - May 31, 1947
Item 3 - October 30, 1945	Item 7 -
Item 4 - October 30, 1945	Item 8 - September 1, 1946

All of the above quoted deliveries are contingent on receipt of Government furnished equipment in sufficient time to meet deliveries quoted. Contractor has already furnished a partial list of Government furnished equipment with dates required and the remainder will be furnished as soon as data is available. Should any of the Government furnished equipment not be furnished in sufficient time to meet the Contractor's delivery dates, a delay in delivery and increased cost will result and the contract shall provide that this shall be an excusable delay and the increased cost shall be reimbursed by the Government by Change Order.

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5. The following specific items are conditions of our quotation and shall be included in the wording of the proposed contract:

(a) No flight demonstration shall be included as it has been omitted from the price.

(b) The quotations for both airplanes are on the basis of including therein only ten (10) hours of functional flight testing for shakedown of airplane, power plant and testing instrumentation. No demonstration, performance, guarantee compliance, etc. testing has been included. This quotation is furthermore submitted on the basis that initial flight tests will be conducted at the Contractor's Plant. Should it be necessary to conduct initial flight tests at some other airport, this will be the subject of later negotiations.

(c) No static test is included in the quotation other than the very limited amount included in the Contractor's Specification 29-Z-1.

(d) The quotation is based on the usual type of equipment being Government furnished such as power units and accessories, radios, radar, instruments, front and rear gun turrets, etc. as listed in Contractor's detail specification.

(e) Only the minimum amount of data shall be furnished, and certain data is not necessary to comply with the provisions of applicable government specifications. The exact data is included in Contractor's Specification 29-Z-1.

(f) The quotation, as submitted herein, is on the basis of present labor rates consideration already having been given during negotiations to labor rate increases approved by Government agencies and placed into effect in recent months. It is understood, however, that the contract will contain a price redetermination clause with provision for upward redetermination only if said increase is the result of additional labor rate increases and is fair and reasonable under all circumstances involved.

(g) In view of the circumstances involved, particularly the acceptance of this work on a fixed price basis at a figure less than our anticipated cost, it is understood that no performance guarantees will be included in the contract. It is further understood that in view of the limited flight test program of only ten (10) hours on each airplane, the airplane as delivered to the Army initially may not fully comply with all provisions of applicable specifications. It is agreed, however, that the airplane must be a reasonably satisfactory article and the following suggested wording is believed to cover this condition:

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To: Commanding General, Air Materiel Command

// "The airplanes as delivered to the Army after completion of the Contractor's flight test shall be airworthy and functionally satisfactory. The term "airworthy and functionally satisfactory" shall mean that (1) the airplane will have satisfactory ground handling and taxiing characteristics, (2) all equipment installed in the airplane will be in satisfactory operating condition, (3) all airplane systems, i.e., electrical, hydraulic, and all control surfaces or other components operated by these systems shall be in satisfactory operating condition, (4) the airplane shall be capable of taking off, cruising up to normal rated power, be satisfactorily controllable when airborne and be landed safely. "Satisfactory" as used herein shall not be interpreted to mean complete compliance with applicable specifications, it being recognized that complete compliance is not necessary to furnish an airplane sufficiently satisfactory for the purpose intended." /

(h) All standard clauses of the original contract shall remain unchanged except for those clauses modified herein or requiring modification due to conversion from cost-plus-fixed-fee to fixed price.

(i) Provision will be made for partial payments.

Respectfully,

CURTISS-WRIGHT CORPORATION
Airplane Division - Columbus Plant

E. J. Ducayet
Contracts Manager

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ENCLOSURE (A) TO CURTISS LTR. EJD/af-487

DESCRIPTION OF WORK

Item 1. Articles and services covering Phase I of XA-43 design development, mock-up, wind tunnel testing and data as specified in Article 1 of original contract.

Item 2. As described in Item 1 of Supplement, dated 22 May 1945, to Letter Contract No. W33-038 ac-6266, as amended by Amendment No. 1 thereto, provided, however, that all work under this Item 1 shall cease on or before 30 October 1945.

Item 3. As described in Item 2 of Supplement, dated 22 May 1945, to Letter Contract No. W33-038 ac-6266, as amended by Amendment No. 1 thereto, provided, however, that all work under this Item 2 shall cease on or before 30 October 1945.

Item 4. As described in Item 3 of Supplement, dated 22 May 1945, to Letter Contract W33-038 ac-6266, as amended by Amendment No. 1 thereto, provided, however, that all work under this Item 3 shall cease on or before 30 October 1945.

(Total of Items 1, 2, 3 and 4)	$ 363,959.32
Item 5. One AAF Model XP-87 airplane will be constructed in accordance with Contractor's preliminary Specification #9566 dated September 15, 1945 including Revision A dated 1 January 1946 and all applicable engineering data, drawings and reports in accordance with Contractor's Report No. 29-2-1 dated 1 January 1946, including flight test instrumentation but omitting certain equipment and installations as specified.	5,283,362.00
Item 6. One AAF Model XP-87 airplane will be constructed in accordance with Contractor's preliminary Specification #9566 dated September 15, 1945, including Revision A dated 1 January 1946 and all applicable engineering data, drawings and reports in accordance with Contractor's Report No. 29-2-1 dated 1 January 1946.	2,[illegible]
Item 7. One (1) complete mock-up of the AAF Model XP-87 airplane described in Item 5 above.	169,112.00
Item 8. Wind tunnel models of the AAF Model XP-87 airplane described in Item 5 above as specifically listed in Contractor's Report No. 29-2-1 dated 1 January 1946, hereby made a part hereof.	43,060.00
Total Contract Price	$9,032,020.32

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ENCLOSURE (B) TO CURTISS LTR. EJD/af487

PRICE BREAKDOWN

	A (4) Scale Models	B Mock-up	C First Airplane	D Orig. Proj. Cols. A,B,C.	E Second Airplane	F Instruments (1) Ship	G Proj. Cost Cols. D,E,F.
Material	$ 1,800	$ 9,989	$ 162,839	$ 174,628	$ 162,839	$ 3,178	$ 340,645
Labor	6,498	60,866	893,396	960,760	714,716	12,201	1,687,677
Overhead	10,522	98,557	1,446,635	1,555,714	1,157,306	19,757	2,732,777
Shop Cost	18,820	169,412	2,502,870	2,691,102	2,034,861	35,136	4,761,099
Engineering	7,120		934,781	941,901	154,134	10,824	1,106,859
Engineering Overhead	7,120		886,498	893,618	145,922	10,247	1,049,787
Tools: Material			39,935	39,935	5,990	594	46,519
Labor			230,740	230,740	34,612	2,205	267,557
Overhead			373,627	373,627	56,046	3,570	433,243
Tunnel Tests	15,000			15,000			15,000
Flight Tests			14,851	14,851	14,351		29,702
Total Cost	48,060	169,412	4,983,302	5,200,774	2,446,416	62,576	7,709,766
Profit			232,333		220,311	6,651	459,295
Total Price							$ 8,168,061

Specification Description
Mfg. Wt. Complete Airplane - 18,235#.
Material Cost - $8.93.
Labor Hours - 33.33 hrs/#.
Labor Rate - $1.32 to 4-15-46 - $1.47 fwd.
Labor Overhead - adjusted.
Engineering Overhead - adjusted.
Tooling Rate - $1.47.
Tooling Overhead - adjusted.
Second Ship Labor Hours/# - 26.66.

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	XA-43 Costs	
PRODUCTION		
Material	$ 69,230.59	
Labor	56,633.25	
Overhead	107,862.96	
Total Production		$ 233,726.80
TOOLING		
Material	32,596.40	
Labor	63,920.36	
Overhead	121,448.58	
Total Tooling		$ 217,965.34
ENGINEERING		
Material	25,167.17	
Labor	160,402.57	
Overhead	212,890.44	
Total Engineering		$ 398,460.18
Cost		$ 850,152.32
Fixed Fee		13,807.00
Total		$ 863,959.32

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Proposed Amendment to Military Characteristics for Penetration and All-Weather Fighter Aircraft

Requirements Division, AC/AS-3 — 4 October 1946

Research & Engineering Division, AC/AS-4 — 2 — Maj EB Harwood/lm/2865

1. The following information regarding the proposed amendment to Military Characteristics for Penetration and All-weather Fighter Aircraft in regard to armor plate, has been received from the Air Materiel Command. This office does not feel that the reasons expressed by Air Materiel Command as to why the armor plate requirements for future Penetration and All-weather Fighter Aircraft are basically sound. The information is being forwarded to you, however, for comments by your office in order that a reply may be prepared to the Air Materiel Command.

2. Requests for deviations from the military requirements for armor protection in fighter aircraft have so far been limited to specific airplane types because full compliance with the requirements would have seriously compromised the design of those particular airplanes from an engineering or performance standpoint. However, the trend toward extremely high speed, long range airplanes will require some modification of the requirements for armor protection as these new planes are developed. This is true for two reasons:

a. High speed performance will in itself demand less protection for the aircraft, and

b. To attain such relatively high speeds, the plane's configuration and weight of armor plate will not permit an installation that will provide more than moderate protection to the pilot and vital parts of the aircraft and engine.

It is believed that airplanes traveling in the neighborhood of 500 - 600 mph will provide the fleetest sort of targets and that the possibilities of receiving direct hits from any particular zone will be effectively reduced. Air turbulence or the slightest amount of maneuvering at such speeds will make accurate sighting by attacking aircraft extremely difficult. It seems probable that future fighters will be concerned more with running into steel fragments from explosive shells with proximity fuses than with the possibility of receiving direct hits. Undoubtedly, the airplane as a whole will become the target, rather than the pilot or any particularly vulnerable parts of the airplane. Much thinner armor plate is required for protection from shell fragments than from direct hits, and it follows that considerable weight can be saved if the requirement for direct hit protection is reduced, both from the front and the rear.

3. Considerable importance is placed on the pilot's morale in regard to armor plate protection. If the pilot feels or thinks that he is completely exposed to fire or shell fragments from any angle, his efficiency is materially affected, even though he knows the chances of receiving a hit are quite remote. Therefore, some protection should be afforded the pilot from the most likely angles of fire if for no other reason than to increase his feeling of security.

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4. In the future, it can be expected that enemy fire will be of higher caliber than caliber .50, just as we expect to be using high caliber guns for offensive armament. To provide complete protection from this high caliber fire, heavier armor plate would be required than would be practical to incorporate in the airplane's design (see table attached as Exhibit A for figures on 20 mm. and .60 caliber protection). Since a compromise must be struck at some point, it is believed advisable to settle on a protective armor that will give a substantial amount of protection, but short of complete protection from the ever-increasing size of enemy fire expected.

5. Considering that the best defense for a truly high speed fighter is its speed, maneuverability, and elusiveness (which characteristics would be materially affected by having to carry around a substantial amount of unnecessary armor protection) it is recommended that the military requirements for the Penetration and All-Weather fighters be amended to read as follows:

"The crew shall be protected by 1/4" steel from the front at all angles not greater than 10 degrees to the longitudinal axis of the airplane, except as follows. Windshield armor glass need be only 1-1/2 inches thick and need extend upward only to a position where the average pilot's head will be protected from horizontal fire when sitting in the normal position against the back of the seat with shoulder straps fastened and with the airplane in a normal attitude of horizontal flight, and shall be required to furnish protection from straight ahead only. The crew shall also be protected by 3/8" steel for head and shoulders and 1/2" aluminum for pilot's back from the rear at all angles not greater than 20 degrees to the longitudinal axis of the airplane. Flak and splinter protection to extremely vulnerable portions of the power plant shall be provided wherever possible without seriously affecting the airplane's aerodynamic efficiency. Provisions will also be made for the installation of removable bottom armor for protection of the pilot and power plant."

This will provide protection equivalent to what is now considered .30 caliber protection.

6. The attached table, Exhibit A, indicates the resultant saving in actual armor plate weight for a single place fighter if protection is afforded in accordance with the proposed revision of requirements. Because of the necessary additional weight of supporting members and the additional weight of gas, etc. to keep the airplane's performance substantially the same, a 141 pound saving in the weight of actual armor installed will result in a total saving of approximately 1.2 x 141 or 169 pounds in the total weight of the airplane. Or, if the weight taken out is replaced by an equivalent amount of fuel, the range will be increased approximately 30 miles per 100 pounds of weight saved. If the weight were not replaced by fuel, an increase of 60 to 70 feet per minute in rate of climb at sea level would be realized for each 100 pounds increment of weight saved.

D. C. DOUBLEDAY
Colonel, Air Corps
Chief, Propulsion & Equipment Branch

Incl: Exhibit A

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[redacted]

HEADQUARTERS ARMY AIR FORCES
WASHINGTON, D. C.

23 November 1945
(Revised 16 July 1948
(Revised 8 Oct. 1946)
(Para. C 2(b) revised

SUBJECT: Military Characteristics of Aircraft (All-Weather Fighter)

TO: Assistant Chief of Air Staff - 4

1. The following principal characteristics of the All-Weather Fighter ar approved:

ALL-WEATHER FIGHTER AIRCRAFT

A. Class - High Performance Night and Inclement Weather Fighter.

B. Mission - The execution of night fighter and intruder missions during periods of darkness and during periods of inclement weather.

C. Requirements -

1. Performance -

(a)	High speed at 35,000 ft.	[illegible] mph
(b)	High speed at Sea Level	[illegible]0 mph
(c)	Climb to 35,000 ft.	12 minutes

Remarks: The above requirements are to be with full internal fuel, normal design armament, radio and accessories installations. War emergency rating may be used to reach the above requirements.

(d) Combat Radius of Action at 10,000 ft. - 600 miles
at best operational altitude - 1000 miles.

Remarks: Maximum combat radius of action will be based on climb to best operational altitude, then cruise out at best operational altitude to the target and engage in combat over the target for 15 minutes at Military Rating and 5 minutes at War Emergency Rating. Cruise back at best operational altitude and arrive over home base with fuel for 30 minutes operation at minimum consumption at an altitude of 5,000 ft. Combat radius of action at 10,000 ft. will be based on climb to 10,000 ft., then cruise out 600 miles and return at 10,000 ft., and arrive over home base with fuel for 30 minutes operation at minimum consumption at an altitude of 5,000 ft. The above requirements are to be met under the same load conditions as specified for high speed and climb, with the addition of the necessary external fuel to realize the combat radius of action.

(e) Performance priorities - If after all requirements have been met additional performance can be realized, it is desired that consideration be based on: (A) more speed and (B), more range.

CO[redacted]

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Military Characteristics of Aircraft "All-Weather Fighter Aircraft"
3 November 1945 (Revised 8 October 1946)

(f) Flying characteristics - The highest degree of controllability and maneuverability possible is desired. Ability to accomplish sustained dives at steep angles is required throughout the altitude operating range.

2. Armament -

(a) Automatic Rocket Fire - To meet future requirements for fighter aircraft, a rocket installation completely housed within the aircraft capable of automatically firing high velocity rockets which are suitable for air-to-air and air-to-ground combat shall be developed.

(b) Guns - Guns will be flexibly mounted to provide a minimum of 15 degrees of movement in any direction from the longitudinal axis of the airplane. Automatic gun-laying will be incorporated to provide master control for all guns firing in the same direction. The aircraft should be designed to permit the installation of the 20mm cannon. A minimum of four forward firing guns is required.

(c) Ammunition - Sufficient ammunition to provide twenty seconds of fire per gun is required.

3. Gunsight - The best available computing and automatic ranging gunsight which is adaptable for use in connection with air-to-air firing, air-to-ground firing, dive bombing and rocket firing is required.

4. Ground Attack Installations - Provisions are required for the installation of a minimum of two bombs in all standard sizes up to 1000 lbs. Provisions shall also be made for the installation of a minimum of eight rockets. Consideration should be given to the versatility of these and other ground attack installations in conjunction with the external fuel tank provisions so that as many alternate combinations as possible may be used.

5. Armor - The crew shall be protected from .50 cal. armor piercing fire from the front and at all angles not greater than 10 degrees to the longitudinal axis of the airplane, except as follows: with the airplane in a normal attitude of horizontal flight, windshield armor glass need only extend upward to a position where the average pilot's head will be protected from forward horizontal fire when sitting in the normal position against the back of the seat with the shoulder straps fastened. The crew shall be protected from .50 cal. armor piercing fire from the rear at all angles not greater than 20 degrees to the longitudinal axis of the airplane. The mission of the airplane demands

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that engineering be undertaken to provide flak and splinter protection to the extremely vulnerable portions of the power plant. Provisions will also be made for the installation of removable bottom armor for protection of the pilot and the power plant.

e. Crew - Pilot and radar observer.

Fuel -

(a) Internal - All internal fuel will be in tanks capable of self-sealing with the type of fuel carried.

(b) External - Total fuel required externally for maximum combat radius of action problems will be only that amount required to climb to altitude from points of take-off and cruise to initial arrival over target. There will be provision points to meet maximum combat requirements. Such provisions must be capable of use at all operational altitudes.

f. Equipment -

(a) Cabin pressurization - Automatic pressurization will be provided and maintained at a safe differential of pressure.

(b) Automatic pilot - An automatic pilot is required.

(c) Oxygen system - A pressure demand system will be installed in accordance with existing specifications.

(d) Crew comfort -

(1) Provisions for at least one quart of thermos contained liquid foods is required for each crew member of aircraft assigned to missions of four to six hour duration. Provisions of two quarts per crew member is required for aircraft assigned to missions of more than six hours' duration. These containers will be mounted with hose "leads" for dispension of the liquids to the crews.

(2) A hammock type seat, or seat of equivalent comfort, with arm rests, is required.

(3) Provisions shall be made for maximum extension of the pilot's legs for comfort.

(4) An adequate crew relief system will be provided.

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(e) Radio - The latest type of communications and radar equipment suitable for this type aircraft will be installed. Facilities required are as follows:

(1) Ground-to-air and air-to-air communications.
(2) Long range navigational equipment.
(3) Identification friend or foe.
(4) Warning, interception and short range navigational equipment.
(5) Air controlled blind landing equipment.

(f) Camera - A gun camera and radar scope camera will be installed.

(g) Instruments - All instruments necessary for the proper performance of the mission of the aircraft are required. Consideration will be given to wind screen projection of all the instruments that are necessary when tracking an enemy aircraft under instrument flying conditions.

(h) Heating system -

(1) An air conditioning system is required for the pilot and the radar observer compartments.

(2) Heating of all airfoil surfaces (except propellers) sufficient to keep these surfaces free from ice formations is required. Propeller deicers are required on all aircraft using propellers.

(i) Flight brake - A means of rapid deceleration of aircraft upon closure with the enemy will be provided.

(j) Crew escape - Provision for emergency ejection of crew members will be considered.

(k) Taxi light - A taxi light will be installed.

(l) Fire extinguisher - A fire extinguishing system will be provided.

9 Structure and Design Features -

(a) Visibility - The forward downward visibility over the nose when the pilot's eye is aligned with the gunsight will not be less than 12 degrees.

(b) Aircraft will be capable of being towed through the nose gear.

(c) Maintenance - Ease of field maintenance, repair, and replacement of parts will receive major consideration. Design and construction of the aircraft should be such that the time required to change a single power unit under field conditions shall not exceed

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one hour. Conduits and control systems shall be arranged and designed to that they may be connected and disconnected quickly.

(d) Consideration should be given to the incorporation of suitable mounting facilities for attaching rocket boost units for assisted take-off. These mounting mechanisms should contain a device for quick release of the rocket units by the pilot; they should furthermore be automatically recessible into the aircraft structure upon release of the rocket units.

(e) Fire prevention - Emphasis must be placed on reduction of fire hazards through engineering design. Fire extinguishing systems must be easily operated in flight to control engine fire. A maximum reduction of fire probability through battle damage must be attained by careful engineering.

(f) Simplicity of design and suitability to quantity production should be emphasized.

FOR THE COMMANDING GENERAL:

(s) Alfred P. Maxwell
ALFRED P. MAXWELL
Brig. General, USA
Chief, Requirements Division
Office of Asst. Chief of Air Staff-3

DISTRIBUTION - Made by Engineering Division,
TSEOA, AMC, Wright Field

25 AC/AS-4
1 TSEEG, Attn. J. Fiala
1 TSENG
1 TSEOP
14 TSELP
2 TSBUY2C
2 AAF Proving Ground Command, Eglin Field, Fla.
3 TSEAC (1 Design Br., 1 Mr. Lippman, 1 Airc. Lab.)
1 TSEPP
1 TSEPS
1 TSEPE
1 TSEPA
1 TSEAM
1 TSEPT
1 TSEAA
1 TSEAP
1 TSXCW
1 TSEWS
1 TSOFE
1 TSESTLOB
1 Allison Div., Indianapolis, Ind.
1 Pratt & Whitney, E. Hartford, Conn.
1 Wright Aero. Corp., Paterson, N.J.
1 General Electric Co., Schenectady, N.Y.
1 Sperry Gyroscope Co., Inc.
1 Aeroproducts Div., Gen. Motors
1 Curtiss-Wright Corp.
1 Hamilton Standard Prop.

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COORDINATION
CG OR DEP CG
ADJUTANT GENERAL
[illegible] (T-1) (T-2A-4)
CHIEF OF ADMIN.
AIR INSPECTOR
PUBLIC RELATIONS
JUDGE ADVOCATE
PERSONNEL (T-1)
INTELLIGENCE (T-2)
ENGINEERING (T-3)
SUPPLY (T-4)
PLANS (T-5)
BASE C. O.
OTHER

AMC Form No. 10-508
(Rev. 22 Oct 45)
(PRINT SYMBOL AND INITIALS IN APPROPRIATE BLOCK)

[illegible]-4/CUT:mmc

15 October 1946

Contract W33-038 ac-6868 08:41
Wind Tunnel Testing of
High Speed Model of XP-37

Curtiss-Wright Corporation
Airplane Division -- Columbus Plant
4300 East Fifth Avenue
Columbus 16, Ohio

References: Conference between the Chief of Engineering Division and Curtiss personnel at Wright Field on 11 September 1946.

1. In accordance with requests by the Contractor during the referenced conference, the Air Material Command has conducted a survey to determine the availability of a high speed tunnel in which to test a model of the XP-87 airplane. Also, numerous inquiries were made as to the attitude of the Army and NACA relative to the interruption of basic research programs in the interest of a specific project.

2. The results of these surveys and inquiries indicate that, in order to realize the greatest overall benefit from the several basic research programs being carried out by NACA, it is not advisable to request the allocation of high speed tunnel time to the XP-87. The unfortunate circumstance is that the aircraft now being developed are so numerous and complex and the facilities for aerodynamic tests so limited that no Contractor may look forward to wind tunnel support in the manner to which he has been accustomed.

3. Of possible future interest to the Contractor is the fact that recently the NACA has offered their facilities at the Wallops Island Base for testing of specific models at transonic speeds by the rocket firing technique. It is recommended that the Contractor investigate these facilities and make every possible use of this method of high speed testing on future projects.

FOR THE COMMANDING GENERAL:

GEORGE F. SMITH,
Colonel, Air Corps,
Chief, Aircraft Projects Section,
Engineering Division.

cc:

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AMC Form No. 10-3
(19 Mar 45)

ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

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Use authorized office symbols to designate addresser and addressee.

Place initials of dictator and typist, telephone number and location to right of signature.

Use entire width of sheet, both sides.

Number all comments consecutively.

Separate comments by horizontal lines across page.

SUBJECT Contract W33 038 ac-[illegible] - Curtiss [illegible] Corporation

TO TSAXF
Attn: Maj. Prugh

FROM [illegible]

DATE 17 Oct 46 COMMENT NO. 1

1. Attached are contractor's quotations dated [illegible] March and 27 September 1946 covering the XP-87 airplane. Both letters summarize negotiations which were originally undertaken the early part of this year and continued in a series of approximately 7 meetings between the Government and the contractor's personnel to arrive at an equitable price for this procurement. Attached also is a copy of price negotiation data supplied by Curtiss Wright and a copy of a letter from the Price Analysis Branch dated 5 October 1946 discussing various aspects of the negotiations.

2. Originally subject contract called for [illegible] of the XA-[illegible] airplane on a CPFF basis. Subsequently, a CPFF letter contract was issued covering the second phase but before it could be completed [illegible] the contractor build an XP-87 in lieu of the XA-[illegible] airplane. Contractor offered to [illegible] the XA-[illegible] airplane for the funds still available against the original contract for the building of the XA-[illegible] airplane. In view of the fact that approximately [illegible] had been expended on Phase I and part of Phase II work on the XA-[illegible], contractor estimated a loss of [illegible],000 in undertaking to build one XP-87. Sometime later, additional funds became available and it was arranged to procure another XP-87 as well as [illegible] models, one mock-up and instrumentation of one XP-87 airplane with [illegible]. These terms were authorized by the War Labor Board to [illegible] and similar increases [illegible]. Consequently, while contractor's quotation last was approximately equal to the first quotation dated 16 January 1946, ($[illegible],[illegible],000 for the XP-87 plus [illegible] less the expenditures made for the XA-43 airplane) so that by [illegible] the figure was reduced to $7,[illegible],000, when consideration was given to the wage increase the cost of the airplane rose to $8,168,000. It ~~was now seen~~ [illegible] that the cost of the XA-[illegible] airplane were $863,959 so that the total cost of the contract as finally negotiated amounted to $9,032,000.

3. Contractor was originally reluctant to accept this figure claiming that to do so would result in his incurring a half-million dollar loss on the contract. Several members of the Corporation, together with the General Manager, came to Wright Field at various times urging that a higher figure be permitted. However, it was pointed out that other Corporations with a high overhead similar to that of Curtiss-Wright had been required to quote on the basis of a lower overhead figure in anticipation that curtailment of overhead costs would enable the contractor to meet the lower overhead figure finally agreed upon. These contractors had generally been able to reduce expenditures so that the overhead figures were now being approached or met. Accordingly, it appeared inconsistent to require one contractor to lower its overhead while making no such requirement in the case of another operating under similar conditions. Contractor of course had initially stated it was willing to accept this business at a substantial loss in anticipation of obtaining an order for production airplanes should the experimental type be satisfactory.

4. It is thought that all correspondence in connection with this procurement is available to the Contracting Officer in the contractor's plant and quite likely in the Dayton Procurement Field Office. However, parts of the file of this office are attached for ready reference with the request that it be returned with comments or approval of the negotiations which have been carried on at this Headquarters. It should be noted that

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TO ~~CHIEF~~ T52XF Maj Prugh FROM WPAL-1 45 DATE 17 Oct 46 COMMENT NO. 1

while the total cost of the contract is $9,032,000, of which $366,000 has been paid against the original CPFF contract, only $8,655,000 had been allocated for this procurement and the Engineering Division is being requested at the present time to advise if additional funds can be allocated to cover the complete procurement or if some curtailment of the items procured will be necessary.

5. It is requested the Dayton Field Office review contractor's quotations and advise this Headquarters so that a contract may be written at an early date.

AC-6266

GEORGE E. SCHAETZEL
Colonel, Air Corps
Chief, Aircraft Section
Procurement Division

SL:vmo
2-5243
Bldg.15
Rm. 230

Incls: (5)
1 - R&R fr BPS9B d/3 Oct 46
2 - C-W ltr EJD/af-487 d/27 Sept 46
3 - WD Std Proc. Form 3 d/3-2-46
4 - Price Negotiation Data Bklt d/3 Apr 46
5 - C-W ltr d/27 March 1946

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Form No 10-514 (Rev 10 Sept 46)

WF-L-2 OCT 46 300M

SAVE

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL, AIR MATERIEL COMMAND, ATTENTION FOLLOWING OFFICE SYMBOL

TSX-4 (Mr. [illegible]-4)

HEADQUARTERS
AIR MATERIEL COMMAND

WRIGHT FIELD, DAYTON, OHIO

[illegible]

SUBJECT: Contract [illegible]-6266
F-87 Airplane -- Permanent Installation
Gun No. [illegible] All Weather Fighter

TO: Commanding General
Army Air Forces
Washington 25, D. C.

Attention: [illegible]-4

1. The present schedule for the development of a remote control automatic gun laying turret equipment for all weather fighter indicates that such equipment will not be available for at least a year after completion of the airplanes.

2. In view of the above, the contractor has been notified to install four (4) fixed 20mm guns in an alternate nose installation in all of the additional service test airplanes. This installation is to be temporary and upon suitable turret and fire control system being available it will be installed in the permanent arrangement.

For the Commanding General:

Joseph Smith

[illegible]

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To: TSBPA4-1 From: TSZXF Date: 14 Nov 46 Comment No. 2

1. In accordance with request in paragraph 2 of foregoing comment, the Dayton Procurement Field Office has made an investigation and as a result of such investigation the following information is given:

a. Personnel involved in discussion with the contractor are as follows:

For the Contractor -
E. J. Brandewiede, Director of Sales
J. A. Lawler, Comptroller
Fred Miller, Sales Administrator
Max Power, Engineering-Planning

For the Dayton Procurement Field Office -
Thomas Bell, Inspector in Charge
W. F. Collins, Contracting Officer

(2) b. It is noted that the proposed contract is, in effect, a continuation of procurement originally intended for the XA-43 airplane and that the procedure followed was not to terminate this procurement but rather to amend, permitting the building of the XP-87 under the same allocation of funds. It is understood that this manner of handling was necessary in order to prevent the possible loss of allocated funds.

c. Reference is made to the Enclosure "A" to Curtiss Letter 711/af-407 and Enclosure "B" to same letter, copies of which are in the attached file.

d. The first item of price on Enclosure "A" is $4,063,[illegible] and represents the cost of Items 1 through 4, as taken from the Contractor's cost records, plus applicable fixed fee. These items were those included in the original contract and supplements as described. This work was performed on a CPFF basis in the Buffalo plant, before removal of the project to Columbus. No audit was made of these costs,

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AMC Form No. 10-3
19 Mar 45)

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AIR MATERIEL COMMAND

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Number all comments consecutively

Separate comments by horizontal lines across page.

SUBJECT

TO	FROM	DATE	COMMENT NO.

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Form No. 10-3
(19 Mar 45)

ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

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Use entire width of sheet, both sides.

Number all comments consecutively.

Separate comments by horizontal lines across page.

SUBJECT Contract W33 038 ac-6266 - Curtiss Wright Corporation

TO	FROM	DATE	COMMENT NO.

Comment No. 2 cont'd

o. The item of flight test, $14,891.00, is for the very limited flight testing contemplated in the proposal. This writer has no data upon which an expression of opinion can be based concerning this item.

p. The estimates set forth in Col. E, costs for the second ship, have been computed similarly to those outlined above. It will be noted that the labor hours for the second ship is approximately 80% of those on first, based apparently on the frequently used "80% curve". Similarly, the engineering costs have been greatly reduced, based, it is stated, on the contractor's experience curve in this connection. The same sort of reduction is apparent in the tooling estimate, and the same amount is set up for flight testing, viz: $14,891.00.

q. The profit claimed is as follows:

	Cost Estimate	Profit	%
On first ship -	$2,[illegible],302.00	$232,333.00	4.66
On second ship -	[illegible],410.00	220,311.00	9.00
On instruments -	62,576.00	5,651.00	9.03

To the above profit figures should be added the profit represented by the fixed fee included in the item of $105,[illegible].[illegible] set forth on Enclosure "A".

r. Attention is invited to the very limited guarantee contained in the contractor's proposal, which guarantee, it is presumed, will be included in the definitive contract. In discussing this with Mr. Grumwiede, it seemed apparent that these limitations were at least in part dictated by the fact that high speed wind tunnel tests would not be made, and without the data obtainable from such tests, which would provide an experimental basis for design features, satisfactory performance could not be forecast nor guaranteed. It is submitted that this procurement involves very large sums on experimental ships, not as yet completely designed. There is a large element of financial risk involved in every experimental procurement. Undoubtedly this risk ought to be reduced as much as possible by careful preliminary engineering investigation and testing of models. Neither this writer nor this office is in a position to judge as to whether or not high speed wind tunnel tests ought to be made (as the Contractor's personnel seem to believe) before great expense is incurred. It is this writer's belief that these tests and the contractor's limited guarantee because, apparently, of their absence, are matters for consideration, recommendation and decision by higher authority.

s. It is also noted (Par 4g) that the contractor does not intend full compliance "with all the provisions of applicable specifications". If this provision is incurred it will present very difficult inspection problems as no standard for inspection will have been provided. It is believed that specifications ought to be prepared which are applicable to the circumstances.

2. It is not the intention of this office to question either the good faith or the accuracy of the methods used, nor the correctness of the figures in the negotiations

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TO	FROM 50	DATE	COMMENT NO.

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ts of this sort is

Dana L. Strickland

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[redacted]

[redacted]

1st Ind.

Headquarters, Army Air Forces, Washington 25, D. C., 2 December 1940

To: Commanding General, Air Corps Board, Wright Field, Dayton, Ohio - Attention: Major (Pilotless)

1. This office is in accord with the action taken as outlined in paragraph 4 of the basic letter. It is understood, however, that approval for [redacted] equipment is given only for the [redacted] Model airplane, and only as a temporary installation.

2. Every effort must be made to insure the availability at the earliest possible date of a suitable turret and fire control system for permanent installation.

By command of the Chief of Staff:

C. F. Bunker
Lieut. Colonel, A.C.
Executive, Materiel Div.
Air Corps

[redacted]

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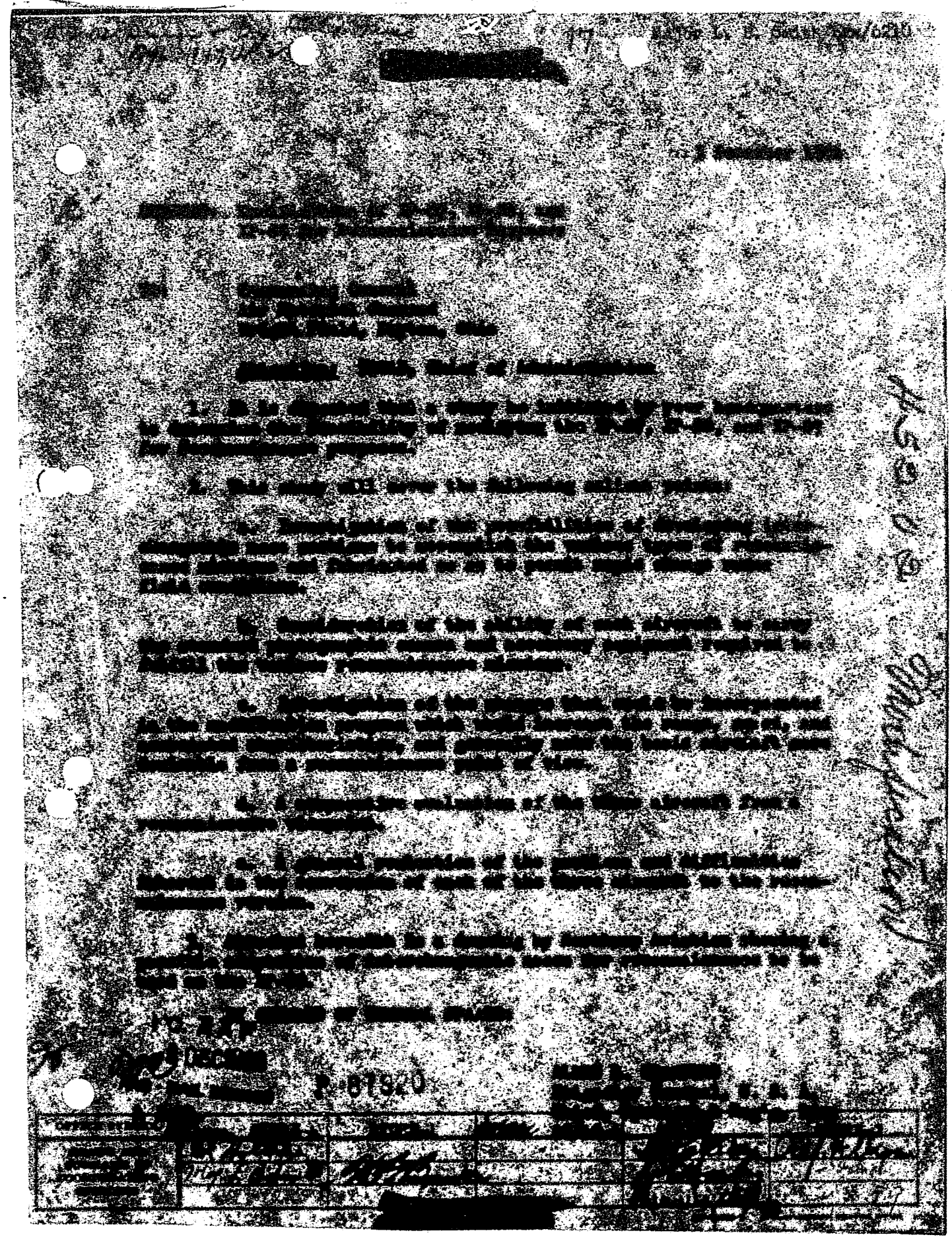

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AMC Form No. 10-508
(Rev 12 Aug 44)

(PRINT SYMBOL AND INITIALS IN APPROPRIATE BLOCK)

ADJUTANT GENERAL

CHIEF OF ADMIN.

AIR INSPECTOR

PUBLIC RELATIONS

JUDGE ADVOCATE

PERSONNEL (T-1)

INTELLIGENCE (T-2)

ENGINEERING (T-3)

SUPPLY (T-4)

PLANS (T-5)

BASE C O

OTHER

TSEOA-4/OBT:hw

TSEOA (TSEOA-4)

4 December 1946

Contract W33-038-AC-6266
XP-87 Airplane
Conversion of Performance Data to Nautical Terms

Curtiss-Wright Corporation
Airplane Division--Columbus Plant
4300 East Fifth Avenue
Columbus 16, Ohio

1. A recent policy set forth by Headquarters, Army Air Forces requires that all distances be expressed in nautical miles and speeds of aircraft in knots. This conversion is to take place as rapidly as possible and all instruments affected will be changed over in the future. Accordingly, in the future the contractor is requested to submit all performance data in nautical miles and knots. The statute miles and miles per hour should be added in parenthesis after the applicable nautical miles and knots per hour until such time as all instrumentation can be converted to the new mileage system.

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FOR THE COMMANDING GENERAL:

C P Garman, Col AC

for GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

Copies to:
Curtiss-Wright, Dayton
AAF CIC, Curtiss-Wright

MK-745

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION-COLUMBUS PLANT

COLUMBUS 16, OHIO

13 January 1947
RRA:HW:12
Quote No. 820

Subject: Contract W33-038 ac-6266
XP-87 Airplanes
X24C Engine Test Nacelle Structure

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSBPS3

Through: AAF Inspector In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) Curtiss Ltr WT:bsp 8911-E dated 27 December 1946
(b) Conference at Wright Field 30 December 1946
Between Curtiss personnel and AMC officials

Enclosure: (A) Cost Estimate Breakdown

1. By reference (a), this Contractor emphasized the desirability of building a nacelle structure for the purpose of testing two (2) X24C Jet Engines. It was pointed out that, in view of the difficulties experienced with the TG-100 engine on the XC-113 Airplane, it seems advisable to conduct such a test program before actual installation of the engines in the airplane.

2. The purpose of such a program is threefold:

(a) To check the power plant installation in a simulated nacelle insofar as such a check is possible with this type of stand. This check is intended to provide preliminary installation information to anticipate and eliminate, prior to the actual installation, such problems as will accompany the incorporation of these new engines. The information thus obtained will be exclusive of and supplementary to the engine test data ordinarily obtained by the engine manufacturer.

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(b) - To obtain engine test data which, in combination with other related installations, cannot be furnished by other sources (inasmuch as it is this Contractor's understanding that no other such test program for XT40 Engines has been or is being conducted).

(c) - To familiarize personnel with operation of the XT40 Engines and thus prevent delays in the flight test program.

This test nacelle structure, which is now under construction, includes fuel, oil, electrical and fire extinguisher systems and embodies the installation of both jet engines.

3. Submitted herewith, in compliance with the Air Material Command's request that this proposal be expedited (reference (b) conference), is this Contractor's quotation for Forty-Six Thousand, One Hundred One Dollars and Seven Cents ($46,101.07) for the subject nacelle structure. A breakdown of this amount is attached hereto as Enclosure (A).

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

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ENCLOSURE (A)

XP-87 ENGINE TEST NACELLE - COST BREAKDOWN

Productive Material	$4,067.91
Productive Labor @ $1.47/hr	7,546.98
Productive Overhead @ 160%	12,075.17
TOTAL SHOP COST	$23,690.06
Engineering Labor	9,110.00
Engineering Overhead @ 100%	9,110.00
Total Cost	$41,910.06
Profit (10%)	4,191.01
PRICE	$46,101.07

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CURTIS-WRIGHT CORPORATION
AIRPLANE DIVISION-COLUMBUS PLANT
COLUMBUS 16, OHIO

23 January 1947

PCM:EW:59

Subject: Contract W33-038 ac-6266
Model XP-87 Airplanes
Cost Change Summary

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSBPS3

Through: AAF Inspector In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Enclosure: (A) Cost Changes for Spec Revision "B"
(B) Miscellaneous Cost Changes

1. In accordance with the Air Materiel Command's request, this Contractor submits herewith total price information for the following groups of XP-87 contract changes:

	Price
(a) Cost Changes for Spec Revision "B"	$64,022.40
(b) Other Cost Changes	193,863.09
Total	$257,885.49

Cost breakdowns by individual changes are attached hereto as Enclosures (A) and (B), respectively.

2. Detail breakdowns of each of the individual changes will be forwarded by subsequent letter. It should be noted that the items of Enclosures (A) and (B) which are marked with an asterisk are included for Air Materiel Command planning purposes on a preliminary estimate basis only.

3. The cost effect, if any, resulting from a consideration of AMC Ltr TSEOA-6/LEW/gem dated 16 January 1947 concerning GFE items is not included in this quotation. Such cost change will be submitted by separate letter.

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4. The price for Item 9C of Enclosure (A) is submitted in compliance with AMC letter TSEOA-4/CBT:hw dated 11 December 1946 rather than in strict accord with the terms of Specification Revision "B". Whereas Revision "B" calls for six (6) Government Furnished booster fuel pumps, the above-referenced letter directs that only two (2) pumps are to be GFE. Therefore, since the original requirement was that all six (6) pumps were to be Contractor-furnished, the quotation contained herein reflects a credit for two (2) GFE pumps.

5. Not included in the list of "Other Cost Changes" is the tachometer drive adaptor item, requested by AMC Letter TSEOA-4/CBT:hw dated 13 January 1947. Insufficient information is available at this time to quote on this as a Contractor-furnished item.

6. The Phase III Flight Test quotation and quotations for the following test programs are not considered in this summary:

(a) Nose Wheel & Landing Gear Drop Tests
(b) Gunfire Test of Fuel Tank
(c) Slosh & Vibration Test of Two Fuel Tanks
(d) " " " " " the Oil Tank
(e) " " " " " " Hydraulic Tank
~~(f) Gunfire test of the Armor Plate~~

7. The miscellaneous cost changes quoted herewith are exclusive of the previously quoted prices for fabrication of a ditching model and an empennage test nacelle structure (Curtiss letters RRA:HW:17 dated 10 January 1947 and RRA:HW:18 dated 13 January 1947).

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Quadyet
Contracts Manager

V.B. Bell

PERSON IN CHARGE

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ENCLOSURE (A)

XP-87

COST CHANGES FOR SPEC REVISION "B"

Item		Price
1.	Use of JP-2 Fuel (Increase Fuel Tank Size)	$1819.40
2.	Addition of Emergency Fuel System	1170.86
3.	Radio & Radar Changes	164.49
4.	Insulation & Gun Heating Provisions for Fwd Turret	519.54
5.	Installation of Taxi Light on Nose Wheel Strut	377.08
6.	Study & Mockup for Pre-loading Bomb Racks	293.55
7.	Afterburning Provisions in Lieu of Water Injection	- 883.98
8.	Remove Tail Turret from Airplane	- 744.40
9.	Incorp. "V" Type De-iced Glass & 1½" Bullet-Resist. Glass	955.64
10.	Provide a Firewall Between Engines	15,564.25
11.	Install Mild Steel Plate Instead of Armor Plate	- 452.82
12.	Addition of Fire Extinguisher System	13,846.14
	Deletion of Bomb Bay from Fuselage	- 7567.54
14.	Instrument Installation Changes	723.00
15.	Install Type Q-2 in Lieu of Q-1 Generator	539.00
16.	Install "Flasher" Fuselage & Tail Lights	599.88
17.	Delete Recognition Lights & Switches	- 346.86
18.	Install Type M-4 Pressure Regulator Valve	133.52
19.	Wing Tip Bomb Installation	25,962.46
20.	Substitution of GFE for CFE Booster Pumps	- 474.00
21.	Delete GFE Periscopic Sight	- 374.11
22.	Canopy Jettison Mechanism	727.30
	Total	$64,022.40

* Preliminary estimate only, for planning purposes

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ENCLOSURE (B)

XP-87

OTHER COST CHANGES - - - - - - - -

Item	Price
1. Additional 7½ Hours of Phase I Flight Test Time	$ 11,134.07
2. Deletion of Spin Model	- 2,739.22
3. Gun Camera Relocation	2,010.59
4. Dummy Nose Installation (No. 1 Airplane)	17,902.94
* 5. Increased Windshield Heating Requirements	6,123.37
6. Substitution of X24C-4A Engines (No. 1 Airplane - 2 engines)	5,655.45
7. Fixed Gun Nose Installation	77,017.05
8. Shipment of No. 1 Airplane to Muroc & Preparation for Flight	76,758.84
Total	$193,863.09

* Preliminary estimate only, for planning purposes.

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38.

ATSC Form No. [illegible] (3 Jan 45)
(Old ATSC Form No. 43)

COORDINATION

DIRECTOR OR DEP.

AIR INSPECTOR

MGT. CONTROL
TSEOA (TSEOA-4)

CHIEF OF ADMN.

SPECIAL STAFF

CHIEF, ENG. & PROC.

CHIEF, SUPPLY & MAINT.

PERS. & BASE SERV. DIV.

MAINT. DIV.

SUPPLY DIV.

ENGINEERING DIV.
O.B. Moore
ppSchmitt

PROCUREMENT DIV.

READJUST DIV.

OTHER

TSAGDS NO 3[illegible]
TSEOA-4/OBT:hw
23

23 January 1947

Contract W33-038-AC-6266
XP-87 Airplane

Curtiss-Wright Corporation
Airplane Division--Columbus Plant
4300 East Fifth Avenue
Columbus 16, Ohio

Reference: (a) C-W ltr. WT:bsp 8911-E dtd. 27 Dec. 1946 attached
(b) C-W ltr. RRA:HE:12, Quote No. 820, dtd. 13 Jan. 1947

1. The contractor's quotation for fabrication and operation of an engine test stand as outlined in the reference letters, has been examined by the Air Material Command. Since the conference at Wright Field on 30 December 1946, during which the contractor was requested to submit a quotation on the engine test stand installation, it has been directed by higher authority that no additional funds be allocated to this project for the purpose of testing the engine installation. On the basis of this direction the contractor's quote letter No. 820 (reference (b)) is therefore disapproved.

FOR THE COMMANDING GENERAL:

Robert J. Fryer, Capt AC
for GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

Copies to:
C-W, Dayton
AMCIC, C-W
Power Plant Lab.

MA-745

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W.P.B. - A.A.F. 63 (OTSM)

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COORDINATION
CG OR DEP CG

AMC Form No. 10-508
(Rev 12 Aug 45)

(PRINT SYMBOL AND INITIALS IN APPROPRIATE BLOCK)

ADJUTANT GENERAL

[redacted] (TSEDA-4)

CHIEF OF ADMIN.

AIR INSPECTOR

PUBLIC RELATIONS

JUDGE ADVOCATE

PERSONNEL (T-1)

INTELLIGENCE (T-2)

[redacted]

SUPPLY T-4

PLANS (T-5)

BASE C O.

OTI

TSEDA-4/OBT:hw

[redacted]

12 February 1947

Contract W33-038-AC-6266
XP-87 Airplane

Curtiss-Wright Corporation
Airplane Division--Columbus Plant
4300 East Fifth Avenue
Columbus 16, Ohio

Attention

Reference: C-W wire WUA36 dtd. 5 February 1947.

1. The contractor is authorized to install one each X24C-4A and one each X24C-4B turbo-jet engines in a ground test stand and to conduct the necessary ground tests on these engines at no expense to the Government.

FOR THE COMMANDING GENERAL:

Robert Johnson Capt AC

GEORGE F. SMITH
for Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

O.D. Knowler

Copies to:
C-W, Dayton
AAFOIC, C-W

MX-745

[redacted]

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CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION-COLUMBUS PLANT
COLUMBUS 16, OHIO

13 February 1947
RRA:HW:105
Quote No. 830

Subject: Contract W 33-038 ac-6266
Model XP-87 Airplanes
Cost Change Summary

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSBPS3

Through: AAF Inspector In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference:
(a) Curtiss Ltr FCM:HW:59 dated 23 January 1947
(b) Wright Field Conference 3 February 1947
Between AMC and Curtiss Representatives
(c) AMC Ltr TSEOA-4/CBT:hw dated 11 December 1946
(d) AMC Ltr TSEOA-4/CBT:hw dated 13 January 1947
(e) AMC Ltr TSEOA-6/LEW/gem dated 16 January 1947
(f) Curtiss Ltr RRA:HW:17 dated 16 January 1947
(g) Curtiss Ltr RRA:HW:67 dated 29 January 1947
(h) Curtiss Ltr RRA:HW:70 dated 3 February 1947
(i) AMC Ltr TSEOA-4/CBT:hw dated 10 February 1947

Enclosure:
(A) Cost Changes for Spec. Revision "B"
(B) Miscellaneous Cost Changes
(C) Test Item Cost Changes
(D) No-Cost Changes for Spec. Revision "B"

1. The XP-87 Cost Change Summary contained in reference (a) is superseded by the quotation submitted herewith, in compliance with the AMC request of reference (b) conference. This quotation is comprised of the following groups of changes:

(a) Cost Changes for Spec. Revision "B"	$ 56,719.19
(b) Miscellaneous Cost Changes	~~26,692.50~~ 20,129.84
(c) Test Items	28,884.00
~~Total~~	~~$ 112,295.77~~ 105,733.72

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These groups correspond to Enclosures (A), (B), and (C), respectively, attached hereto. The Enclosures, in addition to the breakdowns by individual changes, contain a brief description of each item and definition of the work involved. This detail addition to Enclosures (A), (B), and (C), is furnished in compliance with AMC verbal request. For information only, this Contractor submits herewith, as Enclosure (D), a list of Revision "B" Specification changes accomplished on subject airplanes at no cost to the Air Materiel Command. These changes result from mock-up board inspection and subsequent detail specification conferences. In addition to these changes, this Contractor is fabricating an engine test nacelle structure at no cost to the Air Materiel Command.

2. Enclosure (C) lists and prices all the "test items" referred to in paragraph 6 of reference (a) with the exception of the item for gunfire test of the armor plate, which is omitted as a result of the reference (b) conference. It is understood mild steel plate will be substituted to simulate design and weight requirements for this item.

3. As pointed out in reference (a), the price for Item 20 of Enclosure (A) is submitted in compliance with letter reference (c) rather than in conformance with Specification Revision "B". Whereas Revision "B" requires six (6) Government-furnished fuel booster pumps, the AMC letter reference (c) directs that only two (2) pumps are to be GFE. Therefore, since the original requirement was that all six (6) pumps were to be Contractor-furnished, the quotation contained herein reflects a credit for two GFE pumps.

4. Included in the list of Miscellaneous Cost Changes is the tachometer drive adaptor item, requested by reference (d). Inasmuch as insufficient information is available at this time to quote on this as a purchased item, the price is based upon fabrication by this Contractor of the major components in the adaptor. No consideration of the GFE to CFE items contained in AMC letter reference (e) is included herein. These items will be quoted separately.

5. Neither the Phase I nor the Phase III Flight Test Program quotation is contained in this letter. Both will be quoted at a later date.

6. The prices contained in Enclosure (B) are exclusive of the previously quoted price for fabrication of a ditching model, submitted by letter reference (f). In accordance with the AMC request of reference (b) conference, the item covering deletion of the spin model has been included in the list of "B" Revision changes, Enclosure (A). The Air Materiel Command's attention is invited to the fact that a quotation and detailed breakdown of the costs involved in this item have already been submitted by letter reference (h). Such a detailed breakdown for the substitution of two R-4360-4A engines in No. 1 Airplane (Enclosure (B) item) was submitted previously, also, by letter reference (g). It should be noted that the gun camera relocation item has been deleted from the Miscellaneous Cost Change list. The increased windshield heating requirement item has been deleted from Enclosure (B), in view of the revised information contained in AMC letter reference (i). Since

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the requirements outlined in this letter will affect the cost of the windshield heating change, this item will be subject to separate negotiation at a later date.

7. This Contractor wishes to point out that all items of Enclosure (B) which reflect a net charge are broken down to indicate both the debit and credit components used in determining such charge. It is desired to point out further that the quotations contained herein are based on the usage of a 100% engineering overhead, 160% labor overhead, and a profit application of 10%.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

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ENCLOSURE (A)

COST CHANGES FOR SPECIFICATION REVISION "B"

ITEM	PRICE
(1) Use of JP-2 Fuel	$1,819.40

With a lower specific weight, 6.35 in lieu of 6.7 lbs per gallon, re-engineering of the fuel cells for an increase in tank capacity of 176 gallons resulted. Engineering effect on the airplane design is obvious. The cost quotation also includes the cost of larger capacity tanks.

(2). Addition of Emergency Fuel System — 1,17[illegible].86

Engineering this change involved considerable indecision as to the type of system desired. This system required the installation by this Contractor of additional fuel lines, and re-routing of the originally contemplated piping.

(3) Radio and Radar Changes — [illegible],164.49

(a) Replacement of AN/APN-4? and AN/APN-1 and AN/ARC-3 by AN/ARC-19 Radio Equipment.

(b) Deletion of AN/ARC-25A. This required the re-design of the L. E. of the nacelle to eliminate antenna provisions.

(c) Provide space and weight provisions for AN/APS-13 Tail Warning Radar unit.

(d) Deletion of VHF Homing Adapter, AT/ARA-5A. This required elimination in the design for the antenna.

(e) Installation of an interphone jack box in the radio compartment for ground testing.

The above also involved considerable changes to the wiring diagram, junction boxes, supports, etc.

(4) Insulation and Gun Heating Provisions for the Forward Turret — 3,419.54

This requirement deleted the use of electrical gun heaters and substituted in lieu thereof, a minimum gun compartment temperature. This involved provisions for ducting to the nose of the airplane, valves, control units, and blast tube nozzles.

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ITEM	PRICE
(5) Installation of Taxi Light on Nose Wheel Strut This change constitutes a complete C F F installation of taxi light, a slip ring electrical contact for nose wheel rotation, wiring, control, switches, supports, and the effects of this installation on junction boxes and related wiring systems.	$2,377.08
(6) Study and Mock-up of Preloading Bomb Racks The original installation consisted of two bomb racks, eight pulley assemblies, eight cable assemblies, and four hook assemblies to hoist the racks in place. The revised provisions resulted in a study requiring adjustable adapters to be mounted on a dolly; a frame mounting six bomb racks for preloading; provisions within the bomb bay area to support and lock the preloading frame and pulleys, cable and hook provisions for hoisting the preloaded bomb rack into place. These parts were designed and mock-up parts fabricated.	4,293.53
(7) Provisions for After Burning in Lieu of Water Injection No detail engineering design or fabrication of the water injection system was underway. The provisions for after burning required the revision to larger size fuel lines to provide for an increased rate of fuel flow.	- 5,383.93
(8) Removal of Tail Turret from Airplane Although this deletion resulted in the removal of a GFF Radar Remote Control, and a twin 5" caliber gun turret and attendant equipment and provisions, it was necessary for this Contractor to engineer and fabricate a tail cone structure to replace the turret, and to rebalance the airplane, which necessitated relocation of numerous equipment items.	- 8,744.40
(9) Incorporate "V" Type De-Icer Glass This change redesigned the entire windshield and affected the canopy lines. In addition, the increased cost of glass for electrical de-icing, plus the effects on the electrical system to incorporate this feature, necessitated the deletion of the hot air system to the windshield.	1,955.64

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ITEM	PRICE
(10) Provide firewall between Engines This required an additional transverse bulkhead at the forward end of the compressor, and changes for attachment of the longitudinal bulkhead to the aft transverse sealed bulkhead. This also involved changing of mounting support between engines from aluminum alloy to steel... (Two nacelles per airplane).	$13,619.45
(11) Install Mild Steel Plate instead of Armor Plate This item results only in the difference in cost of material..	- 459.82
(12) Addition of Fire Extinguisher System Subject costs include the engineering of this system plus the fabrication of supports, lines, tubing, clamps, all electrical controls, and a fire detector system, and the procurement and installation of CO_2 bottles.	13,846.14
(13) Deletion of Bomb Bay from Fuselage This deletes, mainly, a great deal of engineering and the fabrication of such parts as bomb rack supports and provisions, bomb doors and actuating mechanism, and hydraulic system parts. The deletion of the bomb bay doors necessitated the additional design and fabrication of removable type section for this area.	- 7,567.54
(14) Instrument Installation Change Numerous preliminary mock-ups of the instrument panel and revisions before and after the official mock-up inspection, resulted in a final decision incorporating dual engine indicating instruments and a general regrouping of the switches and instruments.	1,793.00
(15) Installation of Q-2 Generator in Lieu of Q-1 Generator Engineering studies on the installation of the gear housing, extension shaft, mounting of the Q-2 generator to the wing, nacelle and engine.	139.00
(16) Installation of "Flasher" Fuselage and Tail The lights, flasher mechanism, and signals are considered GFE. Contractor design and fabrication responsibility includes the fabrication and installation of resistors, circuit breakers, switches, brackets, clamps and wiring.	1,599.80

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ITEM	PRICE
(17) Deletion of Recognition Lights and Switches This includes deletion of lights and covers (which were GFE) together with provision in the structure, brackets, wiring, and switches.	- $46.36
(18) Installation of M-4 Pressure Regulator Valve This is a new requirement and involves the design, fabrication and installation of a GFE regulator valve, type M-4.	$ 3,13[illegible]
(19) Wing Tip Bomb Installation The requirement for this installation necessitates redesign of the entire wing tip area, including the wing tip fuel tank and attachment. In addition, an adapter for mounting the bomb is required.	$5,[illegible]
(20) Substitution of GFE For GFE Booster Fuel Pumps This is explained in Paragraph 5 of the basic letter submitted herewith.	- [illegible]
(21) Deletion of the [illegible] Sight The necessity for fabricating provisions to accommodate this sight in the canopy, cockpit, pilot's floor and fuselage have been eliminated; however, basic provision such as location of the nose wheel off center has been retained.	- 4,[illegible]4.11
(22) Cabin Jettisoning Mechanism This change required a power type jettisoning system in place of a manual type, requiring disconnecting the normal canopy electrical system operation prior to jettisoning. This change also required a sequence in operations and safety features, so that the seat ejection could not be accomplished until the canopy was clear of the seat. A special gun design was required.	[illegible],[illegible].11
(23) Deletion of the Spin Model Engineering design on this subject was completed at time of cancellation, so that the only saving was in the fabrication of the model itself. Testing of this model was considered to be at government expense.	- [illegible],739.2[illegible]
REVISION "B" - - TOTAL PRICE	~~$[illegible],[illegible].19~~

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ENCLOSURE (A)

OST BREAKDOWNS FOR SPEC. RE\ "B" CHANGES

	Item 1	Item 2	* Item 3 Deletion of AN/ARC-25A			* Item 3 Other Radio Changes		
No. Ships Affected	(2 Ships)	(2 Ships)	Gross Charges	Credits	Net Effect	Gross Charges	Credits	Net Effect
PRODUCTIVE:								
Material	865.92	31.20	23.50	(602.10)	(578.60)	—	(12.75)	(12.75)
Labor Hours	—	(128.0)	(599.2)	(116.0)	(483.2)	—	(20.0)	(20.0)
Labor $1.47/hr.	—	188.16	880.82	(170.52)	710.30	—	(29.40)	(29.40)
Overhead 160%	—	301.06	1,409.31	(272.83)	1,136.48	—	(47.04)	(47.04)
Total Productive	865.92	520.42	2,313.63	(1,045.45)	1,268.18		(89.19)	(89.19)
ENGINEERING:								
Material	—	—	—	—	—	—	—	—
Labor Hours	(176.0)	(160.0)	(328.0)	—	(328.0)	(592.0)	—	(592.0)
Labor $1.70/hr.	299.00	272.00	557.00	—	557.00	1,006.00	—	1,006.00
Overhead 100%	299.00	272.00	557.00	—	557.00	1,006.00	—	1,006.00
Total Engineering	598.00	544.00	1,114.00		1,114.00	2,012.00		2,012.00
TOOLING:	190.08	—	390.00	—	390.00	—	—	—
TOTAL COST	1,654.00	1,064.42	3,817.63	(1,045.45)	2,772.18	2,012.00	(89.19)	1,922.81
Profit 10%	165.40	106.44	381.76	(104.54)	277.22	201.20	(8.92)	192.28
TOTAL PRICE	$1,819.40	1,170.86	4,199.39	(1,149.99)	3,049.40	2,213.20	(98.11)	2,115.09
	Additional Cost Estimate	Additional Cost Estimate						

* All Radio Changes were combined under Item 3 in Quote No. 439 dated 12 June 1947.

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LOS E (A)

SI EA YN AR EC. REV. "B" CHANGES

	Item 4	tem	I 6	Item 7	Item 8	Item 9		
			M P			Gross Charges	Credits	Net Effect
No. Ships Affected	(2 Ships)	(2 Ships)		(2 Ships)	(2 Ships)		(2 Ships)	
PRODUCTIVE:								
Material	1,423.48					529 42	(309 84)	319.58
Labor Hours	(72.0)	128				48 0)	(72.0)	(24.0)
Labor $1.47/hr	987 84					70 56	(105.84)	(35.28)
Overhead 160%	1,580 54					112 80	(169 34)	(56.44)
Total Productive	3,991 86				1,429 46	819 88	(585.02)	227 86
[illegible]:								
Material	--							
Labor Hours	240							
Labor $1 [illegible]/hr	349							
Overhead 160%	360 80							
Total Engineering	690							
[illegible]:	250 80				--			
TOTAL COST	4,932							
Profit 10%	492 63							
TOTAL PRICE	5,419 54							
	Additional Cost Estimate	Additional Cost Estimate						

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ENCLOSURE (A)

COST BREAKDOWNS FOR SPEC. REV. "B" CHANGES

	Item 10	Item 11	Item 12	Item 13			Item 14	Item 15
				Gross Charges	Credits	Net Effect		
No. Ships Affected	(2 Ships)	(2 Ships)	(2 Ships)		(2 Ships)			
PRODUCTIVE:								
Material	133.28	(411.66)	1,136.96	69.00	(476.30)	(407.30)	—	—
Labor Hours	(2,689.7)	—	(2,256.0)	(246.0)	(474.75)	(228.75)	—	—
Labor $1.47/hr.	3,953.86	—	3,316.32	361.62	(697.88)	(336.26)	—	—
Overhead 160%	6,326.18	—	5,306.12	578.59	(1,116.61)	(538.02)	—	—
Total Productive	10,413.32	(411.66)	9,759.40	1,009.21	(2,290.79)	(1,281.58)	—	—
ENGINEERING:								
Material	—	—	—	—	—	—	—	—
Labor Hours	(520.0)	—	(720.0)	(1,600.0)	(3,176.0)	(1,576.0)	(480.0)	(144.0)
Labor $1.70/hr.	884.00	—	1,224.00	2,720.00	(5,399.00)	(2,679.00)	* 815.00	245.00
Overhead 100%	884.00	—	1,224.00	2,720.00	(5,399.00)	(2,679.00)	815.00	245.00
Total Engineering	1,768.00		2,448.00	5,440.00	(10,798.00)	(5,358.00)	1,630.00	490.00
TOOLING:	200.00	—	380.00	250.00	(490.00)	(240.00)	—	—
TOTAL COST	12,381.32	(411.66)	12,587.40	6,699.21	(13,578.79)	(6,879.58)	1,630.00	490.00
Profit 10%	1,238.13	(41.16)	1,258.74	669.92	(1,357.88)	(687.96)	163.00	49.00
TOTAL PRICE	13,619.45	(452.82)	13,846.14	7,369.13	(14,936.67)	(7,567.54)	1,793.00	539.00
	Additional Cost Estimate		Additional Cost Estimate				Additional Cost Estimate	Additional Cost Estimate

* Reduction of $1.00 in labor cost due to clerical error.

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ENCLOSURE (A)

COST BREAKDOWNS FOR SPEC. REV. "B" CHANGES

	Item 16	Item 17	Item 18	Item 19	Item 20	Item 21	Item 22	Item 23
No. Ships Affected	(2 Ships)	(2 Ships)	(2 Ships)	(2 Ships)	(2 Ships)	(1 Ship)	(2 Ships)	Models
PRODUCTIVE:								
Material	14.68	(14.42)	15.50	1,335.40	(1,340.00)	(24.50)	106.88	(236.00)
Labor Hours	(80.0)	(48.0)	(112.0)	(2,456.0)	—	(180.0)	(702.0)	(589.8)
Labor $1.47/hr.	117.60	(70.56)	164.64	3,610.32	—	(264.60)	1,031.94	(867.00)
Overhead 100%	188.16	(112.90)	263.42	5,776.52	—	(423.36)	1,651.10	(1,387.20)
Total Productive	320.44	(197.88)	443.56	10,722.24	(1,340.00)	(712.46)	2,789.92	(2,490.20)
ENGINEERING:								
Material	—	—	—	212.00	—	—	—	—
Labor Hours	(304.0)	(168.0)	(440.0)	(3,176.0)	—	(960.0)	(1,080.0)	—
Labor $1.70/hr.	517.00	(286.00)	748.00	5,399.00	—	(1,632.00)	1,836.00	—
Overhead 100%	517.00	(286.00)	748.00	5,399.00	—	(1,632.00)	1,836.00	—
Total Engineering	1,034.00	(572.00)	1,496.00	11,010.00	—	(3,264.00)	3,672.00	—
TOOLING:	100.00	—	—	1,870.00	—	—	—	—
TOTAL COST	1,454.44	(769.88)	1,939.56	23,602.24	(1,340.00)	(3,976.46)	6,461.92	(2,490.20)
Profit 10%	145.44	(76.98)	193.96	2,360.22	(134.00)	(397.65)	646.19	(249.02)
TOTAL PRICE	1,599.88	(846.86)	2,133.52	25,962.46	(1,474.00)	(4,374.11)	7,108.11	(2,739.22)
	Additional Cost Estimate		Additional Cost Estimate	Additional Cost Estimate			Additional Cost Estimate	

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ENCLOSURE (F)

MISCELLANEOUS COST CHANGES

ITEM		PRICE
(b) (1) Dummy Nose Installation - No. 1 Airplane Only	$ 1,518.37 (Credit) 11,680.11 (Debit)	$ 10,161.73

Included in this cost is a credit resulting from the deletion of the Government Furnished Equipment powered nose turret, for which instrumentation has been substituted as part of the basic requirement for the first airplane. There is, however, additional credit due as a result of deletion of electrical and/or hydraulic drive and control provisions from a power source to the turret attachment.

The cost incurred in this change includes the design, fabrication, and installation of a "dummy" nose assembly, incorporating "dummy" gun muzzles and covers, and ballast. Although instrumentation shall also be housed in the nose, this is part of the basic contract.

(2) Substitution of X24C-4A Engines

(c) This involves the substitution of two X24C-4A engines in the first airplane, one in each nacelle, in lieu of X24C-4B engines. It includes the special design, fabrication and installation of intake ducts, extensive oil system changes, engine access doors, and forward transverse bulkhead.

(3) Fixed Gun Nose Installation - No. 1 Airplane Only

This includes the design and fabrication of a nose structure, dismountable to the fuselage structure. Also included in this nose structure is a radome for the APG-3 scanner. Installation of 4 x 20 mm guns, ammunition boxes, gun supports, ejection chutes, APG-3 radar equipment installation, provisions for accessibility to the component parts, form a part of this Contractor's obligation. 7,196.38 (Credit) 83,608.43 (Debit)

(4) Tachometer Drive Adapter

(d) This cost is based upon this Contractor fabricating the drive adapter in its entirety, exclusive of gears. Quantities are for eight airplanes, four(4) per airplane.

MISCELLANEOUS CHANGES - TOTAL PRICE .....

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ENCLOSURE (C)

TEST ITEM COST CHANGES

ITEM	PRICE
(1) Nose Wheel and Landing Gear Drop Tests	$ 9,106.11
It will be necessary for this Contractor to conduct these tests in a conservative manner, since no additional gear has been procured for these tests. This quote is contingent on the use of the airplane gear with no coverage for structural failure. These tests will necessitate the construction of a drop test fixture, set-up of landing gears, and a series of drop tests, mainly involving metering pin determination.	
(2) Gunfire Test of Fuel Tanks	598.40
The only costs included in this test are observance, follow-up and possible record of charges required for fixture use. The use of the same tanks, fixtures, fuselage section as used in the slosh and vibration tests can be used for this test. This test will be conducted by the Air Materiel Command at Wright Field. No handling, servicing, or maintenance of this test set-up by this Contractor is contemplated.	
(3) Acceleration, Slosh and Vibration Tests of Fuel Tanks	8,998.25
This includes the procurement of two fuel tanks, a simulated section of fuselage, wherein these tanks are mounted, and a fixture for support of the fuselage section. The tests include slosh and vibration as specified under Army Specification AN-V-7 and are considered to be conducted at Wright Field by Army personnel at Army expense. This quotation includes the delivery of this item to Wright Field. The acceleration portion of the tests, as specified under Specification AN-V-7, will be conducted by this Contractor at this Contractor's plant prior to delivery of this set-up to Wright Field.	
(4) Acceleration, Slosh and Vibration Tests of the Oil Tank	3,712.44
This test is similar to the preceding test (Paragraph 3), except that only one tank will be fabricated and only simulated supports will be supplied in lieu of a simulated nacelle, and all tests will be conducted at the Contractor's plant.	
(5) Acceleration, Slosh and Vibration Tests of the Hydraulic Tank	4,763.00
Same conditions govern these tests as the preceding tests (Paragraph 4)	
TEST ITEMS - TOTAL PRICE	$ [illegible]

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ENCLOSURE (D)

N: COST CHANGES FOR SPECIFICATION REVISION "B"

1 Armor for 20 mm ammunition fuses in forward turret

2 Revised 20 mm gun weights

3 Addition of provisions for the installation of 1/2 inch armor plate beneath the pilot's and navigator's seats, for 10 degree protection

4 Replace CGT-13 batteries with CGT-17 batteries

5 Design lower fin integral with fuselage for improved strength (weight ratio)

6 Revise engine control system to incorporate cables in lieu of push-pull rods as control medium

7 Replace manually controlled trim tab on elevator with electrically controlled tab

8 Provide stops at the aileron, elevator, and rudder surfaces in addition to those at the cockpit control elements

9 Revise control system for landing gear to provide hydraulic selector valve operated by means of control handle on center console, in place of electric switches

10 Preliminary design study of duplicate primary controls and space provisions in airplane for duplicate controls

11 Provide defrosting and defogging for the canopy by discharging a portion of the pressurization and ventilating air

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12 Remove 1/2 inch al. al. deflector plates, aft and rear armor, and 1/4 inch al. al. plates below front of canopy

13 Provide means of locking selector valve handle in neutral position, when wheels are in down position

14 Provide cabin pressurization to maintain 8,000 ft., altitude rating from 8,000 ft to 15,400 ft. Maintain pressurization differential of 2.75 psi from 15,400 ft to 35,000 ft. Provide switch to drop differential pressure to 1 psi, prior to entering combat.

15 Install a transverse seal-tight bulkhead to isolate compressor from hot surfaces of burner compartment.

16 Installation of Red Code instrument board lighting

17 Relocation of over-voltage relays, Type F-1 and Red Light, in generator control circuit, as close to generator control switches as possible

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION-COLUMBUS PLANT

COLUMBUS 16, OHIO

17 March 1947
RRA:HW:167
Quote No. 837

AC-19417

Subject: Contract W 33-038 ac-0266
XP-87 Airplanes
Power Turret Proposal
For No. 2 Airplane

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSBPS3

Through: AMC Inspector In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) C-W Ltr WT:hsp-1583E dated 21 Feb 1947

Enclosure: (A) Cost Estimate Breakdown

1. In accordance with information contained in reference (a), this Contractor has proposed a turret nose installation in lieu of a dummy nose or fixed gun installation in the No. 2 XP-87 Airplane. This proposal incorporates a simulated turret designed to permit a check of the aerodynamic effects on the airplane as well as on the operation of the guns at high angles of deflection. It is believed that the power turret as proposed herein will satisfy the requirements for an evaluation of the effect of such factors on the flight characteristics of subject airplanes.

2. For designing, fabricating, and installing such a power nose turret, this Contractor submits herewith a quotation for $63,036.17. A breakdown of the costs involved in this amount is contained in Enclosure (A) attached hereto.

3. This proposal, a layout copy of which was attached to reference (a) as Drawing L-29-377, comprises a turret designed to rotate through the forward right-half hemisphere only. This scope is accomplished by rotation through 180 degrees about the horizontal axis and 90 degrees rotation about the vertical axis. Thus gun deflections may be obtained at any right-forward, quarter-sphere angle. It is proposed that four 20 mm guns and related equipment be installed in the turret. Included in the proposal are provisions for operating the guns in the turret by means of "on-off" switches and the use of Selsyn units for indicating turret and gun positions in the cockpit.

Exhibit "B" to A.F.P. #450210 dtd. 2 April '47.

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4. The above cost proposal includes consideration of the costs involved in ground testing such a power turret. Although no provisions have been incorporated for the operation of the turret and guns by means of a single cockpit control, such a system could be incorporated in the basic turret installation as proposed herein, in the event the Air Materiel Command deems such control desirable. It is desired to point out that no radar or gunsight provisions have been considered in formulating this quotation. This proposal is predicated on the 20 mm guns, gunchargers, and ammunition being provided as GFF. All other items such as feed chutes, ejection chutes, etc., will be provided by the Contractor.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

20 MAR 1947

Concur in

J. B. Bell

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Curtiss Ltr
RRA:HW:167
Quote No. 837

FNCLOSURE (A)

COST ESTIMATE BREAKDOWN

Material	4,706.85
Labor Rate - $1.47/hr	9,111.06
Overhead - 160%	14,577.70
SHOP COST	28,395.61
Engineering Labor	12,540.00
Engineering Overhead - 100%	12,540.00
Tools	3,830.00
Total Cost	57,305.61
Profit - 10%	5,730.56
TOTAL PRICE	$63,036.17

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AF-32 (30 MAY 44) [redacted] 6

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO.	DRE1
FILE NO.	G

SUBJECT: Military Characteristics for the All-Weather Fighter

TO: Research & Engineering Division, AC/AS-4 DATE 27 MAR 1947

FROM: Requirements Division, AC/AS-3 COMMENT No. 4
Lt Col Mahurin/js/72384

1. Reference is made to the attached Memorandum Report from Air Material Command, subject - "Requirements for Angular Displacement of Fighter Nose Turrets". It is felt by this office that the stand now taken concerning nose turrets for all-weather fighters is still sound. At the present time, two (2) all-weather fighters are under development, one embodying a 180 degree cone of fire turret, the other to be equipped with a 30 degree cone of fire turret. When these two (2) aircraft are finally flight tested, accurate operational data can be obtained as to the merits of the two systems.

2. This office is not justified in arbitrarily recommending a 180 degree turret on all-weather fighters when reports from the industry and reports from various flight testing agencies indicate that it may be impossible to project gun barrels into the air stream without seriously disrupting the flow of air over the surfaces of the airplane. Also, this office does not feel justified in dictating that guns shall be entirely internally housed because the increase in size of the aircraft, in order to accomplish such internal mounting, would seriously jeopardize both the speed and performance of the fighters. The length of a 20mm cannon is approximately 7 feet. If a gun of this length is to be internally mounted and still give a 180 degree cone of fire, it is necessary that the fuselage in which the gun is contained have diameter of 7 feet or over. It should be borne in mind that any fighter, regardless of mission, should still retain a high degree of maneuverability.

3. This office has on hand another report from the Armament Laboratory at Air Materiel Command in which the conclusions state that the military characteristics for all fighter aircraft should be changed to allow the mounting of flexible guns. The logic for recommendations such as these was based on the premise that combat would be waged on the scale of one bomber versus one fighter. Various rolling pulls were excelled, times of fire, pursuit curves, and lethal bursts. These facts and figures have not been correlated with technique and actual employment.

4. To begin with, all figures for bombers are quoted at maximum speed. This cannot be accepted. In order to accomplish a mission successfully, the bombers must operate at cruising speed. In the case of jet bombardment, this represents an appreciable decrease in speed from that quoted as maximum speed. As a result, there will be a great speed differential between the bomber and the fighter. No mention in any studies has been made of tactical maneuvers which can be employed by the bombers to offset the comparative performance of turret fighters versus small, light weight, fixed gun fighters. This office can visualize any number of ways one bomber can be shot down by two fighters. It can also be visualized how one fighter, by proper positioning, can lower wheels and flaps and wait until the enemy bomber approaches to make a frontal attack. The cruising speed would be the cruising speed of the bomber plus the slightly higher than stalling speed of the fighter, not the top speed of the bomber plus the top speed of the fighter. Underneath attacks could be made. Cross and attacks would be possible. It should be emphasized that the fighter will not be

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AF, WD-33 (20 MAY 44) [redacted] 7

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO.	
FILE NO.	

SUBJECT: Military Characteristics for the All-Weather Fighter

TO: Research & Engineering Division, AC/AS-4 DATE 27 MAR 1947

FROM: Requirements Division, AC/AS-3 COMMENT No. 4(Cont'd) Lt Col Mahurin/js/72284

confined only to a pursuit curve, and it will not be confined to attacks only on one bomber.

5. Turret fighters, because of size and weight, will be slower and less maneuverable than a fixed gun fighter. It would be a simple job for a fixed gun, light weight fighter to follow in behind a turret fighter and pursue until the turret fighter is shot down. If the turret fighter is to have complete protection, it would be mandatory to have one turret in the nose and one turret in the tail. Then this fighter would be completely unable to pursue a light weight, fixed gun fighter. In any combat, it should be remembered that it is impossible to break up an attack once the attack has been initiated. It is necessary to be able to break up attacks far in advance before enemy aircraft have time to position themselves advantageously. Breaking up such attacks could not be accomplished by a slow, unmaneuverable fighter; it must be accomplished by a fast, fixed gun fighter. The conclusions in the attached report are undoubtedly sound when predicated on the theory that combat will be one bomber versus one fighter. However, it is the opinion of this office that this will not necessarily resemble the course that future aerial combat will take.

6. No mention has been made in any of these studies of the difficulties the tail gunner in the bomber and the fighter pilot will have if either airplane "jinks" while on the pursuit curve. If the bomber is "jinking" while cruising along to the target, it will be practically impossible for the mechanical turret to predict accurately enough to score hits on the bomber. Conversely, if the fighter pilot "jinks" while on his pursuit curve, it will be difficult for the automatic gun laying mechanism in the tail of the bomber to predict accurately enough to bring the fighter down. These points should be taken into consideration.

7. In view of the above, this office does not concur that the Military Characteristics for the All-Weather Fighter should be changed until concrete results obtained from the flight testing of the XP-77 and XP-75 indicate that a 180 degree zone turret is practical and that a 30 degree zone turret is impractical.

Incl - a/e

Alfred K. Maxwell

ALFRED K. MAXWELL for
Brigadier General, U. S. A.
Chief, Requirements Division

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PUBLIC RELATIONS
JUDGE ADVOCATE
PERSONNEL (T-1)
INTELLIGENCE (T-2)
ENGINEERING (T-3)
OB Thornton
SUPPLY (T-4)
PLANS (T-5)
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OTHER

AMC Form No 10-508
(Rev 12 Aug 46)
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T5:EOA-4/OBT:hw

T5:EOA (T5:EOA-4)

23 April 1947

Contract W33-038-AC-6266
XP-87 Airplane — Serial No. 46-522
Nose Turret Proposal

Curtiss-Wright Corporation
Airplane Division—Columbus Plant
4300 East Fifth Avenue
Columbus 16, Ohio

1. The contractor's quotation letter No. 837 dated 17 March has been reviewed by the Air Materiel Command and procurement action has been initiated to cover the cost of installing a simulated turret on the second XP-87, Serial No. 46-522.

2. However, it is pointed out that funds to cover this procurement will not be available until fiscal year 1948, therefore, it is doubtful that any contractual coverage can be given the contractor until after 1 July 1947.

3. The purpose of this correspondence is to express the intent of the Air Materiel Command to install a simulated turret on XP-87 airplane Serial No. 46-522 and is not to be considered as a commitment on the part of the Government.

FOR THE COMMANDING GENERAL:

ROY E. MANN
Captain, Air Corps

GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

Copies to:
C-W, Dayton
AAFOIC, C-W

MX-745

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AMC Form No. 13-3
(ERP-13-Mar 45)

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Use authorized office symbols to designate addressor and addressees.

Place initials of dictator and typist, telephone number and location to right of signature.

Use ... width of sheet, both sides.

Number all comments consecutively.

Separate comments by horizontal lines across page.

SUBJECT XP-87 Aircraft

TO TSENG FROM TSEPF DATE 12 May 47 COMMENT NO. 1.

1. This Laboratory has made an intensive study of the XP-87 Airplane nearing completion by the Curtiss-Wright Corporation in its Columbus plant. It appears to this Laboratory that this airplane has the best possibilities as a photographic reconnaissance airplane of all the types which have been inspected by this Laboratory. The XP-87 will take the three tri-metrogon cameras, thus satisfying the mapping and charting requirements of the Army Air Forces, as well as the Corps of Engineers; it will take the K-18 vertical camera, or the vertical 40-inch K-22 Camera to fulfill the requirements for reconnaissance. The installation of the new German-gyro-stabilized camera mount therein will facilitate the accomplishment of acceptable photography for the Corps of Engineers in precision maps production.

2. In addition, this aircraft will facilitate the installation of a 40-inch forward shooting oblique camera for use in diving missions in high-speed aircraft from much higher altitudes than that from which the Army Air Forces was forced to fly during the past war. This airplane will most advantageously provide ample room to make these installations and at the same time permit adjustment in flight for crabbing the cameras. This, in the past, in all airplanes used for photographic reconnaissance, has been impossible. The spacious quarters for cameras in this aircraft facilitates ready removal which, in time of war, would result in the complement being taken out of the airplane after each flight for check and protection against the reckless and wasteful policy of leaving them in the airplanes and subjecting them to the elements as was the case in the past war.

3. In the advancement of development leading to suitable reconnaissance type airplanes (jet type high-speed airplanes), which includes emergency modification of fighter or light bomber type aircraft to photographic, it is strongly recommended that the Photographic Laboratory, after completing its study and mock-up, make an actual installation in an XP-87. It is understood that this could be accomplished in two ways: Either by using the second XP-87 in conjunction with the Armament Laboratory in its test of the airplane; or obtaining a third aircraft which would be made available for the major use of the Photographic Laboratory in conducting exhaustive and intensive tests with all types of installation set-ups. This latter program has never been accomplished for any service type of photographic aircraft.

GEORGE W. GOLLAND
Colonel, Air Corps
Chief, Photographic Laboratory
Engineering Division

GWG/HWP/vgs
23235

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(Rev 10 Mar 45)

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Place initials of dictator and typist, telephone number and location right of signature.

Use entire width of sheet, both sides.

Number all comments consecutively.

Separate comments by horizontal lines across page.

SUBJECT: XP-87 Airplane, Contract AC-6266

TO	FROM	DATE	COMMENT NO.
TSEPF ✓	TSEOA (TSEOA-4)	20 May 1947	2

1. The Aircraft Projects Section concurs in Comment No. 1 in that the proposed photo reconnaissance modification could be easily accomplished on an existing XP-87 airplane. It is pointed out, however, that funds for such a modification are not presently available from Aircraft Projects' allotments. Information is requested relative to the availability of Photographic Laboratory's funds for the purpose of financing the purchase of a modified nose section.

2. The No. 2 XP-87 airplane scheduled for delivery in September of this year, could be made available for photographic tests following the tests to be conducted on the simulated turret and radio and radar installations. It is thought that these tests could be completed within 6 months following delivery of the No. 2 airplane, at which time the airplane could be made available for photo reconnaissance modification.

PHOTOGRAPHIC LABORATORY WRIGHT FIELD
MAY 22 3 56 PM
MX-745

George F. Smith

GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

TSEOA-4/OBT:hw
Ext. 2-3230

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION-COLUMBUS PLANT

COLUMBUS 16, OHIO

20 May 1947
RRA:HW:222
Quote No. 841

Subject: Contract W 33-038 ac-0260
Model XP-87 Airplane
Modified Phase I Flight Test Program

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: Unit TSEOA

Through: AAF Officer In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) C-W Ltr EJD/af-100 dated 13 March 1947
(b) AMC Ltr TSEOA-4/CB1:hw dated 29 April 1947
(c) AMC Ltr BPA4-1/SL/vmo dated 7 May 1947

Enclosure: (A) Summary of Costs for 10-Hour Program Only
(B) Muroc Lake Cost Breakdown
(C) Columbus Cost Breakdown
(D) Phase I Program Outline

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1. This Contractor by reference (a) submitted a proposal for the flight test program for No. 1 Airplane, based on a total of 28½ hours of flight at Muroc Lake. However, since reference (a) was submitted, the Air Materiel Command has requested that a modified proposal based on a 10-hour flight program only be submitted. (reference (b)).

2. Therefore, in compliance with this request, this Contractor submits herewith an increase in the fixed price of subject contract of $127,258.10 for conducting a 10-hour flight program at Muroc Lake, instead of at the Contractor's plant. This quotation is based on the assumption that the proposed program will be considered complete at the end of 10 hours of flying time or three months from the date of shipment of the airplane from this Contractor's plant, whichever occurs first, regardless of the work completed.

3. The above quotation is further predicated on the same stipulations and conditions which were set forth in this Contractor's letter reference (a). The overhead for direct charges for Columbus personnel at Muroc has been calculated at 35% only. As in the reference (a) quotation, the 10-hour flight test costs included in the original contract price have been deducted from the total cost. In specific reply

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to paragraph 2(a) of reference (c), since the Contractor has deducted the total estimated cost of the original program as included in the negotiated contract price, credit has been given for any personnel who would have participated in the program had it been accomplished at the Contractor's plant. In reply to paragraph 2(b), the Contractor cannot show in detail the specific reasons and circumstances requiring overtime. However, since all flight test programs of this nature require a certain amount of overtime in order to make maximum use of available flying weather, it appears obvious that such overtime will be encountered on this program and will result in appreciably shortening the total elapsed time and in an ultimate savings in overall cost to the Government. In reply to paragraph 2(c), this Contractor considers that the twenty percent contingency is necessary and justifiable under the circumstances as pointed out in reference (a). It is noted that although the Air Materiel Command has requested the deletion of this contingency, no reason for such deletion has been given.

4. It should be noted that the outline for the Phase I portion of the Flight Test Program, as set forth in Enclosure (A), to reference (a), has been altered in proportion to the reduction in flight hour time from 17½ hours to 10 hours, and is herewith resubmitted as Enclosure (L). This program may be revised in detail at the Contractor's discretion during the actual performance of the tests to facilitate ultimate completion at the earliest possible date. Enclosure (A) attached hereto summarizes the costs of both Columbus and Muroc Lake phases of this proposed 10-hour program. In addition, the productive costs involved at Muroc and Columbus are contained in the breakdowns attached hereto as Enclosures (B) and (C), respectively.

5. In submitting this 10-hour program quotation, it is desired to point out that the costs contained herein are based on the following conditions (necessitated by the effort to reduce costs to a minimum):

(a) That during the move to Muroc, and in cases of emergency, the AMC will place an Army-manned C-47 (or similar type) airplane at the disposal of and at no cost to the Contractor (this deletes cost considerations as set forth in paragraphs (c) and (f) of reference (a)).
(b) That necessary crane and automotive equipment will be made available at Muroc for unloading the airplane, equipment and supplies.
(c) That emergency equipment will be made available to this Contractor during the period of ground runs and flight test.

6. In addition to the above listed conditions, it is desired to point out that further cost reductions have been effected through the elimination of certain engineering tests and miscellaneous data originally contemplated as part of the costs included in reference (a) quotation, but not part of the specification requirements. Likewise, some cutbacks in the number of shop personnel required as contemplated originally, have resulted in a further monetary reduction.

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7. All other terms and conditions set forth in paragraphs (a) through (m) of the reference (a) letter are applicable to this quotation with the exception of paragraphs (g), (h), (i), (l), and (m).

8. The Air Materiel Command's comments and/or approval of this quotation at the earliest possible date, are respectfully requested.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

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ENCLOSURE (A)

XP-67 AIRPLANE NO. 1 - -
SUMMARY OF ESTIMATED COSTS
Revised Flight Test Program
- (10) Hours -

PRODUCTIVE	Columbus	Muroc Lake	Total
Material	$1,713.50	$34,201.20	$35,914.70
Labor	3,181.08	19,908.74	23,089.82
Overhead	5,389.75	6,908.30	12,298.05
Overtime Premium	- - - - -	3,001.54	3,001.54
Total	$9,284.31	$64,019.78	$74,303.09
TOOLING			
Material	$4,450.00	- - - - -	$ 4,450.00
Labor	5,947.00	- - - - -	5,947.00
Overhead	7,177.75	- - - - -	7,177.75
Overtime Premium	- - - - -	- - - - -	- - - - -
Total	$17,574.75	- - - - -	$17,574.75
ENGINEERING			
Material	- - - - -	$11,250.00	$11,250.00
Labor	$1,200.00	7,800.00	10,050.00
Overhead	1,200.00	3,110.00	4,310.00
Overtime Premium	- - - - -	1,340.00	1,340.00
Total	$2,400.00	$23,500.00	$27,000.00
Pilot's Bonus			1,000.00
GRAND TOTAL			$120,878.84
CREDIT Original (10) Hour Program			($ 2,341.00)
TOTAL Additional Costs			$118,537.84
CONTINGENCY 20%			23,707.56
GRAND TOTAL			$142,245.40
PROFIT 10%			$ 14,224.54
SALES PRICE			$156,469.94

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ENCLOSURE (B)

XP-87 AIRPLANE NO. 1
MUROC LAKE - FLIGHT TEST PROGRAM
SUMMARY OF ESTIMATED COSTS

	Material	Labor	Overtime Premium
1. Freight Cost of Shipment	$3,[illegible]	$ - - -	$ - - - - -
2. Personnel Transportation Cost	3,[illegible]	- - -	- - - - -
3. Labor in Transit	- - - -	2,77[illegible]	3[illegible]
4. Unloading and Set-up at Muroc	7,240.[illegible]	1,304.[illegible]	201.70
5. Depreservation and Reassembly	[illegible]	5,73[illegible]	847.14
6. Ground Test and Pre-Flight	1,5[illegible]	3,43[illegible]	645.44
7. Flight Test (10) Hours	2,[illegible]	5,4[illegible]	750.48
8. Packing Equipment for Return to Columbus	[illegible]	1,100.[illegible]	157.[illegible]
9. Per Diem Expense of Personnel	11,[illegible]	- - - - -	- - - -
10. Equipment (2) Station Wagons (4) Scooters	2,[illegible]	- - - - -	- - - -
11. Maintenance of Automotive Equipment	1,[illegible]	- - - - -	- - - -
TOTAL	$34,[illegible]	$1,[illegible]	$[illegible]

SUMMARY

Material	$[illegible]
Labor	[illegible]
Overtime Premium	[illegible]
Overtime Adj (Applied to Labor only)	[illegible]
TOTAL	$[illegible]
Pilot's House	[illegible]

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ENCLOSURE (C)

XP-87 AIRPLANE NO. 1
COLUMBUS PHASE - FLIGHT TEST PROGRAM
SUMMARY OF ESTIMATED COSTS

	PRODUCTIVE		TOOLING	
	Material	Labor Hrs	Material	Labor Hrs
1. Disassembly for Shipment	$ 10.00	590	$- - - -	- -
2. Preservation of Parts and Assemblies	15.00	58	- - - -	- -
3. Construction of Tools and Equipment	- - -	- -	3,450.00	1800
4. Crating and Loading for Shipment	1,688.50	1,110	1,100.00	1634
5. Unloading upon return from Muroc	- - -	456	- - - -	- - -
TOTALS	$1,713.50	2,104	$4,450.00	3434

PRODUCTIVE

Material	$1,713.50
Labor @ $1.47	3,161.38
Overhead 100%	5,389.73
Total Productive	$9,264.31

TOOLING

Material	$4,450.00
Labor @ $1.47	5,047.98
Overhead - 100%	8,176.77
Total Tooling	$17,674.75

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66:6DNT:TJC:hn

Subject: Contract W33-038-AC-6266, Model XP-87 Airplane, Modified Phase 1 Flight Test Program (Curtiss ltr. R-1:HW:222 Quote No. 841, 20 May 1947)

1st Ind.

Office of AAFOIC, Curtiss Wright Corp., Columbus, Ohio. 22 May 1947

To: CG, AMC, W/F, Dayton, O., Attn: TSECA

Concurred in.

THOMAS J. [illegible]
Lt. Colonel, Air Corps
AAF Officer in Charge

1 Incl.- n/c

cc: TSAXF-2A

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Encl. (D) to
C-W ltr.
RRA:HW:222
dated

XP-87 Phase I Flight Test Program

Reference: (a) Contract No. W33-038AC-6266
(b) Curtiss Report No. 9566B, Model Specification for Curtiss-Wright Airplane Model XP-87, dated 15 September 1945, Revised 1 November 1946.
(c) Curtiss Report No. 29-Z-1, Requirements for Curtiss-Wright Airplane Army Model XP-87, dated 1 January 1946.
(d) Letter Curtiss-Wright to AMC, EJD/af-487 dated September 27, 1946.
(e) Curtiss Report No. 29-X-1, Preliminary Test Instrumentation Proposal for XP-87, dated 8 October 1946, and all Revisions Thereto.

In accordance with references (a), (b), (c) and Paragraph 5g of reference (d), Phase I flight tests will be accomplished on the subject airplane as outlined herein. The flight tests will be divided into the following categories for presentation:

I. Ground Tests
II. Investigation of Aerodynamic Characteristics
III. Functional Tests
IV. Instrumentation Shakedown

The actual flight testing will not be accomplished in the order of presentation hereafter; each flight may incorporate items from one or all of the above listed categories. Instrumentation for all tests will be in accordance with reference (e).

I. Ground Tests

A. All routine ground tests required by A.A.F. Specifications before the first flight of an experimental airplane will be complied with and authorized in detail by separate correspondence.

B. An actual weight and balance determination will be made and the airplane will be ballasted to approximately design C.G. wheels up with full internal fuel (no tip tanks).

C. Instrumentation calibration will be accomplished for both the test and cockpit instruments. All instrument circuits and systems will be checked for proper operation.

D. Static tests will be made to determine the following items:

1. Spring tab constants and preloads.
2. Mechanical advantage of flight controls.
3. Down spring hinge moment.
4. Control system friction.

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E. The follow[illegible]

1 [illegible] with
[illegible]

2. On each [illegible]:

a. [illegible] idli[illegible] speed and set detent.
b. Run for [illegible] minute at idling [illegible] speed, 10,000 rpm, 11,000 rpm and 12,000 rpm (or limit turbine outlet temperature) to [illegible] cooling of nacelle compartments and structures [illegible] not necessary determine.
c. After the last one minute run in Paragraph (b) above, the throttles will be quickly reduced to the idling rpm position to determine burner blow-out tendencies.
d. With engine stabilized the throttle will be moved rapidly [illegible] to determine pulsation tendencies. These [illegible] will be accomplished in order from 10,000, 8,000 [illegible] rpm.

[illegible] of the left nacelle and then operate [illegible] for one minute.

[illegible] simultaneously at each of [illegible]

[illegible]
[illegible]
[illegible]
[illegible] temperature) - 30 seconds

F. During the [illegible], canopy will be closed and the cabin ventilation [illegible] operation.

G. A minimum of four (4) [illegible] ing speeds and one lift-off will be made prior to the [illegible] All runs will be started by releasing brakes after all engines have been brought up to 12,000 rpm (or limit turbine outlet temperature).

II. Investigation of Aerodynamic Characteristics

A. Control and tab flutter, trimming characteristics, and longitudinal stick-free stability will be investigated by trimming the airplane at approximately 10,000 ft. pressure altitude and attempting to induce flutter by rapidly vibrating controls and then releasing them. This will be accomplished at the following equivalent airspeeds: 200, 250, 300, 350, 375, 400, 425, 450, 470 and 480.

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B. At approximately 15,000 ft. pressure altitude stalls will be investigated in the following configurations:

	Flaps	Gear	Power
1	Up	Up	Level flight at 300 mph I.A.S.
2	Up	Up	Off
3	Down	Down	Off
4	Down	Down	Level flight at 190 mph I.A.S.
5	Down	Down	Take-off
6	Down	Up	Take-off

Stalling points will be defined in terms of "indicated" airspeed as no airspeed calibration will be available.

C. Longitudinal static stick-fixed and stick-free stability and control will be investigated at approximately 10,000 ft. pressure altitude (approximate design gross weight and C.G.) by trimming in level flight at the trim speeds listed below and then stabilizing in configurations shown at all listed speeds without retrimming.

Gear	Flaps	Trim Speed	Test Power	Test Speeds
Up	Up	260	NRP	190, 210, 240, 280, 320, 350, 400, 450.
Down	Down	175	50% NRP	140, 150, 165, 180, 190, 200.

D. Investigation of trim changes will be made by trimming under conditions shown below, making the changes listed, and then stabilizing the airplane without changing trim.

	Trim			
Speed	Flap	Gear	Power	Change
200	Up	Up	Off	Gear - down
200	Up	Down	Off	Flap - down
1.4 V_{s_1}	Down	Down	Off	Take-off Power
1.2 V_{s_1}	Down	Down	Take-off	Gear-Up
1.4 V_{s_1}	Down	Up	Take-off	Flaps - Up

V_{s_1} is stalling speed in landing configuration as determined in Paragraph II-B above.

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E. Investigation of directional and lateral stability will be made at 10,000 feet pressure altitude (approximate design gross weight and C.G) by performing steady straight sideslips to both the left and right progressively increasing the rudder angle up to full throw or maximum permissible pedal force (180 lbs.) at an equivalent airspeed of 150 mph with the gear and flaps down and normal rated power. These tests will be repeated with the critical engine inoperative and the others at normal rated power.

F. Investigations of aileron control power will be made approximately at 10,000 ft. pressure altitude (approximate design gross weight and C.G.) by trimming the airplane at an equivalent airspeed of 325 mph (gear and flaps up), locking the rudder in trim position, and applying abrupt aileron deflection to 1/2 and full deflection (or maximum wheel force) Recovery will be executed after 60° of bank is obtained.

Rolls will be made both to the left and right. These roll tests will also be made at an equivalent speed of 175 mph with gear and flaps down. The landing configuration tests will be repeated with aileron boost inoperative.

G. An airspeed calibration from 180 mph I.A.S. to placard speed in level flight will be made if facilities are available A radio calibrated range or calibrated aircraft of at least 500 mph E.A.S. capabilities will be necessary for this calibration. Placard equivalent airspeeds at various pressure altitudes are:

500 at sea level
480 at 10,000'
440 at 15,000'
390 at 20,000'
345 at 25,000'
260 at 35,000'

H. If paragraph (G) above is accomplished a preliminary investigation of high speed up to approximately normal rated power will be made by stabilizing in level flight and recording complete engine, flight and fuel flow data under the following conditions:

RPM	Standard Temperature Altitude		
11,000	9,000	6,000	3,000

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To: Mr. E. J. Ducayet

Subject: XP-87 Phase I Flight Test Program

III. Functional Tests

A. The following tests will be accomplished on the left inboard engine with the other three engines at NRP.

1. At approximate pressure altitude of 10,000 ft. start by windmilling and accelerate to 11,000 rpm. (Reduce power on other engines if necessary so as not to exceed placard speed.
2. Determine minimum idling speed of the engine.
3. In the tests of Paragraph (1) above the throttle will be quickly reduced to idling rpm position to determine burner blow-out tendencies.
4. After idling rpm is established in Paragraph (3) above the throttle will be moved rapidly to full open to determine pulsation tendencies.

Tests will be discontinued if operating temperatures become excessive.

B. The following tests will be accomplished on all four engines simultaneously (except where noted otherwise):

1. Check minimum idling speed of engine with airplane in Configuration (L).
2. After idling rpm is established in Paragraph (1) above rapidly move the throttle to full open to determine pulsation tendencies.
3. After the high rpm is obtained in Paragraph (2) above quickly close the throttles to the idle position to determine burner blow-out tendencies. Test in order: singly, by pairs, and all.
4. At 11,000 rpm (or lower if speeds exceed placard value) stable runs will be made at 9,000 ft. and 25,000 ft. pressure altitude and in a climb from 9,000 ft. to 25,000 ft. Cooling, thrust and induction air flow data will be recorded on these tests.

Tests will be discontinued if operating temperatures become excessive.

C The following tests will be performed on the hydraulic systems:

1. Extend and retract landing gear at 200 mph I.A.S.
2. Lower landing gear by free fall at 200 mph I.A.S. and near the stall speed for clean configuration as determined in Paragraph II-B
3. Operate the dive flaps in level flight at the following equivalent airspeeds at approximately 10,000 ft. pressure altitude: 250, 300, 350, 400, 425, 450 and 480.
4. After flaps are open in the 250 mph E.A.S. test of Paragraph (3) above maintain airspeed by increasing power, and bleed all pressure from the actuator and observe whether airflow closes the flaps.
5. Depress dive flap pedals at 200 mph E.A.S. at approximately 10,000 ft. and increase speed slowly until flaps open.

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D. The following tests will be made on the various systems:

1. Generator voltage output and voltage regulation will be checked during tests of Paragraph II-A and Paragraph III-B-4.
2. Operation of: (1) standby compass, (2) gyrosyn compass, (3) automatic pilot, (4) trim tabs, (5) oxygen system, (6) pressurization and (7) trim tab indicators will be checked under conditions of Paragraph II-A.
3. Investigation of radio (pilot's opinion) will be made in all test conditions used in Paragraph (2) above.
4. Operation of canopy both electrically and manually at approximately [illegible],000 ft. pressure altitude and 300 mph E.A.S. (cabin pressurization off).

E. [illegible] will be made for carbon monoxide under various flight [illegible] carbon monoxide colorimeter detection tubes will [illegible] check.

IV [illegible]

A. On the first flight all instrumentation will be operated on take-off, climb, final approach, landing and any other times at which records of tests are desired.

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Project No. [redacted]

NOTICE [redacted]

HEADQUARTERS
AIR MATERIEL COMMAND

MSEPS35/MSB/eb
Wright Field, Dayton, Ohio
20 May 1947

SUBJECT: Letter Contract dated 22 May 1945
designated Supplement to Contract
W 58-038 ac-6286

[redacted]

Amendment No. 18 to subject Letter Contract.

To: Curtiss-Wright Corporation
(Airplane Division)
Columbus 16, Ohio

1. Subject Letter Contract, as heretofore amended, placed an order with you for the supplies or services therein described.

2. It is now desired to amend subject Letter Contract, as heretofore amended, the following respects:

a. By increasing the amount you are authorized to expend or obligate as set forth in paragraph 5 thereof, from $8,502,145.52 to $8,687,145.52.

b. By adding the following Item 7 in paragraph (a) of Exhibit "I" (made a part of subject Letter Contract by Amendment No. 6):

"Item 7 - The Contractor shall disassemble the first XP-87 Airplane, Serial No. 45-59600, at the Contractor's plant, Columbus, Ohio, and properly load it on railway cars and cause it to be transported to Muroc Army Air Field, Muroc, California, where it shall be reassembled and prepared for flight. The Contractor shall conduct ten (10) hours of flight testing at said point on the first XP-87 Airplane, Serial No. 45-59600, in accordance with a flight test program to be mutually agreed upon by the Contracting Officer and the Contractor at a later date."

3. If the foregoing is acceptable to you, kindly so indicate by signing the three (3) numbers of this Amendment and return same to the Contracting Officer forthwith, whereupon subject Letter Contract shall be deemed amended accordingly.

4. This Instrument has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 528, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

[redacted]

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[redacted]

OTE: Type or print names under all signatures.

THE UNITED STATES OF AMERICA

BY: _____
STEPHEN LOMAS
(Contracting Officer)

ACCEPTED 3 June, 1947

CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION)
(Contractor)

AFFIX CORPORATE SEAL

BY: _____
(Name: Official Title)
Edwin J Ducayet, Representative

The Finance Officer, U. S. Army, Army Base, Brooklyn, New York, is designated as the officer to make payments in accordance with this contract.

The sums to be expended by the Government hereunder are chargeable to the following allotments, the available balances of which are sufficient to cover the same:

DEBIT: 2170705, 702-7004 P 611-09 S 35-058 - - $125,000.00

AFP: 650209 Class: 01-A

Ref: R&R from TSEPA4-1
dtd 5 May 47
Stephen Lovas

[redacted]

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HEADQUARTERS
AIR MATERIEL COMMAND

TSBPS5B/HSB/cb
Wright Field, Dayton, Ohio
6 June 1947

SUBJECT: Letter Contract dated 22 May 1945
designated Supplement to Contract
W 85-058 ac-6266

TO: Curtiss-Wright Corporation
(Airplane Division)
Columbus 16, Ohio

Amendment No. 19 to subject Letter Contract.

1. Subject Letter Contract, as heretofore amended, placed an order with you for the supplies or services therein described.

2. It is now desired to amend subject Letter Contract, as heretofore amended, in the following respects:

(a) By increasing the amount you are authorized to expend or obligate thereunder as set forth in paragraph 5 thereto, from $8,827,145.52 to $8,865,229.52.

(b) By adding the following Item 8 to paragraph (a) of Exhibit "I" (made a part of subject Letter Contract by Amendment No. 6):

"Item 8 - Spare Parts for the XP-87 airplane in a quantity the price of which shall not exceed $75,000.00."

3. If the foregoing is acceptable to you, kindly so indicate by signing the three (3) numbers of this Amendment and return same to the Contracting Officer forthwith, whereupon subject Letter Contract shall be deemed amended accordingly.

4. This Instrument has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

NOTE: Type or print names under all signatures.

THE UNITED STATES OF AMERICA

BY: _____
STEPHEN LOVAS
(Contracting Officer)

ACCEPTED [illegible], 1947

CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION)
(Contractor)

BY: _____
(Name: Official Title)
Edward L. Bayet
Representative

AFFIX CORPORATE SEAL

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SAFETY FILM KODAK

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The Finance Officer, U. S. Army, Army Base, Brooklyn, New York, is designated as the officer to make payments in accordance with this contract.

The sums to be expended by the Government hereunder are chargeable to the following allotments, the available balances of which are sufficient to cover the same:

DEBIT:	212/60705, 662-2000 P 611-09 S 35-038 - -	$163,083.80
	2170705, 702-7004 P 611-09 S 53-039 - - -	75,000.00
		238,083.80

AFP: 457691 Class: 01-A

Ref: R&R's from TSBPA4-1
dtd 17 & 29 Apr 47
Stephen Lovas

Rec'd CONTRACTS DEPT.
JUN 1947

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Project No. [redacted]

HEADQUARTERS
AIR MATERIEL COMMAND

Brook

MSBP382/MSB/eb
Wright Field, Dayton, Ohio
13 June 1947

SUBJECT: Letter Contract dated 22 May 1945
designated Supplement to Contract
W33-038 ac-8268

TO: Curtiss-Wright Corporation
(Airplane Division)
Columbus 16, Ohio

Amendment No. 22 to subject Letter Contract.

1. Subject Letter Contract, as heretofore amended, placed an order with you for the supplies or services therein described.

2. It is now desired to amend subject Letter Contract, as heretofore amended, in the following respects:

(a) By increasing the amount you are authorized to expend or obligate under paragraph 5 thereof, from $8,865,229.52 to $8,971,113.04.

(b) By adding the following Item 9 to paragraph (a) of Exhibit "I" (made a part of subject Letter Contract by Amendment No. 6):

"Item 9 - Changes in the design, development and construction of the two (2) airplanes called for under Items 5 and 6 as follows:

a. Comply with Revision B, dated 1 November 1946, to Model Specification No. 9566, instead of revision A, dated 1 January 1946.

b. Design, fabricate and install a dummy nose on airplane Serial No. 45-59600 called for in Item 5, in lieu of installing a G.F.E. power turret.

c. Design, fabricate, and install all special intake ducts, access doors, oil system, and forward transverse bulkheads, necessary to facilitate the installation of two Westinghouse X24C-4A engines in lieu of two X24C-4B engines presently specified for airplane Serial No. 45-59600 called for in Item 5.

[redacted]

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d. Design, fabricate, and install a tachometer generator adapter capable of raising the tachometer generator speed to 4200 RPM at 12,000 engine RPM, for airplanes, Serial Nos. 45-59600 and 46-522, called for in Items 5 and 6.

e. Construct necessary jigs and conduct a series of drop tests in accordance with the current issue of AAF Specification 40228, on the nose wheel and main landing gear for the purpose of determining correct metering pin size and to insure structural integrity at landing loads.

f. Construct a simulated fuselage section containing the rear fuselage fuel tank and the bombay tank and conduct accelerated tests on the test rig in accordance with ANA Specification AN-V-7, dated 21 July 1942 and Amendment No. 2 dated 8 August 1944. Upon completion of these tests the simulated fuselage section containing the two fuel tanks shall be delivered to Wright Field for further testing by the AAF. The Contractor shall follow up these tests conducted by the AAF and record any changes that may be necessary on future airplanes.

g. Fabricate one oil tank and one hydraulic tank and conduct vibration, slosh, and acceleration tests at the Contractor's plant in accordance with the current issue of ANA Specification AN-T-49."

5. If the foregoing is acceptable to you, kindly so indicate by signing the three (3) numbers of this Amendment and return same to the Contracting Officer forthwith, whereupon subject Letter Contract shall be deemed amended accordingly.

4. This Instrument has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 15 of Public Law 528, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

NOTE: Type or print names under all signatures.

THE UNITED STATES OF AMERICA

BY: _____
STEPHEN LOVAS
(Contracting Officer)

ACCEPTED 11 June, 1947

CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION)
(Contractor)

BY _____
(Name: Official Title)
Erwin J Lavagetto - Representative

AFFIX CORPORATE SEAL

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The Finance Officer, U. S. Army, Army Base, Brooklyn, New York, is designated as the officer to make payments in accordance with this contract.

The sums to be expended by the Government hereunder are chargeable to the following allotments, the available balances of which are sufficient to cover the same:

DEBIT: 2170705, 702-7004 P 611-09 S 55-068 - - - $105,865.72

AFF: 450203 Class: C1-A

Ref: R&R from TSEPA4-1
dtd 9 June 47
Stephen Bovas

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CURTISS-WRIGHT CORPORATION
Airplane Division
Columbus 16, Ohio

19 June 1947
RBA:MW:437
Quote No. 865

Subject: Contract W 33-038 ac-6266
XP-87 Airplanes
Photo Reconnaissance Modification

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSEOA-4

Through: AAF Officer In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) AMC Ltr TSEOA-4/CBT:hw dated
30 April 1947

Enclosure: (A) Cost Breakdown

1. The Air Materiel Command by reference (a) requested the submission of an informal cost and delivery quotation for the following two photo reconnaissance proposals for XP-87 Airplanes:

(a) One complete new XP-87 Airplane designed for photo reconnaissance
(b) Modification of an existing XP-87 for photo reconnaissance purposes

2. In compliance with reference (a), this Contractor desires to quote herewith an informal quotation in the amount of $72,024 for the fabrication of a photographic nose for installation on No. 2 A rplane in accordance with proposal sketch L-29-357, copies of which have been delivered to the Air Materiel Command previously. A breakdown of this amount is contained in Enclosure (A) attached hereto.

3. This cost proposal is based on the assumption that Airplane No. 2 would have been delivered previously to the Army. As a result, it would be necessary to return the airplane to this Contractor's plant for incorporation of the photographic nose modification. Furthermore, in view of the informal status of this proposal, it is desired to point out that no work is being or will be accomplished toward such modifications until go-ahead approval is received from the Air Materiel Command. In view of this circumstance it is hereby requested that, in the event this proposal is favorably received and it is desired that this

See RBR to Photo Lab.
3 July '47, CBT/hw

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Contractor proceed with the development of such a photographic nose, a Contract Change Notification be issued to provide preliminary authorization for the initiation of such a program.

4. On the assumption that go-ahead in the form of a Contract Change Notification would be received by this Contractor not later than 1 July 1947, it is estimated that all necessary engineering and tooling for the photographic nose modification could be accomplished by 1 November 1947. Assuming that No. 2 Airplane will have been delivered by that time, and that that airplane could not be returned to this Contractor's plant at the earliest before 1 December 1947, the entire photographic nose assembly can be installed within one month after receipt of No. 2 Airplane at this plant.

5. No proposal for a complete new XP-87 Airplane designed for photographic reconnaissance purposes alone is being submitted herewith pending receipt of Air Materiel Command comments on the quotation for the nose modification contained herein. If a quotation for such additional airplane is desired, this Contractor will be pleased to prepare a cost estimate for such airplane.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

1st Ind. 20 JUN 1947

From: AAFOIC, Curtiss Wright ..., Columbus, Ohio.

To: .....

Concurred in.

THOMAS J. C[illegible], Lt. Col., A. C.
AAF Officer in Charge

.....Incl.....

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ENCLOSURE (A)

PHOTOGRAPHIC HOSE

PRODUCTIVE:	
Material	$2,243.00
Labor Hours	(7,575)
Labor @ $1.47/hr	11,135.00
Overhead @ 160%	17,816.00
Total	$31,194.00
TOOLING:	
Material	482.00
Labor Hours	(2,381)
Labor @ $1.47/hr	3,500.00
Overhead @ 160%	5,000.00
Total	$9,582.00
ENGINEERING:	
Material	100.00
Labor	12,300.00
Overhead @ 100%	12,300.00
Total	$24,700.00
FLIGHT TEST	- - - -
GRAND TOTAL	$65,476.00
Profit @ 10%	6,548.00
TOTAL COST	$72,024.00

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Folder 5 6(III)

TSEAO Form No. 23
(Rev. 24 Jan 46)

RECORD OF OFFICIAL CONTAC

ENGINEERING DIVISION

FILE:	PROJECT: All-Weather Fighters	DATE: 19 June 1947

SUBJECT: Application of All-Weather Flying Center Work to All-Weather Fighter Projects

PERSON(S) CONTACTED: Mr. W. W. Foster, Maj. D. L. Boone, Capt. Callahan, Wing Cmdr. Hughes, & Col. A. E. Kay

REPORT ON:

- ☐ Long Distance Telephone Call
  - ☐ Govt. Paid ☐ Incoming
  - ☐ Contractor Paid ☐ Outgoing
- ☐ Personal Visit of Representative
- ☑ Conference
- ☐
- ☐

APPROVAL OF L. D. TELEPHONE CALLS

Name and Location of Activity:

Reason for Call:

Signature of Authorizing Official: | Account No.

Symbol | Approval No.

FACTUAL DATA (If additional space required, use reverse side):

On 18 June 1947 Messrs. O.B. Thornton and John M. Herald, Project Engineers on the XP-87 and XP-89 aircraft respectively, visited the Clinton County Army Air Base to discuss All-Weather projects.

Personnel of the Engineering Section were contacted and an informal conference was arranged for the afternoon during which many interesting points with regard to All-Weather flying were discussed and their applications to present All-Weather Fighters considered. As a result of this conference the following two conclusions were reached:

(1) A certain amount of liaison should be established between the Aircraft Projects Section and the All-Weather Flying Center with regard to present All-Weather fighter projects and future development of the All-Weather fighter type.

(2) The personnel of the All-Weather Flying Center indicated that they were initiating a project for the study of high-speed all-weather flying for which they will need suitable test airplanes. The XP-87 appears to be most logical for this work and consideration should given to the assignment of the No. 2 airplane to the All-Weather Flying Center on completion of tactical evaluation at Eglin Field.

ACTION REQUIRED:

SIGNATURE OF INITIATOR:	Symbol	COORDINATION:
O. B. Thornton J. M. Herald	TSEAA-4	

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HEADQUARTERS
AIR MATERIEL COMMAND

TSEPR-1/GMG/vga
WRIGHT FIELD, DAYTON, OHIO
23 July 1947

SUBJECT: Photographic Installation in XP-87 Aircraft

TO: Commanding General
Army Air Forces
Washington 25, D. C.
ATTN: AC/AS-3, Requirements Division

1. This Command has made a thorough study of new types of aircraft at present in the design or experimental stages, with a view to submitting recommendations on aircraft which could be adapted for photographic reconnaissance. Of all the aircraft examined, it is believed the Curtiss-Wright XP-87 offers the best possibilities considering the requirements of close and medium reconnaissance, especially for night photography, low and forward shooting high speed photography so essential for coverage in support of ground forces.

2. The enclosed proposed performance specifications, together with the enclosed photographs, show the types of aircraft cameras and the manner in which they could be mounted.

3. Information is requested as to the need for equipping one XP-87 airplane for photographic test and what priority requirement exists.

4. This Command is constantly scrutinizing all aircraft being developed to explore their photographic potentialities. Drawings and essential data will be prepared on each fighter or bomber which appears to have production possibilities in order that the selected types can be effectively converted for photographic reconnaissance in a future emergency.

5. Although most of these types are not considered ideal for photographic use, past experience shows this factor might be waived in the face of critical tactical or strategic requirements. Having

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Ltr. Hq., AMC, 23 Jul 47, to CG, AAF, Subj: "Photo Installation in XP-87 Aircraft"

such drawings and data available for an emergency, could simplify that problem.

FOR THE COMMANDING GENERAL:

L. C. CRAIGIE
Major General, U.S.A.
Chief, Engineering Division

3 Incls:
1. XP-87 Photo Nose Install., Char. & Performance
2. Photo #72GC AMC-EPF
3. Photo #73GC AMC-EPF

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ADDRESS REPLY TO
THE ADJUTANT GENERAL, ARMY AIR FORCES
WASHINGTON, D. C.

WAR DEPARTMENT
HEADQUARTERS OF THE ARMY AIR FORCES
WASHINGTON, D. C.

25 July 1947

SUBJECT: Supplemental Agreement No. 1
Contract W33 038 ac-6266

TO: Chief, Current Procurement Branch
Procurement Group, WDGS

1. Attached are one number and two cover sheets of Supplemental Agreement No. 1 to Contract W33 038 ac-6266, submitted under the Provisions of PR 305.3, with the recommendation it be approved under the Provisions of Public Law 703, 76th Congress as amended by Section 13, Public Law 580, 77th Congress, Title II of the First War Powers Act 1941 and Executive Order 9001, 27 December 1941. The following information is submitted in conformance with PR 305.4:

a. Contractor: Curtiss Wright Corporation, Airplane Division, Columbus 16, Ohio.

b. Location of plant from which supplies are to be furnished: Contractor's plant, Columbus, Ohio.

c. Materials:

Item	Description
1A	Wind tunnel model of XA-43 airplane conforming to contractor's Specification 9433 dated 21 October 1944 and testing thereof in a GALCIT 10 foot wind tunnel.
1B	Report analyzing the wind tunnel tests conducted pursuant to 1A above.
1C	Mockup of XA-43 airplane.
1D	Preliminary engineering services in connection with the design, development and construction and mockup of the XA-43 called for by Items 1A and 1C above.

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Appendix 1 attached to the supplemental agreement sets out the method of provisioning for the XP-87 spare parts under the contract.

k. (1) On 22 May 1945 a letter supplement (CPFF) was entered into with Curtiss Wright for the building of 3 XA-43 airplanes, a static test article, test models and a test of one TG-180 engine (Phase II procurement) following completion of Phase I, or the engineering phase, covered by CPFF prime contract 733 938 ac-6266. Contractor performed a considerable amount of work under the letter supplement before it was decided, in October 1945, that the XA-43 airplane would not be suitable for the AAF. Contractor upon being notified informally of the decision reached, requested it be permitted to continue under the letter supplement to build an XP-87 airplane in lieu of the XA-43 with the funds remaining available for construction of the latter. Contractor submitted an estimated cost on 30 October 1945 of $4,792,951.00 for one XP-87 airplane plus additional costs for models and mockup. Amendment No. 6 dated 4 January 1946 to the letter supplement formalized this switch in requirements by providing for procurement of one XP-87 airplane, one complete mockup and several wind tunnel models in addition to all work performed on the XA-43 to that date.* Under this amendment all work was to be on a FP basis in lieu of a CPFF basis, specification requirements were changed and new funds were appropriated for the procurement of an additional XP-87 airplane which contractor estimated would cost approximately $2,872,200.00. Contractor's revised quotation of 27 March 1946 contained the following:

Phase I - XA-43 Airplane	$336,791.00	
" II - XA-43 Airplane	641,355.00	$ 978,146.00
1st XP-87 Airplane		4,658,087.52
2nd XP-87 Airplane		2,872,200.00
One complete mockup		171,726.00
Various wind tunnel models		48,585.00
Total		$ 8,729,044.52

Contractor's total price quotation at this time for both the XA-43 work performed and XP-87 work to be performed was $8,729,044.52. Contractor's cost breakdown submitted at the same time showed that the work performed and to be performed would cost $9,105,822.00. It will be noted contractor was offering under this proposal to do the work at an estimated loss of $376,777.48. Furthermore no profit allowance has been made for the first XP-87 airplane produced or for the XP-87 mockup or scale models. In this quotation contractor included the cost for Phase I work of $352,964.00 covered by prime contract 733 938 ac-6266 and did add for profit a 4% fee totaling $13,827.00 which had been written into the original contract. This cost plus a profit of 4% amounted to $366,791.00, the value of the original

(*) Note: WAR [illegible]" dated 27 December 1945 approved this change in procurement.

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contract and was simply a conversion from CPFF to Fixed-Price without changing the price for the work performed. Phase II work on the XA-43 airplane, which was originally covered by letter supplement dated 22 May 1945, contractor estimated, would cost $611,655.00 for work performed up to 31 October 1945, when Curtiss Wright had been directed to cease work on the XA-43 airplane. The contractor requested no fee or profit for this portion of the work performed. The combination of these two phases of work on the XA-43 totaled $965,.45 and is shown in the first column of contractor's cost breakdown, page 6A attached to AF Form 3 submitted 27 March 1946 by the Contractor. Since contractor had already performed all of the work listed above (that is, Phase I and that portion of Phase II which had not been affected by the stop order), it desired payment for these items of work (shown in this Supplemental Agreement No. 1 attached, as Items 1a through 1e), upon the signing of the contract, and submittal of invoices by the contractor, which invoices would include the credit due for reimbursement already received. Contractor was requested to supply actual cost figures on the Phase II portion of the work performed to determine the exact amount of the cost incurred.

(2) As finally accepted by the negotiators, which, all costs were in, this Phase II cost was set at $ 37,10.,32 or a total cost for the XA-43 portion of the contract of $ 3,95.,97 instead of $47,4.0.0. originally requested. This final figure for the XA-43 portion of the work is shown in Enclosures 2 and 3 to contractor's letter of 27 September 1946.

(3) In examining the figures submitted for the XA-7 portion of the proposal dated 31 March, 194, all items of cost were reviewed in great detail. In the original proposal, contractor stated material costs were estimated at $ per hour of airframe weight, based on experience in building other aircraft for the Army and Navy. Contractor estimated labor hours per pound of airframe weight for building the first XA-7 airplane at 9 hours, or total labor hours, (production) of 5,3,600 based on manufactured airframe weight for the airplane of 14,200-pounds. Fabricating and tooling hours were quoted at $1.3 per hour; engineering at $2.5 per hour. Manufacturing and tooling overhead were quoted at 19% on direct; overhead at 10%. Charts presented by the contractor supported fully the figures quoted. Contractor's quotation included a contingency of 5% and a profit of 10% for the second airplane and instrumentation of the first airplane. While the rates shown included normal merit and promotion increases, no allowance was made for a general wage increase which was anticipated at the time contractor submitted its proposal. However, contractor's quotation was predicated on inclusion in the contract of a Cost Plus Fixed Fee to permit an equitable adjustment in prices, if the contract work was subsequently, if a general wage increase were granted to the employees.

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1E	Engineering Data including photographs of the mockup, model specifications of the XA-43, drawings, inboard profile, prospective drawings and aerodynamic report and structural criteria report covering the airplane.
2	XA-43 airplane in accordance with the contractor's Specification No. 9533 dated 15 March 1945.
3	Various test models of the XA-43 airplane.
4	One model TG-180 aircraft engine installed and ground tested in a ground testing installation.
5	One XP-87 airplane in accordance with the contractor's preliminary Specification 9566 dated 15 September 1945 and including Revision A dated 1 January 1946 and all applicable engineering data, drawings and reports in accordance with contractor's Report 29-2-1 dated 1 January 1946, including flight test instrumentation less certain installations and equipment as specified.
6	One XP-87 airplane in accordance with contractor's preliminary Specification 9566 dated 15 September 1945 including Revision A dated 1 January 1946 and all applicable engineering data, drawings and reports in accordance with contractor's Report 29-2-1 dated 1 January 1946.
7	One complete XP-87 mockup.
8	Various wind tunnel models of XP-87 specifically listed in contractor's Report 29-2-1 dated 1 January 1946.
9	Data in accordance with contractor's Report 29-2-1 dated 1 January 1946.
10	Spare parts in accordance with Provisioning Appendix attached to the contract as Appendix 1.

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d. Prices:

Item No.	Amount
1 through 4	$ 863,959.32
5	5,283,862.00
6	2,666,727.00
7	169,412.00
8	43,060.00
9	included in Item 1
10	75,000.00
TOTAL:	$ 9,107,020.32

e. Deliveries

Item No.	On or Before
1A through 1E	15 March 1945
2, 3 and 4	30 October 1945
5	May, 1947
6	July, 1947
7	Delivery not required
8	1 September 1946
9	As required by contractor's Report 292-1 dated 1 January 1946.
10	Spare parts Appendix attached to the contract.

f. The contractor is an established manufacturer of aircraft and has been a contractor to the AAF for a period of years. It has the necessary facilities and experience and is believed capable of performing the contract.

g. New facilities, it is anticipated, will not be required for the performance of this contract.

h. Negotations were conducted with only one contractor. It was determined that the work could not be performed elsewhere with assurance of adequate performance and timely deliveries.

i. Contract Placement Policies were considered in making this procurement. Curtiss Wright was considered the sole source of supply since it is the designer of the airplane and it may be presumed will accordingly be best qualified to build the airplane and recognize and carry out, as work progresses, what improvements in design may be needed.

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j. This is the supplemental agreement contemplated by letter supplement dated 22 May 1945 as amended, except that items covered by Amendments Nos. 18 and 22 to the letter supplement have not been negotiated and are not included in this supplemental agreement. A copy each of the letter supplement and amendments thereto is forwarded attached for ready reference. Since it has been the express policy of the War Department to place contracts on a fixed price basis wherever possible, and since contractor was willing to accept this experimental contract on such a basis, despite the fact that estimates submitted indicated contractor would incur a loss in the performance of the contract, the contract has accordingly been so negotiated.

Article 15(g) provides that with respect to Items 1a through 1e of Article 15A the words "to be delivered" shall be deemed to mean "to be completed", while with respect to Items 2, 3 and 4, the words "to be delivered" shall not be deemed to require actual completion or delivery but that the work shall cease by the dates shown.

Article 15(i) provides that Items 2, 3 and 4 of Article 15A shall be delivered to the Government in the state of completion of such articles at the date work ceased thereon.

Article 15(n) provides contractor shall use its best efforts to make available spares for the airplanes not later than the date of completion of the two XP-87 airplanes called for under the supplemental agreement.

Article 20 provides for more liberal inspection procedure in the building of the two XP-87 airplanes.

Article 29 provides for the exclusion of certain taxes from the price of the supplies being procured.

Article 36 provides that the Vinson-Trammell Act Article shall apply only to Items 5 and 6 of Article 15A of the supplemental agreement.

Article 36A incorporates the Renegotiation Act since the letter supplement was written prior to 31 December 1945, and the contract incorporates work performed under prime contract W33 038 ac-6266 in 1945.

Article 39 provides for Authorization and Assistance in connection with the use of any patented invention embodied in the articles being procured.

Article 40 provides for Reproduction of License Rights granted to the Government.

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Article 41 provides for Price Revision due to change in wages or employment conditions. This is based on Form 211 redetermination Article (Fi. 7/he.), modified to delete any reference to the War Labor Board and vesting responsibility for redetermining prices in the Contracting Officer, subject to the approval of the Under Secretary of War. Contractor requested inclusion of paragraph (b)(1)(c) because it was concerned about a possible retroactive ruling or judgment against the contractor under the Fair Labor Standards Act, which might result in increasing wages and salary costs.

Article 42 provides that this supplemental agreement supersedes letter supplement dated 22 May 1945 except Amendments Nos. 18 and 22 thereto.

Article 45 provides that the Government may take possession of any and all tools desired, upon completion of the contract.

Article 46 permits substitution of materials so long as strength and safety are not affected, and the use of a minimum number of drawings which need not comply with AN-D-12.

Section II provides for (1) payment for articles under Items 1a through 1e and Items 2, 3 and 4, accepted prior to the date of this supplemental agreement and (2) applicability of reimbursements under the CPFF letter supplement to the FP definitive contract with appropriate adjustments as may be necessary.

Section III further clarifies deliveries under the CPFF letter supplement which is now superseded by a FP definitive contract, and returns title to work-in-process under the contract, with certain limitations, to the contractor.

Section IV provides for negotiations to determine the value of government-owned property transferred to the contractor prior to the date of execution of this supplemental agreement for use on the supplies contract.

Section V provides for revision of price under the contract if contractor's lease of the Columbus, Ohio plant is terminated prior to completion of the work called for by this supplemental agreement.

Section VI provides that prior to the effective date of this supplemental agreement, any notice of termination shall be under Article 30 "Termination at the Option of the Government" of the supplies contract as amended by the Supplemental Agreement.

Section VII provides that this supplemental agreement shall be subject to the written approval of the Secretary of War or his representative.

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(4) In reviewing the overhead rates contractor pointed out manufacturing overhead for the first quater of 1946 had been 239% including G&A Expense. Contractor's records showed it had experienced approximately a 200% manufacturing overhead for some months, and there was no basis for believing this would be reduced substantially during the life of this contract. The forecasted trend by the Company for all of 1946 was 216%. It was noted that even during wartime when a great amount of direct labor in contractor's plant would have tended to reduce overhead costs percentagewise, contractor had experienced an overhead of 155% plus 26% G&A Expense. Nonetheless contractor was advised that since overhead rates being negotiated with other contractors for the same period as that in which this contract would be performed ran between 130% and 160% even where past experience or future trend indicated a higher rate, Curtiss Wright could not be given preferential treatment in this respect. Negotiators for the Government offered a maximum figure of 160% which the contractor in later negotiations accepted.

(5) The engineering labor rate for 1946 based on past performance and future trend was forecasted at 95%. However, the reallocation to manufacturing, G&A Expense and engineering overhead of (a) payroll taxes, (b) Workmans Compensation Insurance, (c) provisions for vacations, (d) provisions for Xmas gratuities and (e) rental expense, formerly charged to manufacturing solely, was expected to raise this figure approximately 15%. However, 100% was agreed upon at this time as a satisfactory engineering overhead rate for the contract. Contractor's original quotation of $1.32 per hour direct labor was considered reasonable as was the engineering rate of $1.50 per hour. However, while negotiations were in the later stages, the War Labor Board granted approval to increase wages and salaries in contractor's plant; $0.15 per hour for manufacturing and tooling direct labor; $0.20 per hour for engineering direct labor. Contractor now requested an increase in direct manufacturing wages from $1.32 to $1.47 per hour. The compromise worked out set up a $1.32 per hour to 15 April 1946 with $1.47 per hour applying to the labor hours developed subsequent to that date.

(6) The engineering labor rate likewise was increased from $1.57 per hour to $1.70 per hour effective 28 February 1946 because of the wage increase granted to engineering labor effective 1 March 1946. Because of the high labor rates as well as a change in contractor's chart of overhead accounts, forecasted manufacturing and tooling overhead rates now dropped somewhat below 200% but never approached the 160% figure negotiated.

(7) Despite the use of the 160% manufacturing and tooling overhead rate, the cost of building the 2 airplanes, instrumentation of the

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first airplane, the mockup and models, because of the new labor rates, increased by $245,312.00. A breakdown of this increase was presented in contractor's Intereffice Memorandum of 8 July 1946. The exhibit dated 3 July 1946 attached to this memorandum showed $1.32 per hour to 15 April 1945 and $1.47 per hour for the estimated cost to complete, applicable to tooling and production labor as agreed in negotiations. Engineering hours were quoted at $1.50 per hour through 28 February 1946 and $1.70 per hour effective 1 March 1946, the effective date of the wage increase for engineering labor. At this time contractor advised it had made a mistake in presenting the XP-87 manufactured weight. Instead of 14,200 pounds, the airframe weight produced by the contractor was actually 18,235 pounds. This was an increase of 4,035 pounds. Since total labor hours were based on 39 hours per pound of airframe weight, this required increasing substantially the direct labor dollars to be expended, as well as material costs which was based on $28.14 per pound. In further negotiations however, centered around this latest presentation it was pointed out to the contractor that compared to material costs obtained from other aircraft manufacturers, $28.14 per airframe pound was excessive. Data recently compiled was presented to contractor's negotiators and based on these figures, $9.33 per airframe pound was offered the contractor in lieu of $28.14. This was accepted at the time. In final negotiations, however, this figure was further reduced to $8.93 per pound. Also the labor hours per pound were reduced at this Command's insistance, from 39 hours per pound to 33.33 hours per pound.

(3) The contractor had reiterated throughout some 10-12 conferences over a period of 10 months that it would incur a loss of approximately $400,000 to $500,000 on the contract, the figure varying as negotiations progressed from one conference to another. Its latest quotation dated 27 September 1946 confirming most previous negotiations and accepting the figures arrived at, stated, for the records, that it was incurring an estimated loss of $450,000.00 by accepting the contract. Previously, top officials of the Company came to Wright Field requesting that the overhead rate be adjusted upward to permit the contractor to avoid the loss. In response to these various pleas contractor was given an additional $150,000.00 on the total price of the airplane which it elected to apply to manufacturing and tooling overhead. This raised the figure of overhead rate as finally accepted to 181.92% plus. As will be noted, over a period of several months negotiations, concessions were made and accepted and the figures thus arrived at further modified; percentagewise in some cases or by addition or deletion of lump sums in others during some stage of the negotiations, so that the final figures as agreed upon were not always subject to simple mathematical determination. For example, profit percentage on the first airplane, as finally negotiated amounted to 4.66% plus,

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Engineering overhead, which is stated at 10%, was reduced, except for the scale model, to 9% rate, and no adjustment followed the general wage increase. Tooling material was outside and in line with quotations from other contractors and tooling labor and overhead rates were the same as for manufacturing. Flight test costs were considered not excessive. While contractor's original estimate of March 1946 had shown no profit for building one first airplane, the contractor believed that cash from a lot for this work to appear equitable. Later negotiations to allow some profit on this large item of work. Accordingly, a profit was [illegible], which after all costs, finally amounted to $[illegible] or approximately 4.46% of the allowed cost to build, with profit on electronics and instruments of the second airplane amounting to $2,[illegible], or approximately 5% of the estimated cost. Total profit on the XA-7 portion of the contract was $[illegible],295 on an estimated cost of $7,[illegible],76[illegible] or approximately 5.[illegible]%. This profit figure, however, was based on overhead rates which it did not appear contractor would attain during the life of the contract. Subsequently, $75,000 was added for spare parts, the profit to be figured at 10% of the estimated cost. Doctor Stack's earlier request for a contingency of 5% was denied. It was not contained in the negotiation as finally accepted. A breakdown of contractor's quotation is attached to contractor's letter dated [illegible] 1946. It will be noted that phase I and phase II of the XA-4 portion of the contract totalled $[illegible],9[illegible]%, including a fixed fee of $[illegible],[illegible] on phase I work only. The XA-7 models, namely, first and second airplanes and [illegible] of the second airplane total $[illegible],[illegible]00, including a profit of $[illegible],[illegible]. Total price for the whole contract, including the $75,000 set up for spares would be $[illegible],[illegible]02[illegible], which is considered fair and reasonable.

3. No advance payments will be made under this contract.

4. Contractor's quotation indicates that 1[illegible]% of the work will be subcontracted.

5. $75,000 was set up for spare parts. This figure will be adjusted upward or downward depending upon the quantity of spare parts finally procured under the contract. The cost of tooling and engineering is fully absorbed in the price of the complete airplane. Accordingly, no tooling or engineering costs will be reflected in the cost of the spare parts being procured.

6. The articles are required and are being procured in the furtherance of the National Defense. 1945 and 1947 fiscal year funds are obligated for this supplemental agreement in addition to 1945 fiscal year funds obligated originally by the CPFF contract which is hereby being converted to fixed price. An article for periodic or optional periodical repricing upon demand by either party was not included in this

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contract for the following reasons: (a) It was considered impracticable to obtain costs on a maximum of 50% of the articles completed (as is generally permitted by the Price Revision Articles set out in the Procurement Regulations which might have been used in this contract), and have any reasonable basis for renegotiating the price since the smaller, less expensive articles would be completed first and would bear no relationship to the building of the airplanes themselves. Moreover, if it were planned to redetermine after completion of the first airplane, it would still have been difficult, if not impossible, to segregate costs because a considerable portion of the work required for both airplanes was being performed concurrently for the sake of efficiency and economy, and was so co-mingled that separate cost figures, to provide a basis for renegotiation of any substantial part of the contract, it was anticipated, would not be available; (b) it was felt that contractor would not make more than a normal profit on this contract at best, since material costs were based on a figure approximately one-third what the contractor estimated was required, ($2.14 against $8.93 per pound of airframe weight); production labor hours were based on a figure approximately 15% less than the contractor estimated was required (39 hours against 33.33 hours per pound of airframe weight allowed); and production overhead was approximately 20% less than contractor could anticipate for the life of the contract (approximately 200% against 161.92% allowed); (c) finally, the total profit allowed for the XP-37 portion of the contract was considerably less than the 10% of cost usually allowed for a large fixed-price contract for aircraft.

r. An extra copy of the contract marked "advance copy" is forwarded and may be retained.

FOR THE COMMANDING GENERAL, ARMY AIR FORCES:

WILLIAM D. ECKERT
Colonel, Air Corps
Chief, Procurement & Industrial
Planning Division
Office, Ass't Chief of Air Staff - 4

6 Incls:
1 - Cont ac-6266, S.A. 1
(1 number & 2 cover sheets)
2 - CW Ltr d/27 Mar 46
3 - CW ltr d/8 July 46
4 - CW ltr d/27 Sept 46
5 - Ltr Cont. AC-6266 w/amendments
6 - "Adv Cy" S.A. #1

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RRTTNE

4 AUGUST 1947

COMMANDING GENERAL
ARMY AIR FORCES
WASHINGTON 25, D.C
ATTN: AC/AS-4

P. B. KLEIN, Colonel, A.C.
Chief, Fighter Br.
23230 PBS/ms

GEORGE F. SMITH, Colonel, AC
Chief, Airc. Proj. Sec.
Engineering Division

WITH RESPECT TO THE XRAY PETER DASH EIGHT SEVEN AIRPLANE CMA REFERENCE TWX WAR EIGHT TWO THREE NINE/DATED TWO ONE JULY ONE NINE FOUR SEVEN SUBJECT TWO FOUR DASH CHARLIE ENGINE PROGRAM CMA A CHANGE FROM JIG DASH THREE FOUR TO JIG DASH THREE THREE AELE DASH CHARLIE SIX ENGINES IS FEASIBLE WITHOUT ANY LOSS IN PERFORMANCE PD ACTUAL ~~AMEE IN ENGINES ON ONE OF THE EXPERIMENTAL AIRPLANES~~/WILL COST APPROXIMATELY SIX FIVE ZERO THOUSAND BUT SHOULD NOT BE MADE UNLESS PRODUCTION IS DEFINITELY SCHEDULED PD A JIG DASH THREE THREE ENGINE INSTALLATION IS DEFINITELY RECOMMENDED FOR THE PRODUCTION VERSION OF THIS AIRPLANE PD IN THE CASE OF THE XRAY PETER DASH NINE ZERO THE AIR MATERIEL COMMAND IS AWAITING RESULTS OF A STUDY OF THE JIG DASH THREE THREE ENGINE WITH AFTERBURNING VERSUS THE JIG DASH THREE FOUR INSTALLATION PD THE JIG DASH THREE THREE INSTALLATION LOOKS PROMISING BUT THE REQUESTED RECOMMENDATION WILL HAVE TO BE DEFERRED UNTIL THE STUDY IS COMPLETED POSSIBLY THREE WEEKS HENCE PD IF ONE JIG DASH THREE THREE ENGINE IS USED IN THE XRAY PETER DASH NINE ZERO THE POSSIBILITY OF LATER SUBSTITUTION OF TWO JIG DASH THREE SEVEN ENGINES AS INTIMATED IN THE REFERENCE MESSAGE WILL REQUIRE MAJOR CHANGE PD TO CONSOMAIR FROM CONSOMANC HOWEVER IF THE XRAY PETER DASH NINE ZERO IS BUILT AROUND TWO JIG DASH THREE FOUR ENGINES SUCH SUBSTITUTION WILL BE COMPARATIVELY SIMPLE

EOA-4, EPF, EPE3, EOA-6, [illegible]
EOA-4

U-30577-A-2

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[redacted]

AAF Engine Program

(1) AG/AS-2, Requirements Division
(2) AG/AS-4, Procurement & Industrial Planning Division

AG/AS-4, Research & Engineering Division

7 August 1947

1

Colonel M C Dunlar/ars/53[illegible]

1. Reference attached AMC Procurement Division letter dated 11 July 1947, subject as above, and attached copy of AMC teletype dated 5 August 1947; it is tentatively recommended that any production of P-87 airplanes be based upon the installation of two Allison V-3420 engines. This change from the present installation of four each V-1650 engines in the XP-87 is feasible without any loss in performance. Further, on the basis of 150% spare engines, this change will reduce the cost of engines per airplane from approximately $650,000. to $157,000.

2. Possible production of P-87 airplanes is so far in the future (four to five years) that a firm selection of several proposed engine installations cannot be made at this time.

3. The above further reduces the planned production requirements for Westinghouse 24C engines to the point that it would appear

a. The peak requirement for 24C production and production engineering is reduced within the present estimated capacity of Westinghouse.

b. A requirement no longer exists for the current, costly, educational contract with W.A.E. for the preparation of additional 24C engine production capacity.

4. Concurrence is requested from AG/AS-3, Requirements Division, in the recommended engine change for production P-87 airplanes.

5. Provided AG/AS-3 concurs in the above, it is recommended that the Aeronautical Board again examine the 24C engine production program and render a decision as to whether or not a requirement still exists for Contract AC-16238 with the Wright Aeronautical Corporation.

6. It is requested that this office be advised by the Procurement and Industrial Planning Division as soon as the P-87 airplane is definitely scheduled for production.

F. O. CARROLL
Brigadier General, U.S.A.
Chief, Research & Engineering Div.

Incls - 2
1 - Ltr fr AMC 11 July 1947
2 - Ltr AMC Mag. 452-134

CONCURRENCE: AC/AS-4

[redacted]

AC of S - Requirements

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45213 Engineering Parts, [illegible]

[redacted]

HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

IN REPLY REFER TO: [illegible]

[redacted]

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION-COLUMBUS PLANT

COLUMBUS 16, OHIO

August 25, 1947
EJD/tc(af-399)

Subject: Contract W33-038 ac-6266
XP-87 Airplane - Phase I Flight Test Program

To: Commanding General, AMC
Wright Field, Dayton, Ohio

Attention: Unit TSBPA4-1

Through: AAF, Officer In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) Curtiss letter, EJD/af-487, dated 27 September 1946
(b) Curtiss letter, EJD/af-160, dated 13 March 1947
(c) Curtiss letter, RRA:HW:222, dated 20 May 1947

Enclosure: (A) Outline of Phase I Flight Test Program
(B) Cost Breakdown

1. By reference (a), the Contractor confirmed the negotiations covering subject contract which included provisions for ten hours of flight test on the first airplane and for further negotiations should the initial tests be conducted at any location other than the Contractor's plant. This Contractor recommended, in the interests of obtaining maximum safety, that the initial tests be conducted at Muroc Lake, California, and the Air Materiel Command has concurred and so amended the Letter Supplement to subject contract to cover the program accordingly. By reference (b), the Contractor submitted a detail quotation covering Phase I, Phase IA and Phase II of a recommended flight test program. In view of limited funds, the Contractor was requested to resubmit quotation on the basis of only ten hours and to reduce costs to a minimum, which was done by reference (c). As a result of discussions, conferences and negotiations in regard to references (b) and (c), and particularly discussions with the Contracting Officer on August 7, 1947, all of which have resulted in various changes in the terms and conditions of our proposal, this letter cancels and supersedes all previous quotations and the entire quotation is resubmitted herewith.

2. The Contractor quotes an increase in the fixed price of subject contract of $141,268.33 for conducting a ten hour flight test program on the first XP-87 airplane at Muroc Lake instead of at the

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Contractor's plant. An outline of the program is included herewith as Enclosure (A). A summary and detail breakdown of the above quoted price is included herewith as Enclosure (B). This quotation is based on the assumption that the proposed program will be considered complete at the end of ten hours of flight time or three months from the date of shipment of the airplane from the Contractor's plant, whichever occurs first regardless of the amount of work completed. This quotation has been increased over previous quotation, reference (c), for the following major reasons:

a. Preparatory costs at Columbus can be more accurately calculated since the work has been more clearly outlined and the cost is estimated to be higher than originally anticipated.

b. Twenty percent (20%) contingency has been eliminated as insisted upon by the Air Materiel Command.

c. Labor rates have been changed from estimated average rates to actual rates since the personnel to conduct the flight test program have been actually selected and their rates are known.

d. Overtime premium has been included only for sufficient time to cover the unloading, reassembly, ground test and first week of flight test.

e. Flying pay has been increased since the actual bonuses to be paid for first flights are now known.

3. This quotation is submitted on the basis that the following special terms and conditions shall maintain:

a. The supplement to subject contract covering this flight test program shall include provision for redetermination of price of this quote only after completion of the work with a maximum increase of not to exceed twenty percent (20%) of the total price, or $29,253.00.

b. The contract shall include recognition as an approved item of cost of overtime premium for such overtime as has been included in this quotation or as may later be approved by the Air Materiel Command.

c. All salaries and wages for personnel away from the Contractor's plant shall be treated as direct charges and overhead at a rate of thirty-five percent (35%) shall be applied thereto.

d. All travel expenses and per diem expenses have been considered as direct charges. The airplane and all other equipment and supplies (both Government and Contractor-owned) required at Muroc shall be shipped at Government expense on Government Bill of Lading

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both to and from Muroc as required. Furthermore, the airplane and other equipment shall be transported to Muroc by truck (U. S. Airplane Carriers, Incorporated, Dover, Delaware.)

e. In cases of emergency the Air Materiel Command will make every effort to place an Army-manned C-47, or similar type airplane, at the disposal of the Contractor at no cost to the Contractor.

f. Emergency equipment available will be made available to the Contractor at no expense during the period of ground runs and flight test.

g. Crane equipment will be made available at Muroc to assist in unloading the airplane, equipment and supplies.

h. Hangar and office facilities shall be made available at Muroc at no cost and living facilities for men only shall be made available at standard rates.

4. The following information and comments are furnished to assist the Air Materiel Command in reviewing this quotation:

a. This Contractor has studied the cost and reviewed the advantages of operating an Army-owned C-47 airplane under bailment contract to provide transportation between the Contractor's plant and Muroc and has come to the conclusion that it would be more economical to rely on commercial transportation. This conclusion has been reached since it is estimated to cost approximately $28,000 to operate a C-47 airplane under bailment contract for only six (6) round trips, and since excellent commercial transportation is available and is considerably cheaper. This quotation has been prepared, therefore, on the basis that no bailment airplane will be used.

b. Freight charges for transportation of the airplane, material and equipment were inadvertently included in the previous quotation but have been eliminated from this quotation.

c. Labor rates utilized for work accomplished at Columbus are rates which currently exist in this Contractor's plant for this type of work, due consideration having been given to a recent increase effective in the latter part of June in an amount of $.10 per hour. Labor costs for Muroc work have been computed on the basis of the

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actual rates of the personnel selected to go on this assignment. It must be remembered that exceptionally high-quality personnel is required for the work to be conducted at Muroc.

d. Overhead rates of one hundred sixty percent (160%) for productive and tool work and one hundred percent (100%) for engineering work have been used for work accomplished at the Contractor's plant. These rates are the same as used in the original negotiations of the subject contract. The rate of thirty-five percent (35%) applied as overhead on the labor at Muroc is to cover payroll taxes, insurance and administrative expenses.

e. As in previous quotations, the cost of the first ten hour flight test, as included in the original contract price confirmed by reference (a), has been deducted from the total cost.

Respectfully,

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J. Ducayet
Contracts Manager

cc: TSEOA-4 - Wright Field

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Enclosure (B) to Curtiss ltr. EJB/[illegible]-3[illegible]) dated August 25, 1947

ENCLOSURE (B)

Muroc Lake Flight Test Program
Phase I - Ten (10) Hours

	Columbus	Muroc	Total
EXECUTIVE:			
Material	$ 4,713.50	$30,870.00	$ 35,583.50
Labor	1[illegible],623.[illegible]	21,913.73	3[illegible],537.11
Overhead	29,397.45	1,669.80	31,067.25
Overtime Premium	---	2,159.38	2,159.38
Total	$42,734.37	$62,613.38	$105,347.75
ENGINEERING:			
Material	$ 500.00	$12,433.00	$ 12,933.00
Labor	2,600.00	16,824.00	19,424.00
Overhead	2,600.00	5,868.00	8,468.00
Overtime Premium	---	2,[illegible]4.00	2,[illegible]4.00
Total	$ 5,700.00	$37,1[illegible]4.00	$ 42,849.00
Flying Pay			$ 4,120.00
GRAND TOTAL Revised Ten (10) Hour Program			$152,316.75
Credit Original Ten (10) Hour Program			23,801.00
Total Additional Costs			$12[illegible],425.75
Profit 10%			12,[illegible]2.58
TOTAL REVISED SALES PRICE			$141,268.33

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[redacted]

...ve 2 of Enclosure (B) to
...tiss letter, SJD/tc(af-399),
dated August 25, 1947

...CLOSURE (B)

...3-17 Airplane No. 1
Lunar Lake Flight Test Program

Summary of Costs at Columbus

	Material	Labor
1. Disassembly of the Airplane and Packing for Shipment 2,430 hours @ $1.50	$1,...83.00	$ 3,763.50
2. Construction of Tools and Equipment 2,...63 hours @ $1.57 to 30 June 3,...42 hours @ $1.57 30 June fwd.	3,033.59	4,355.61 4,271.33
3. Unloading Material and Equipment upon return from Lunar ...0 hours @ $1.50	- -	$2...00
Totals	$4,7...50	$14,...41

SUMMARY

Material	$ 4,713.59
Labor Hours (9,503)	
Labor (Av. Rate $1.52)	14,...73.41
Overhead 160%	23,...37.46
Total	$42,...34.37

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...e 3 of Enclosure (B) to
...rtiss letter, EJD/tc(af-399),
dated August 25, 1947

ENCLOSURE (B)

XP-87 Airplane No. 1
Muroc Lake Flight Test Program

Summary of Costs at Muroc

		Material	Labor	Overtime Premium
1.	Personnel Transportation	$ 4,680.00	$ ---	$ ---
2.	Labor in Transit	---	2,991.40	55.30
3.	Per Diem Expense	11,709.00	---	---
4.	Unloading and Setup	4,700.00	754.00	192.60
5.	Depreservation and Reassembly	25.00	5,373.10	990.19
6.	Ground Test and Pre-Flight	1,325.00	4,563.70	688.89
7.	Flight Test	2,655.00	6,297.10	186.90
8.	Packing for Return to Columbus	115.00	1,065.40	---
9.	Automotive Equipment	2,300.00	---	---
10.	Maintenance of Automotive Equip.	2,078.00	---	---
11.	Replacement Personnel	1,288.00	363.00	56.00
	Totals	$30,870.00	$21,913.70	$2,159.88

SUMMARY

Material	$30,870.00
Labor Hours (10,948)	21,913.70
Labor (Avg. Rate $2.00 +)	2,159.88
Overtime Premium	7,669.80
Overhead 35% (Applied to Labor Only)	$62,613.38
Total	4,120.00
Flight Pay	$66,733.38
Total	

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Mod. Ltr, CR, A.F. dl Au; 47, to [redacted], ANC, subj: Engine Installation, P-87 Airplane

[redacted]

1st Ind [illegible](1.E'v-L)/P.M/ms

[illegible] Wright Field, Dayton, Ohio, 2 Sept 1947

To: Commanding General, Army Air Forces, Washington 25, D. C. ATTN: AC/AS-4

1. The latest set of performance figures submitted to the ANC by the Curtiss-Wright Corporation for the XP-87 with two Allison J-35-C5 engines, was based on the curves extrapolated from the Allison C-5 specification. These figures provided the basis for the statement in ANC teletype No. AT-124 dated 5 [illegible] 1947, that no loss of performance would result if J-35-C5 engines were installed.

2. During the time that the above data were being evaluated by the Aircraft Laboratory, the Allison Army Model A specification covering the C-5 engine, which contains thrust curves considerably more conservative than the extrapolated C-5 curves upon which Curtiss-Wright had based their preliminary performance data. Upon receipt of the Allison C-5 Model specification, the contractor submitted a second set of performance figures based on the specification, which were evaluated in the Aircraft Laboratory with the following results:

	C-1 C-5 Perf.	Aire. Lab. C-5 Perf.
[illegible] at S.L.	[illegible]	[illegible]
[illegible] at [illegible] ft.	[illegible]	[illegible]
[illegible] at S. L.	[illegible]	[illegible]
[illegible] at [illegible] ft.	[illegible]	[illegible]
[illegible] to [illegible] ft.	[illegible] min.	[illegible] min.
Normal range of cruise	[illegible] mi.	[illegible] mi.
[illegible] distance over [illegible] ft. msl.	[illegible] ft.	[illegible] ft.

3. As can be seen by a comparison of the above tabulation, the performance of the P-87 airplane with two C-5 engines as calculated by the contractor and the Aircraft Laboratory, is very similar; therefore, it is expected that the above Aircraft Laboratory data will very closely represent the performance of this airplane.

4. The following is a performance survey [illegible] the Military Characteristics for [illegible] dated [illegible], [illegible] verification. Airplane [illegible] for purposes of [illegible], the airplane [illegible] performance data.

[redacted]

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[redacted], [redacted], [redacted], [redacted], [redacted], [redacted], subject [redacted] X - [redacted].

	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	-	[redacted] ft/min.	[redacted] ft/min
[redacted]	-	[redacted] ft/min.	[redacted] ft/min
[redacted]	[redacted] min.	[redacted] min.	[redacted] min.
[redacted]	[redacted] mi.	[redacted] mi.	[redacted] mi.
[redacted]	-	[redacted] ft.	[redacted] ft.

[redacted] evaluation of the proposal indicates that there will be [redacted] in performance when the various engine specification figures are [redacted] with specific fuel consumption and thrust available, information [redacted] to determine if the action directed in Paragraph [redacted] is still desired.

[redacted]

[redacted]

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AF HQ-33 (20 MAY 44) 452.1 Pursuant to 194-47, Vol 2 11 ACC (1)

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO.	AAP
FILE NO.	452.1 (1)

SUBJECT: Designation of All-Weather Fighters 7/1/47

TO: Asst Chief of Air Staff - 4

DATE 4 - SEP 1947

COMMENT No. 1

FROM: Asst Chief of Air Staff - 3

Lt Col Johnson/mbj/72284

1. It has been noted that the designation of the XP-87 has been changed in the Sixth Edition of TSEMO Report #3, Characteristics of Experimental Airplanes, (Short Title, "Green Book").

2. The designation of the XP-87 in this publication was changed from "all-weather" to "night" fighter. Request all reference in the future to fighter aircraft used at night or during inclement weather be "all-weather fighter" and the name "night fighter" dropped as a type of fighter aircraft.

AFHRE Col Holtoner

AFHRE/F Col Stone

LELAND G. FIEGEL
Colonel, Air Corps
Executive
Assistant Chief of Air Staff-3

TO: Asst Chief of Air Staff - 3

DATE 18 Sept 1947

COMMENT No. 2

FROM: Asst Chief of Air Staff - 4

Capt Standifer/bkw/6210

1. Air Material Command has been advised as to the correct designation for the all weather (P-87) fighter.

J. S. HOLTONER
Colonel, Air Corps
Chief, Aircraft Branch
Research & Eng'g. Div. A-4

AFDRE-4F C&S

TO CENTRAL FILES - CONFIDENTIAL

9-26-47 (Date)

C.A. May (Name)

(Signature)

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File 6-16 (11)

AMC Form No 10-3
(Rev 19 Mar 45)

ROUTING AND RECORD SHEET [redacted] AIR MATERIEL COMMAND

Use this form for inter-office correspondence in headquarters.

Use authorized office symbols to designate addressor and addressee.

Place initials of dictator and typist, telephone number and location to right of signature.

Use width of sheet, both sides.

Number all comments consecutively.

Separate comments by horizontal lines across page.

SUBJECT XP-87 Airplane, C-6 Engine Installation

TO TSEOA-4 FROM TSEAC-6 DATE COMMENT NO. 2

1. As requested by Comment No. 1, the performance data on the XP-87 airplane are submitted herewith.

2. In the contractor's range calculations it was assumed that the airplane would climb to 30,000 feet on military power and cruise part way to the target at 30000 feet on normal power. As soon as the airplane weight is reduced sufficiently to permit a 35,000 ft service ceiling on normal power, the airplane would be climbed to 35,000 feet and the remainder of the flight made at this altitude. The descent was assumed to be made on course at the maximum angle of glide with the engines idling. Fuel allowances for 20 minutes of combat and a 30 minute reserve were included.

3. The range calculations made by the Aircraft Laboratory are similar to those of the contractor except for the climb to 35,000 feet. In the Aircraft Laboratory's calculations it was found that it would be possible for the airplane to climb to 35,000 feet, as in the contractor's calculations, but it would be flying at its absolute ceiling when on normal power. Since this is impractical the entire flight to the target was calculated at 30,000 feet.

4. It is believed that the range could be increased considerably if the airplane were flown at maximum miles per pound of fuel instead of at normal power, but the average speed of the mission would be decreased.

5. Included below is a comparison of the performance quoted by the contractor and the performance calculated by the Aircraft Laboratory.

	AAF	Contractor
V_{Max} at Sea Level	500 mph	574 mph
V_{Max} at 35,000 feet	517 mph	521 mph
Rate of Climb at Sea Level	[illegible] fpm	[illegible] fpm
Rate of Climb at 35,000 feet	[illegible] fpm	[illegible] fpm
Time to Climb to 35,000 feet	[illegible] Minutes	[illegible] Minutes
Range	[illegible] Miles	[illegible] Miles
Take-off Distance to Clear a 50 foot Obstacle (Std. Sea Level Conditions)	[illegible] feet	[illegible] feet

[redacted]

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COORDINATION
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ADJUTANT GENERAL
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CHIEF OF ADMIN.
AIR INSPECTOR
PUBLIC RELATIONS
JUDGE ADVOCATE
PERSONNEL (T-1)
INTELLIGENCE (T-2)
ENGINEERING (T-3)
SUPPLY (T-4)
PLANS (T-5)
BASE C.O.
OTHER

AMC Form No. 10-508
(Rev 2 Apr 47)
(PRINT SYMBOL, DATE AND INITIALS IN APPROPRIATE BLOCK)

[redacted]4)

TSSOA-4/OBT/hw

7 SEP 10 12:05

10 September 1947

Contract W33-038-AC-6266, XP-87 Airplane, Engineering Acceptance Inspection

Commanding General
Army Air Forces
Washington 25, D. C.
ATTN: AC/AS-4

1. The Engineering Acceptance Inspection on the Curtiss-Wright XP-87 airplane is scheduled to begin on Tuesday, 30 September 1947, at the contractor's plant, Columbus, Ohio.

2. The XP-87 is one of the two all weather fighters currently being procured, based on the Military Characteristics for an All Weather Fighter, dated 23 November 1945, revised 8 October 1946. The airplane to be inspected is equipped with a dumay nose housing flight test instrumentation in lieu of the specified power turret since the turret is currently under development by Martin Aircraft Corporation and will not be available for 18 months to 2 years. Certain items of radio and radar equipment not necessary for flight testing are also omitted from the No. 1 airplane. The second article which will be delivered approximately 3 months hence, will be complete with all tactical equipment currently available and will be equipped with a working mock-up turret capable of being remotely controlled from the cockpit and fired from any position in the forward hemisphere. It is believed that a degree of tactical evaluation may be accomplished on the second article by making use of the mock-up turret.

3. It is requested that this office be notified as soon as possible the name and rank of all personnel from Hq. AAF and the BuAero who will attend the inspection in order that final organization of the inspecting party may be accomplished and adequate accommodations arranged.

FOR THE COMMANDING GENERAL:

GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
[redacted]ineering Division

Cy to:
Fighter Br., Proc. Div.

MX-745

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HEADQUARTERS, ARMY AIR FORCES
Washington

In Reply Refer To:
AFIRE-4F

11 September 1946

SUBJECT: Designation of All-Weather Fighters

TO: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: Chief of Administration

1. The Sixth Edition of TSEMG Report No. 3, Characteristics of Experimental Aircraft, refers to the XP-67 aircraft as a night fighter.

2. Attention is invited to the latest "Military Characteristics of Aircraft" (revised 8 October 1946) which refers to this type aircraft as an All-Weather Fighter with the assigned mission of executing fighter and intruder missions during periods of darkness and during periods of inclement weather.

3. It is requested that this type aircraft be referred to as All-Weather Fighters to avoid confusion. The mission of the All-Weather Fighter is believed to define its use.

By command of General SPAATZ:

L. C. CRAIGIE
Major General, U.S.A.
Chief, Research & Engrg Div.
AC/AS-4

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PERSONNEL (T-1)
INTELLIGENCE (T-2)
ENGINEERING (T-3)
SUPPLY (T-4)
PLANS (T-5)
BASE C. O.
OTHER

AMC Form No. 10-508
(Rev 2 Apr 47)
(PRINT SYMBOL, DATE AND INITIALS IN APPROPRIATE BLOCK)

TSEOA-6/EJT/mch

15 September 1947

Contract (33-038) AC-6266, XB-87 Aircraft, Early Flight Operation of X24C Turbo Jet Engines

Curtiss-Wright Corporation
Airplane Division, Columbus Plant
Columbus, Ohio

1. The following recommendations relative to the early flights of airplanes incorporating XJ34-WE Turbo Jet Engines have been forwarded this Command by the Westinghouse Company: This Command concurs in these recommendations and requests that they be complied with by the Contractor.

a. "In each prototype airplane installation, the engine should be instrumented to determine the flow distribution at the inlet to the compressor. It is essential that the flow variations over the cross-section of the compressor inlet be kept to a minimum. The maximum tolerable variation in flow distribution at the inlet has been specified as a 5% pressure variation. Once a prototype installation has been instrumented and tested, and the test results accepted by the cognizant agency, this instrumentation is no longer required.

b. "It is recommended, for the present time, that maximum flight speeds be limited on the basis of compressor inlet air density to the following:

Altitude	True Airspeed
Sea Level	524 knots (650 MPH)
10,000 feet	720 knots (830 MPH)
20,000 feet	870 knots (1000 MPH)

c. "The maximum lubricating oil temperature (leaving the bearings) should not exceed 255° F. (140° C) for the X24C-4B and J34-WE-22 (-24, -26, -7, -9) model engines. For the X24C-2 and X24C-4A types the following maximum bearing temperatures are allowable:

#1 Bearing	275° F. (135° C)
#2 and #3 Bearing	375° F. (190° C)

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Ltr, AMC, dated 15 Sep 47, to Curtiss-Wright Corp., Columbus, Ohio, subj: "Contract AC-6266, XP-87, Early Flight Operations of X24C Engines"

It is recommended that the pilot's panel instruments for indicating these temperatures be red lined.

d. "The previous requirement that the turbine wheel be inspected after each forty-five (45) minutes of military operation should be continued."

2. It is important that all data on engine performance at high speeds and altitudes be made available to this Command at the earliest possible date in order that it may be used in furthering the development of the Westinghouse engine.

FOR THE COMMANDING GENERAL:

GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

cy AAF CIC
Dayton AAF PFO

COORDINATION
CO OR DEP CO
AMC Form No. 10-508
(Rev 2 Apr 47)
(PRINT SYMBOL, DATE AND INITIALS IN APPROPRIATE BLOCK)
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AF MD-33 (20 MAY 44)

HEADQUARTERS ARMY AIR FORCES

C.17.

ROUTING AND RECORD SHEET

TALLY NO	DRE 1
FILE NO.	17

SUBJECT: Military Characteristics for Fighter Aircraft

TO: Research & Engineering Div, AC/AS-4
(Attn: Mr. Graichen)

DATE: 23 Sep 47

COMMENT NO. 1

FROM: Requirements Division, AC/AS-3

Lt Col Johnson/mbj/71715

The attached military characteristics for Penetration and All-Weather Fighters have been approved by the Aircraft Weapons and Munitions Board for study and research. Request necessary action be taken by your Division.

2 Incls
As desc

/s/ L. O. Peterson

LESLIE O. PETERSON
Colonel, Air Corps
Acting Chief, Requirements Division

452.1 Pursuit

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45-1 Feb 46 - 1948 Vol. I

[redacted]

23 Sep 1947

SUBJECT: Military Characteristics for Aircraft

TO: Assistant Chief of Air Staff - 4

1. The following Military Characteristics for military aircraft of the All-Weather Fighter Type are approved for study and research:

a. Class - High performance fighter, capable of diversified operations in all kinds of weather.

b. Mission - The destruction of enemy air forces and of tactical targets during periods of night and inclement weather.

c. Requirements -

(1) Performance -

(a)	High speed at 30,000 ft	600 knots
(b)	High speed at Sea Level	600 knots
(c)	Climb to 30,000 ft	45 min.

Remarks: The above requirements are to be with full internal fuel, normal design armament, radio and accessories installations. War emergency rating may be used to reach the above requirements.

(d)	Combat Radius of Action at 10,000 ft	670 nautical mi.
	At best operational altitude	1300 nautical mi.

Remarks: Maximum combat radius of action will be based on climb to best operational altitude, then cruise out at 435 knots at best operational altitude to the target and engage in combat over the target for 15 minutes at Military Rating and 5 minutes at War Emergency Rating. Cruise back at 435 knots at best operational altitude and arrive over home base with fuel for 30 minutes operation at minimum consumption at an altitude of 10,000 feet. Combat radius of action at 10,000 ft will be based on climb to 10,000 ft, then cruise out 670 nautical miles at 435 knots and return to 10,000 ft, and arrive over home base with fuel for 30 minutes operation at minimum consumption at an altitude of 10,000 ft. The above requirements are to be met under the same load conditions as specified for high speed and climb, with the addition of the necessary external fuel to realize the combat radius of action.

(e) Performance priorities - If overall requirements have been met and additional performance can be realized, it is desired that consideration be based on (1) range (2) speed, and (3) altitude, in that order.

Encl #2

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Mil Char for Aircraft (All-Weather Fighter)

(f) Flying Characteristics - The highest degree of controllability and maneuverability possible is desired. Ability to accomplish sustained dives at steep angles is required throughout the altitude operating range.

(2) Armament -

(a) To include the most effective weapons available.

(3) Gunsight - The best available computing and automatic ranging gunsight which is adaptable for use in connection with air-to-air rocket firing, air-to-ground rocket firing, and dive bombing is required.

(4) Ground Attack Installations - Provisions are required for the installation of a minimum of two bombs in all standard sizes up to 1000 lbs. Provisions shall also be made for the installation of a minimum of eight rockets. Consideration should be given to the versatility of these and other ground attack installations in conjunction with the external fuel tank provisions so that as many alternate combinations as possible may be used.

(5) Guided Missiles - Consideration shall be given to the installation of air-to-air and air-to-ground guided missiles.

(6) Armor - Protection against fragmentation is required to protect the pilot and extremely vulnerable portions of the power plant.

(7) Crew - Pilot and radar observer-navigator.

(8) Fuel -

(a) Internal - All internal fuel will be in tanks capable of self-sealing with the type of fuel carried.

(b) External - Total fuel required externally for maximum combat radius of action problems will be only that amount required to climb to altitude from points of take-off and cruise to initial arrival over target. There will be provision for carrying external fuel a sufficient number of bomb suspension points to meet maximum combat requirement. Such provisions must be capable of use at all operational altitudes.

(9) Equipment -

(a) Cabin pressurization - Automatic pressurization will be provided and maintained at a safe differential of pressure.

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Mil Char for Aircraft (All-Weather Fighter)

(b) Automatic pilot - An automatic pilot is required.

(c) Oxygen system - A pressure demand system will be installed in accordance with existing specifications.

(d) Crew comfort -

1. Provisions for at least one quart of thermos-contained liquid foods is required for each crew member of aircraft assigned to missions of four to six hours' duration. Provisions of two quarts per crew member is required for aircraft assigned to missions of more than six hours' duration. These containers will be mounted with hose "leads" for dispension of the liquids to the crews.

2. Provisions shall be made for maximum extension of the pilot's legs for comfort.

3. An adequate crew relief system will be provided.

(e) Radio - The latest type of communications and radar equipment suitable for this type aircraft will be installed. Facilities required are as follows:

1. Ground-to-air and air-to-air communications.

2. Long range navigational equipment.

3. Identification friend or foe.

4. Warning, interception and short range navigational equipment.

5. Blind landing equipment operated automatically and manually.

(f) Camera - A radar scope camera will be installed.

(g) Instruments - All instruments necessary for the proper performance of the mission of the aircraft are required. Consideration will be given to wind screen projection of all the instruments that are necessary when tracking an enemy aircraft under instrument flying conditions.

(h) Heating system -

1. An air conditioning system is required for the pilot and the radar observer compartments.

2. Heating of all airfoil surfaces sufficient to keep these surfaces free from ice formations is required.

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Mil Char for Aircraft (All-Weather Fighter)

(i) Flight brake - A means of rapid deceleration of aircraft upon closure with the enemy will be provided.

(j) Crew escape - Provision for emergency ejection of crew members will be required.

(k) Taxi light - A taxi light will be installed.

(l) Fire extinguisher - A fire extinguishing system will be provided.

(10) Structure and Design Features -

(a) Visibility - The forward downward visibility over the nose when the pilot's eye is aligned with the gunsight will not be less than 12°.

(b) Aircraft will be capable of being towed through the nose gear.

(c) Maintenance - Ease of field maintenance, repair, and replacement of parts will receive major consideration. Design and construction of the aircraft should be such that the time required to change a single power unit under field conditions shall not exceed thirty minutes. Conduits and control systems shall be arranged and designed so that they may be connected and disconnected quickly.

(d) Consideration should be given to the incorporation of suitable mounting facilities for attaching rocket boost units for assisted take off. These mounting mechanisms should contain a device for quick release of the rocket units by the pilot; they should furthermore be automatically recessible into the aircraft structure upon release of the rocket units.

(e) Fire prevention - Emphasis must be placed on reduction of fire hazards through engineering design. Fire extinguishing systems must be easily operated in flight to control engine fire. A maximum reduction of fire probability through battle damage must be attained by careful engineering.

(f) Simplicity of design and suitability to quantity production should be emphasized.

FOR THE COMMANDING GENERAL:

/s/ LCP
LESLIE O. PETERSON
Colonel, Air Corps
Acting Chief, Requirements Division
Office of Asst. Chief of Air Staff-3

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

Subject: [illegible]

To: [illegible]

Attention: [illegible]

Through: [illegible]

References: [illegible]

Enclosure: [illegible]

1. By reference (b) [illegible] submitted [illegible] designing, fabricating, and installing [illegible] airplane No. [illegible] in general accordance with the [illegible] by reference (a). However, subsequent to receipt of reference (b), which indicated that contractual coverage for this item could not be issued until a later date, it was decided to proceed with the fabrication and installation of a nose shell for No. [illegible] in anticipation of [illegible] this nose shell for No. [illegible] Airplane, [illegible] program be accomplished in two phases. [illegible]

2. Therefore, this contract submits herewith a revised quotation for designing, fabricating, and installing [illegible] total price increase of $[illegible]. This proposal is based [illegible] the manufacture of a turret as proposed by references (b) and (c) which will [illegible] [illegible] [illegible]

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Materiel Command so desires. In addition, Enclosure (A) reflects a credit of $o,542.16 for not installing a GFE nose turret on No. 2 Airplane. The net charge which results is contained in Column 4 of Enclosure (A). The Air Materiel Command's attention is invited to the fact that three different engineering labor rates have been used in compiling this quotation. This application of varying rates is necessary because of the successive labor rate increases which have occurred in this Contractor's Engineering Department since the inception of the subject turret program.

4. As noted in reference (b) this quotation is predicated on the assumption that 20 mm guns, gun chargers, and ammunition will be provided as GFE. All other items such as feed chutes, ejection chutes, et cetera will be furnished by the Contractor.

5. It is requested that authorization be extended to submit at a later date a quotation concerning the weight and performance changes which will result from incorporation of this turret in No. 2 Airplane, inasmuch as the present design status does not permit accurate determination of such data at this time.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

20 SEP 1943

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ENCLOSURE (A)

XP-67 AIRPLANE NO. 2

Revised Nose Turret Estimate

COLUMN	I PHASE "A"	II PHASE "B"	III CREDITS	IV NET TOTAL
PRODUCTIVE				
Material	$ 340.55	$ 14,170.89	$ (32.00)	$ 14,479.44
Labor Hours	(1,674)	(6,199)	(280)	(7,593)
Labor @ $1.57/hr	2,628.18	9,732.43	411.00)	11,949.01
Overhead @ 160%	4,205.09	15,571.89	(658.56)	(19,118.42)
Total	$ 7,173.82	$39,475.21	$(1,102.16)	$45,546.87
TOOLING				
Material	$ 234.74	$ 176.83		$ 416.57
Labor Hours	(991)	(903)		(1,554)
Labor @ $1.57/hr	1,555.87	883.91		2,439.78
Overhead @ 160%	2,489.39	1,414.29		3,903.65
Total	$4,285.00	$2,475.00		$ 6,760.00
ENGINEERING				
Labor Hours	(920 hrs @ $1.70/hr) (831 hrs @ $1.50/hr) (1,449 hrs @ $1.90/hr)	(850 hrs @ $1.70/hr) (671 hrs @ $1.80/hr) (4,677 hrs @ $1.90/hr)	(160 hrs @ 1.70/hr)	
Labor	5,812.90	11,549.30	$(2,720.00)	$14,642.20
Overhead @ 100%	5,812.90	11,549.30	(2,720.00)	14,642.20
Total	$11,625.80	$23,098.60	$(5,440.00)	$29,284.40
GRAND TOTAL	$23,084.62	$65,048.81	$(6,542.16)	$81,591.27
Profit @ 10%				8,159.13
SALES PRICE				$ 89,750.40

Productive Labor under Column III is based on the original contract rate of $1.47/hr.

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Curtiss-Wright Corp., Airplane Div.,
Columbus, Ohio

Supplement No. 1 to
Contract W 33-038 ac-6266

x
x
x
x
x
x
x
x

Approval recommended:

JUL 25 1947

RALPH P. DUNN
Deputy Chief, Procurement &
Industrial Planning Division
Office, Ass't Chief of Air Staff - 4

OCT 3 - 1947

APPROVED: _____
By direction of the Under Secretary of [illegible] under the provisions of Public Law 703, 76th Congress (as amended by Section 13 of Public Law 580, 77th Congress); Title II of the First War Powers Act, 1941 and Executive Order No. 9001, 27 December 1941.

PHILLIPS W. SMITH
Colonel, GSC
Chief, Current Procurement Branch
Procurement Group, [redacted] G-S&CSA

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[illegible] dictated by
[illegible] Division (T-1104-4)

AP: [illegible] indicated by
Captain R. [illegible] Williams (T-1104-4)

Supplemental Agreement No. 1 (-17-01)
to Letter Contract W-535 ac-6266 (12-7-44)

Classification: C1

AC's: 3[illegible], 45764, 2-1975

SUPPLEMENTAL AGREEMENT
TO
COST-PLUS-A-FIXED-FEE
CONTRACT FOR SUPPLIES

(ARMY AIR FORCES)

WAR DEPARTMENT

WDMcC:jba

CONTRACTOR: CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION)

SUPPLEMENTAL AGREEMENT FOR: Certain Phase I Work Performed in Connection with XA-43 Airplanes; Two (2) A-57 Airplanes Spare Parts, Mock-Up, Wind Tunnel Models and Data.

CONTR. IN PRICE: Increase: Not to Exceed $9,107,020.32
Less Funds Previously Obligated 366,791.00
Net $8,740,229.32

Payments to be made by the Finance Officer, U. S. Army, Army Base, Brooklyn, New York.

The supplies and services, if any, to be obtained by this instrument are authorized by, are for the purpose set forth in, and are chargeable to the allotments below enumerated under the heading "Debit", the available balances of which are sufficient to cover the cost thereof.

Debit:	21/70705, 702-7304 P 611-37 S 33-038	$ 75,000.00
Debit:	212/60705, 662-2000 P 611-37 S 33-038	$3,035,283.80
Debit:	212/60705, 502-5150 P 611-37 S 33-038	$5,629,945.52
	Net	$8,740,229.32

Plus Previously Obligated
Debit: 212/50705, 502-5150 P 611-37 S 33-038 . . . . $ 366,791.00

This Supplemental Agreement supersedes Letter Contract dated 22 May 1945, as amended, except Amendments 18 and 22 thereto, and designated as Supplement to Letter Contract No. W-038 ac-6266.

Contractors' invoices, or VSD's used as invoices, shall be made out to the Finance Officer designated to make payments hereunder, and shall be sent by the Contractor, for record use, to the Dayton AAF Procurement Field Office, Wright Field, Dayton, Ohio (ISXAF) which has been designated as the place of AAF administration for this contract.

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SUPPLEMENTAL AGREEMENT TO
COST-PLUS-A-FIXED-FEE CONTRACT
FOR SUPPLIES

THIS SUPPLEMENTAL AGREEMENT No. 1 (S-17591) to Contract No. W 33-038 ac-6266 (13235), entered into this 13th day of March, 1947, by and between THE UNITED STATES OF AMERICA, hereinafter called the "Government", represented by the Contracting Officer executing this Supplemental Agreement*, and CURTISS-WRIGHT CORPORATION (AIRPLANE DIVISION), a corporation organized and existing under the laws of the State of Delaware, of the City of Columbus, in the State of Ohio, hereinafter called the "Contractor",

W I T N E S S E T H

WHEREAS, the parties hereto have heretofore entered into Cost-Plus-A-Fixed-Fee Contract No. W 33-038 ac-6266, dated 28 April 1945 and approved 24 May 1945, which contract (hereinafter called the "Supplies Contract") provides among other things for the furnishing to the Government of certain engineering services and data and a certain Wind Tunnel Model, Report and Mock-up; and

WHEREAS, the Government desires to obtain and the Contractor is willing to furnish and deliver to the Government two (2) XP-87 Airplanes and Spare Parts, Mock-up, Wind Tunnel Models and data, in lieu of certain items of work called for under Letter Contract dated 22 May 1945 (as amended by Amendment No. 1 thereto) and designated as Supplement to Letter Contract No. W 33-038 ac-6266; and

WHEREAS, said Letter Contract dated 22 May 1945 contemplating a cost-plus-a-fixed-fee form of definitive contract was further amended by Amendment No. 6 thereto in contemplation of a fixed price form of definitive contract; and

WHEREAS, the Government and the Contractor agree to convert the Supplies Contract to a fixed price basis; and

WHEREAS, after consideration of all factors deemed relevant to the conversion of this contract from a cost-plus-a-fixed-fee to a fixed price basis, and after reasonable price analysis, the terms and conditions set forth in this Supplemental Agreement have been found to be reasonable under all the known circumstances;

NOW, THEREFORE, in consideration of the premises and of the mutual covenants and agreements herein contained, and for other good and valuable considerations, it is hereby agreed that the Supplies Contract is amended, modified and supplemented as follows:

* This Supplemental Agreement has been negotiated pursuant to Public Law 7.3, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

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SECTION I

This Supplies Contract is hereby amended by deleting all of the provisions thereof and inserting in lieu thereof the following, comprising Articles 1 to 35, inclusive, 35-A, 36, 36A and 37 to 46, inclusive, hereinafter set forth, it being understood that, except as provided in Sections II to VII, inclusive, of this Supplemental Agreement, the rights and obligations of the Government and the Contractor shall be the same as if the Supplies Contract had originally been written as so amended.

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ARTICLE 15. - Articles and Services to be Furnished - (a) The Contractor shall furnish and deliver to the Government all of the following articles and services in the quantities and at the prices set forth below:

Item 1a - Wind Tunnel Model of airplane designated as Curtiss-Wright Corporation Model No. 52 and Air Model YA-[illegible], conforming to Contractor's Specification No. [illegible], dated 23 October 1944, to the extent applicable, said Specification being hereby made a part hereof, to be constructed to scale for testing in a 7 by 10 ft. Wind Tunnel, and the Wind Tunnel testing thereof by Contractor at California Institute of Technology at Pasadena, California and at Massachusetts Institute of Technology, Cambridge, Massachusetts.

The Wind Tunnel Test program to be conducted by the Contractor shall be such that it will satisfactorily determine the following:

(a) The lift and drag polars of the airplane for the various possible flight configurations.

(b) Compliance of the Airplane with the requirements of Specification C-1875.

Item 1b - Report analyzing the Wind Tunnel tests to be conducted pursuant to Item 1a hereof, to be submitted in triplicate in non-reproducible form.

Item 1c - Mock-Up of the A/F Model YA-[illegible] (Contractor's Model No. 7) constructed in accordance with the applicable requirements of Handbook of Instructions for Mock-Up Inspectors, Eighth Edition, Revision No. 7, dated 1 November 1943, including Amendment No. 1, dated 15 March 1944.

Item 1d - Preliminary engineering services in connection with the design, development and construction of the Wind Tunnel Model and Mock-Up of the A/F called for by Items 1a and 1c hereof.

Item 1e - Data to be furnished:

(A) Photographs of the Mock-Up called for by Item 1c hereof sufficient to show all the installations and features thereof, in triplicate.

(B) Model Specification for the A/F Model YA-[illegible] Airplane (Contractor's Model No. 7) prepared in accordance with the requirements of AAF Specification No. 1601-1, dated 18 November 1944.

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(C) Drawing of the YA-[illegible] setting forth the general arrangement thereof, consisting of front, side and top views and containing the following additional information:

1. Overall dimensions of the airplane.
2. Span of wings.
3. Length of each panel.
4. Chord of each panel (in the case of tapered wings, the root and tip chords).
5. Incidence of wing (degrees, at root and tip).
6. Dihedral (degrees).
7. Sweepback (degrees).
8. Location of wing in relation to thrust line.
9. Mean aerodynamic chord length and location from leading edge of wing and thrust line.
10. Span, Chord, and location of each aileron, including hinge line location, together with angular movement (dimensioned in degrees) above and below neutral.
11. Span, chord, and location of each tab, together with angular movement (dimensioned in degrees) to each side of neutral.
12. Over-all dimensions of tail surfaces.
13. Location of hinge lines of tail surfaces.
14. Span and chord of each tail surface, together with angular movement (dimensioned in degrees) to each side of neutral.
15. Total wing area.
16. Area of each wing (including ailerons).
17. Total aileron area.
18. Area of each aileron.
19. Area of each horizontal tail surface, and total area of horizontal tail surfaces (stabilizers and elevators).
20. Area of each vertical tail surface, and total area of vertical tail surfaces (fin and rudders).
21. Center of gravity locations for the design gross weight condition with the alighting gear retracted and extended. Center of gravity travel; that is the extreme forward and extreme rearward positions in which the airplane is likely to be flown with the alighting gear retracted or extended, whichever results in the greatest center of gravity movement. (A total of four center of gravity locations). The center of gravity is dimensioned from the leading edge of the wing at root chord and from the thrust line.
22. Size of alighting gear wheels and tires.
23. Tread of wheels
24. Wheel Base.
25. Deflection of alighting gear shock absorbers and tires, both above and below static position.
26. Angle between thrust line and ground line, the latter being a line tangent to the deflected alighting gear tires with the weight of the airplane on the wheels.

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27. Angle between line normal to thrust line and the line passing through the point of wheel to ground contact and design gross weight center of gravity.
28. Location of engine nacelles.
29. Location, span, and chord of all lift and drag increasing devices, together with the dimensions of their movements.
30. Airfoil section designations (root and tip, and any intermediate variations thereof).
31. Weight empty, design useful load, and design gross weight.
32. Maximum alternate useful load and maximum alternate gross weight.
33. Any other alternate useful loads and gross weights applicable to combinations of loads other than specified in 31 and 32 above such as used for maximum range, maximum range with reduced bomb load, maximum load with reduced range, et cetera, when applicable.
34. Manufacturer's model number of airplane.
35. Engine model designation.

Drawings shall be made to an appropriate decimal scale (such as 1:20, 1:30, or 1:40) so that the three view drawing will be approximately 36 by 60 inches.

(D) Inboard profile drawing of the XA-43 with the necessary cross sectional views to show interior and general structural arrangements.

(E) Installation assembly and perspective drawings of the XA-43, prepared in sufficient detail to indicate compliance with all applicable specifications. The perspective drawings shall be superimposed on a silhouette of the airplane and the dimension thereof shall be approximately 11 1/2 by 17 inches. These drawings shall cover all of the following subjects:

1. Fuselage Structure
2. Wing Structure
3. Empennage Structure
4. Alighting Gear
5. Flight Controls, including Automatic Pilot
6. Defensive Armament
7. Armor and Flak Protection
8. Ice Removal System
9. Power Plant, Including Quick Detach Features
10. Fuel System
11. Lubrication System
12. Hydraulic System
13. Bomb Provisions
14. Bombing Sight, Radar and/or Optical
15. Communication System
16. Photographic Equipment
17. Navigation Equipment
18. Pitot and Engine Instruments

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19. Electrical System
20. Oxygen System
21. Crew Compartment Supercharging and Air Conditioning System.
22. Hoisting and Jacking Provisions
23. Any new or novel features.

(b) Aerodynamic report covering the B-43, which shall include, but need not be limited to, the following data:

a. Physical characteristics.

Weights

(1) Design gross weight
(2) Maximum alternate gross weight

Fuel

(1) Normal
(2) Maximum

Bombs

(1) Normal
(2) Maximum

Areas

(1) Wing
(2) Horizontal Tail
(3) Aileron area forward of hinge line
(4) Aileron area aft of hinge line
(5) Vertical tail area
(6) Rudder area aft of hinge line
(7) Rudder area forward of hinge line
(8) Elevator area aft of hinge line
(9) Elevator area forward of hinge line
(10) All tab areas

Span

(1) Wing
(2) Horizontal tail

Aspect Ratios

(1) Wing
(2) Horizontal tail
(3) Vertical tail

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Airfoil Sections

(1) Wing
(2) Horizontal tail
(3) Vertical tail

Type of tabs

(1) Elevator
(2) Rudder
(3) Aileron

Type of control surface balance

(1) Elevator
(2) Rudder
(3) Aileron

Tail lengths

(1) Distance from design c.g. to aerodynamic center of horizontal tail.
(2) Distance from design c.g. to aerodynamic center of vertical tail.

Angular deflections of all control surfaces

Graphs showing kinematic relations hip between cockpit control deflections and deflections of all control surfaces under no load conditions.

Lift and drag increasing devices

(1) Type
(2) Description
(3) Dimensions and maximum deflection angles

Determination of mean aerodynamic chord of:

(1) Wing
(2) Horizontal Tail
(3) Vertical tail

c.g. data

(1) Design
(2) Maximum forward
(3) Maximum aft

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b. Performance Data

Graphs of lift coefficient versus drag coefficient for the complete airplane in the normal flight condition, in the takeoff condition, and in the landing condition. The effects of compressibility on the drag should be considered. Corrections should be based upon data obtained from high-speed wind tunnel tests if available. If no high-speed wind tunnel data are available, the drag corrections for compressibility should be based on the generalized drag data taken from high-speed wind tunnel tests on other models or upon flight data, if available, of other airplanes.

Details of range and endurance calculations; stalling speed calculations for normal flight configurations and for landing configurations, power- ; take-off and landing distance calculations, including ground run and total distance over 50-foot obstacle.

Graphs of the following at various gross weights including the design gross weight, the maximum take-off gross weight and the minimum landing gross weight:

High speed Vs. Altitude
Rate of climb vs. altitude
Time of climb vs. altitude
Service ceiling with all engines and one-half engines
Landing distance over 50 ft. obstacle
Miles per pound of fuel vs. speed and altitude
Maximum range
Range (gross weight with design fuel and bomb load) vs. average airspeed.

c. Stability and Control Data.

Estimate of the following data on longitudinal stability and control, giving methods used:

(1) Center of gravity locations for neutral static longitudinal stability, stick-fixed, stick-free, and maneuvering (stick force per g) for the following conditions:

(a) Normal rated thrust, normal flight condition
(b) Power-off (idling), normal flight condition
(c) Normal rated thrust, landing condition.

(2) Curve of stick force per "g" versus c.g. position for 10,000 and 25,000 feet for the airplane in the normal flight condition, with normal rated thrust at the design gross weight.

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(3) Elevator angle and force required to achieve $C_{L_{max}}$ in the presence of the ground, power-off, flaps down, gear down, at the most forward c.g. with the airplane trimmed for zero stick force at $1.4\ V_{stall}$.

(4) Elevator angle required to trim at $1.4\ V_{stall}$ flaps down, gear down, power-off, not in the presence of the ground, at the most forward c.g.

(5) Characteristics of any adjustable stabilizer or other longitudinal trimming device other than pure trim tab.

Estimate of the following data on directional and lateral stability and control, giving methods used:

(1) Slope of yawing and rolling moment coefficients versus angle of yaw ($dC_n/d\Psi$ and $dC_l/d\Psi$) for normal rated thrust and power-off conditions.

(2) Rudder power ($\partial C_n/\partial \delta_r$) for normal rated thrust and power-off conditions.

(3) Rudder and aileron deflection and rudder and aileron force necessary to trim airplane with zero sideslip at $1.2 V_{stall}$, gear and flaps down, with one outboard engine windmilling and the remaining engines delivering full take-off thrust.

(4) Aileron effectiveness (i.e., $pb/2V$ for full aileron deflection). Calculate variation of rolling velocity versus indicated airspeed at 10,000 feet for stick force limitation of 50 pounds or a wheel force limitation of 80 pounds up to limit diving speed. Account should be taken of wing twist.

(G) Structural criteria report covering the YA-13, which shall include, but need not be limited to, the following:

1. Resume of performance
2. Resume of weights and balances
3. Airfoil data
4. V-n diagrams for critical design conditions
5. Statement of basic conditions for stress analysis
6. Description of any special design conditions

All of the data called for by sub-items (C) through (G) hereof shall be furnished in triplicate in non-reproducible form. The Specification called for by sub-item (B) shall be furnished as follows: One reproducible copy and two blueprint copies thereof.

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Item 2 - AAF Model YA-43 airplanes, in accordance with Contractor's Specification No. 9573, dated [illegible] Feb 1945, and including all engineering drawings and reports as follows:

(a) One (1) Stripped Flight Article.

(b) One (1) completely equipped Flight Article.

Contractor warrants that all work under this Item 2 ceased on or before 30 October 1945.

Item 3 - Test Models for the AAF Model YA-43 airplane in accordance with the following:

(a) Nacelle model, 1/5-scale, to develop nacelle and wheel fairing, fillets, ducts and duct lips, exit screen for test in Curtiss 8-foot wind tunnel.

(b) Isolated horizontal tail model, 1/4-scale to develop balancing devices, determine effectiveness and minute movements, for test at N.A.C.A.

(c) High speed tunnel model, approximately 1/8-scale for determining high speed control and stability, aerodynamic loading, and compressibility effects for test at NACA.

(d) Revised stability model, 1/10-scale for further low speed stability and control tests, to be tested at N.A.C.A. or "ALCI" tunnels, depending on availability.

(e) Two-dimensional tunnel model of wing section (two required) for development of flap and aileron, to be tested by N.A.C.A.

(f) Isolated empennage model, to be tested at high speed, for detail control surface design to provide satisfactory high speed characteristics, to be tested by NACA.

(g) Half span wing model for tests of flap, aileron, spoilers, and dive flaps, and for development of fillets and nacelle fairing at high speeds, to be tested by NACA.

(h) Flutter model of wing for test in Curtiss 8-foot wind tunnel.

(i) Flutter model of horizontal tail and portion of fuselage, for test in Curtiss 8-foot wind tunnel.

The Contractor warrants that all work under this Item 3 ceased on or before 30 October 1945.

Item 4 - One (1) Model W-1340 Aircraft Engine installed and ground tested in a ground testing installation.

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The Contractor warrants that all work under this Item 4 ceased on or before 30 October 1945.

The articles and services called for in Items 1 to 4, both inclusive, shall be furnished at a price of . . . . . $863,959.32.

Item 5 - One (1) AAF Model XF-87 Airplane to be constructed in accordance with Contractor's Preliminary Specification No. 9566, dated 15 September 1945, including Revision A, dated 1 January 1946, and all applicable engineering data, drawings and reports in accordance with Contractor's Report No. 29-A-1 dated 1 January 1946, including flight test instrumentation, but omitting certain installations and equipment as specified. At a price of . . . . . $5,283,862.00.

Item 6 - One (1) XF-87 Airplane to be constructed in accordance with Contractor's Preliminary Specification No. 9566, dated 15 September 1945, including Revision A, dated 1 January 1946, and all applicable engineering data, drawings and reports in accordance with Contractor's Report No. 29-A-1, dated 1 January 1946. At a price of . . . . . $2,666,727.00.

Item 7 - One (1) complete mock-up of the AAF Model XF-87 Airplane described in Item 5 above. At a price of . . . . . $ 169,413.00.

Item 8 - Wind Tunnel Models of the AAF Model XF-87 Airplane, described in Item 5 above, as specifically listed in Contractor's Report No. 29-A-1, dated 1 January 1946, hereby made a part hereof. At a price of . . . . . $ 48,060.00.

Item 9 - Data in accordance with Contractor's Report No. 29-A-1, dated 1 January 1946, and referred to above. The price of the data called for under this Item 9 is included in the price of the airplane called for under Item 5.

Item 10 - Such spare parts for the airplanes called for under Items 5 and 6 above as the Government may become obligated to take delivery of pursuant to the provisions of Appendix I, entitled "Spare Parts Provisioning Appendix for use in Connection with Contracts for Experimental Aircraft" attached hereto and hereby made a part hereof. Such spare parts shall be listed in a spare parts exhibit, in accordance with the provisions of said Appendix I and said Exhibit shall be attached to and made a part of this contract as Exhibit "A". If, as provided in said Appendix I, partial spare parts exhibits are compiled and approved from time to time, the first such partial exhibit shall, however, be attached hereto and made a part hereof as "Exhibit 'A', Part I", the second such list shall be attached hereto as "Exhibit 'A', Part II", and so on. The total amount to be paid for the spare parts delivered hereun or shall not exceed . .$ 75,000.00.

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(b) The Contractor shall prepare the Wind Tunnel Model, called for by Item 1a of paragraph (a) hereof, for shipment to and return from California Institute of Technology in such manner as may be directed by the Contracting Officer and shall submit requests for bills of lading covering such transportation to the Commanding General, ATSC, Eastern District, 67 Broad Street, New York, New York, or otherwise as may be specified in writing to the Contractor by the Commanding General.

(c) The Contractor may, with the approval of the Contracting Officer, make such alterations in the wind tunnel model and the mock-up called for by Items 1a and 1c of paragraph (a) hereof as may be necessary in connection with the performance of the work called for hereunder.

(d) Contractor shall serially number the airplanes called for by Items 5 and 6 of paragraph (a) thereof with serial numbers to be assigned by the Contracting Officer.

(e) All references in any Government specification incorporated herein to other Government specifications shall be deemed to include all specifications supplementary to or superseding the specifications so referred to, to the extent that such supplementary or superseding specifications are in effect at the date of Contractor's latest quotation, if the Contractor was furnished or otherwise notified of the existence of such supplementary or superseding specification at the time of said quotation.

(f) It is understood that the efficient use by the Government of the supplies called for hereunder requires that the data called for hereunder be delivered not later than the time or respective times herein specified. If such data is not delivered at said time or times, the Government may at its election, so long as such data remains undelivered, unless the delay in delivery thereof is an excusable delay as such term is defined in Article 5 (Delays-Damages), withhold payment to the Contractor for any of the supplies theretofore delivered to the Government, refuse approval of the Contractor's vouchers and refuse to accept further deliveries hereunder from the Contractor or take any other action authorized by law or regulation now or hereafter in effect including termination of this contract for default to the extent and in the manner authorized by Article 5 (Delays-Damages), and may take any or all of the foregoing actions separately or in combination.

(g) Except as may be made necessary by conditions hereafter arising, the Government will furnish no facilities to the Contractor in connection with the performance of this contract.

(h) The following specific items are conditions of this contract:

(1) No flight demonstration shall be deemed to be included as such demonstration has been omitted from the contract price.

(2) The contract price for the airplanes called for under Items 5 and 6 are on the basis of including therein only ten (10) hours of functional flight testing on each airplane for shakedown of airplane, power plant and testing instrumentation. No demonstration, performance, guarantee

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compliance, etc. testing has been included. Furthermore, such contract price is on the basis that initial flight tests will be conducted at a flying field in the vicinity of the Contractor's plant. Should it be necessary to conduct initial flight tests at some other airport, an equitable adjustment will be made in the contract price.

(3) No static test is included in the contract price other than the very limited amount included in the Contractor's Specific tion No. 29-7-1.

(4) The contract price is based on the usual type of equipment being Government-furnished such as power units and accessories, radios, radar, instruments, front and rear gun turrets, etc. as listed in Contractor's detail Specification No. 9566, dated 15 September 1945, Revision "A", dated 1 January 1946.

(i) The airplanes as delivered to the Army after completion of the Contractor's flight test shall be airworthy and functionally satisfactory. The term "airworthy and functionally satisfactory" shall mean that (1) the airplane will have satisfactory ground handling and taxiing characteristics, (2) all equipment installed in the airplane will be in satisfactory operating condition, (3) all airplane systems, i.e., electrical, hydraulic, and all control surfaces or other components operated by these systems shall be in satisfactory operating condition, (4) the airplane shall be capable of taking off, cruising up to normal rated power, be satisfactorily controllable when airborne and be landed safely. "Satisfactory" as used herein shall not be interpreted to mean complete compliance with applicable specifications, it being recognized that complete compliance is not necessary to furnish an airplane sufficiently satisfactory for the purpose intended.

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ARTICLE 16.—Delivery.—(a) If any aircraft are required to be furnished to the Government under this contract, the following provisions of this paragraph shall be applicable to the delivery thereof. Unless otherwise provided in this Article or elsewhere in this contract, all said aircraft shall be delivered completely set up, serviced and ready for flight at the flying field where the same are to be finally inspected pursuant to the provisions of paragraph (a) of Article 17 hereof. All fuel, oil and/or cooling fluid necessary for engine tests and/or flight tests required to be made under the provisions of AAF Specification No. R-1800-E, shall be furnished and supplied at the expense of the Contractor. All fuel, oil and/or cooling fluid necessary for fly-away shall be furnished by the Contractor at its expense in an amount to be designated by the ferry pilot for each aircraft delivered. In the event it becomes necessary to ship any of the aircraft called for by rail or other carrier, same shall be packed as may be directed in writing by the Contracting Officer, such changes as may be necessary relating to packing and shipping to be made under the provisions of Article 2 hereof.

(b) If any spare parts or special hand tools and ground equipment are required to be furnished to the Government under this contract in accordance with the terms of any Appendix attached to or made a part of this contract, said spare parts and such special hand tools and ground equipment shall be delivered in accordance with the provisions of said Appendix.

[redacted]

(d) Except as otherwise provided in [redacted], and except as to aircraft to be flown away, all the supplies required to be furnished under this contract shall be delivered to the Government f. o. b. cars and/or freight station, at the city or cities, or shipping point or points, where is located the plant or plants at which such supplies are to be finally inspected pursuant to the provisions of Article 17 hereof and shall be packed in accordance with the requirements of Article 19 hereof. If the Contracting Officer directs in writing that any of the supplies to be furnished hereunder be shipped by air such supplies shall be delivered to the Government f.o.b. a flying field designated by the Contracting Officer for such purpose in the vicinity of the plant or plants at which such supplies are to be finally inspected pursuant to the provisions of Article 17 hereof. If the Contracting Officer directs in writing that any of the supplies to be furnished hereunder be shipped other than by rail or air, such supplies shall be delivered to the Government f.o.b. the plant or plants at which such supplies are to be finally inspected pursuant to the provisions of Article 17 hereof.

(e) For the purpose of determining the fulfillment of this contract so far as delivery dates are concerned, in the event the delivery point or points are not the same as the point or points of destination, the time of delivery of the supplies shall be considered as the date of final Government inspection ready for shipment to destination as certified to by the Government representative or, in the event of acceptance of the articles without inspection, pursuant to the provisions of Article 17, as the date of delivery to the carrier ready for shipment to destination.

(f) All communications hereunder for Government Purchasing [redacted] shall be addressed to the Chicago Ordnance District, Chicago Ordnance Office, 39 South LaSalle Street, Chicago 3, Illinois.

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(g) The articles and services called for by paragraph (a) of Article 15 hereof shall be delivered to and performed for the Government in accordance with the following schedule; provided, however, that with respect to Items 1a, 1b, 1c, 1d and 1e the words "To Be Delivered" shall be deemed to mean "To Be Completed"; provided further, that with respect to Items 2, 3 and 4, the words "To Be Delivered" shall not be deemed to require actual completion or delivery of the articles referred to in said Items 2, 3 and 4, but shall be deemed to mean that all work under said Items 2, 3 and 4 shall have ceased at the time specified.

Item	Description	To Be Delivered
1a	Wind Tunnel Model of Airplane designated as AAF Model XA-43	On or before 15 March 1945
1b	Report analyzing wind tunnel tests.	On or before 15 March 1945
1c	Mock-Up of AAF Model XA-43	On or before 15 March 1945
1d	Preliminary engineering services	On or before 15 March 1945
1e	Data	On or before 15 March 1945
2	(a) One (1) Stripped Flight Article (b) One (1) completely equipped Flight Article	On or before 30 Oct. 1945 On or before 30 Oct. 1945
3	Test Models for XA-43 Airplane	On or before 30 Oct. 1945
4	One (1) AAF Model TG-180 Aircraft Engine installed and ground tested	On or before 30 Oct. 1945
5	One (1) AAF Model XP-87 Airplane	During May 1947
6	One (1) AAF Model XP-87 Airplane	During July 1947
7	One (1) complete Mock-up of AAF Model XP-87 Airplane	Delivery not required. Mock-Up heretofore completed.
8	Wing Tunnel Models of the AAF Model XP-87 Airplane	On or before 1 Sept. 1946
9	Data	As required by Contractor's Report No. F9-S-1 dated 1 January 1946.
10	Spare Parts	As required by Appendix I hereto, entitled "Spare Parts Provisional Appendix for Use in Connection with Contracts for Experimental Aircraft."

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(h) All of the work called for under Item 1 of Article 15 (a) shall be completed on or before 15 March 1945. The Model and the Mock-Up of the XA-43 Airplane, called for by Items 1a and 1c of Article 15(a) shall be delivered to the Government at Contractor's plant, Buffalo, New York, at such time after the completion of said work and packed in such manner as the Contracting Officer may direct. The report and data called for by Items 1b and 1e of Article 15(a) shall be delivered to the Government on or before 15 March 1945 by registered mail postage prepaid, addressed to the AAF Supply Officer, Wright Field, Dayton, Ohio, Attention: TSESE2A.

(i) The articles called for under Items 2, 3 and 4 of Article 15 (a) shall be delivered to the Government, as the Contracting Officer may direct, in the state of completion of such articles at the date work ceased thereon.

(j) It is anticipated that the airplanes called for by Items 5 and 6 of Article 15 hereof may, at the direction of the Contracting Officer, be flight tested, before final inspection and acceptance thereof, at Muroc Lake, California, instead of at Columbus, Ohio, as called for by Article 17 hereof. Contractor shall comply with such directions and if Contractor's costs are increased thereby an equitable adjustment shall be made in the price or prices of the airplanes to be so flight-tested; such airplanes shall be finally inspected and accepted by the Government at Muroc Lake, California, and, from the time said airplanes are shipped from Contractor's plant at Columbus, Ohio, or flown away from a flying field in the vicinity of said plant, as may be directed by the Contracting Officer, Contractor's liability therefor shall be the same as if said airplanes were Government-owned property within the meaning of Article 38 hereof. Delivery of said airplanes for shipment or flyaway as aforesaid shall constitute the time of delivery thereof for the purpose of determining compliance with the delivery schedules herein set forth.

(k) The Mock-Up called for under Item 7 of Article 15 (a) shall be deemed to have been delivered to the Government in place at Contractor's plant, Columbus, Ohio.

(l) The Wind Tunnel Models called for under Item 8 shall be delivered to the Government f.o.b. Contractor's plant Columbus, Ohio, and shall be consigned to such destination as may be directed by the Contracting Officer.

(m) The data called for under Item 9 of Article 15 (a) shall be delivered to the Government by registered mail, postage prepaid, addressed to the AAF Supply Officer, Wright Field, Dayton, Ohio, Attention: TSEOA-4.

(n) Notwithstanding the provisions of Appendix I hereto, the Contractor shall use its best efforts to complete and make available for final inspection by the Government the spare parts called for by Item 10 of paragraph (a) of Article 15 hereof not later than the date of completion of the first airplane called for by Item 5 of paragraph (a) of Article 15 hereof. After final inspection and acceptance thereof by the Government such spare parts

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shall be retained by the Contractor at Contractor's plant at Columbus, Ohio, or at the flying field designated for flight testing, until completion of the flight test program with respect to the airplanes called for by Items 5 and 6 of paragraph (a) of Article 19 hereof and the acceptance of such airplanes by the Government. The Contractor may use such spare parts for installation in said airplanes if and to the extent necessary to complete the flight test program and to deliver said airplanes as called for by this contract. Immediately upon acceptance of the last of the airplanes to be delivered under said Items 5 and 6, the Contractor shall deliver to the Government f.o.b., Columbus, Ohio, or at such other f.o.b. point as may be designated in writing by the Contracting Officer, packed for domestic shipment in accordance with Article 19 hereof, all such spare parts as have not been delivered to the Government by installation in said airplanes.

(c) Except as otherwise herein provided shipping instructions will be furnished later. The Contractor shall make written request to the Commanding General, Air Material Command, Wright Field, Dayton, Ohio, Attention: OFT Branch, Traffic Section (TSARQ) for shipping instructions not later than fifteen (15) days prior to the date on which any of such articles to be shipped are ready for shipment.

(d) Payment for the articles and work called for under Items 1 a., 1 b., 1 c., 1 d., 1 e., 2, 3 and 4 of Article 19 shall be made at the contract price stipulated therefor, less any amounts theretofore received by the Contractor as reimbursements for such articles or services under the Supplies Contract. Such net payment shall be due and payable forthwith upon the approval of this Supplemental Agreement No. 1, upon the submission of a properly certified invoice as provided in Article 9. Such invoice shall indicate the amount of credit due against the amount of credit allowed against the stipulated contract price by reason of reimbursements theretofore received by the Contractor. Payment for the airplanes called for under Items 5 and 6 shall be made in each case upon completion of the Contractor's flight test of the respective airplanes. Payment for the mock-up called for under Item 7 shall be made upon completion of such mock-up and incorporation therein of any changes required as a result of inspection by the Air Material Command Mock-Up Board. Payment for the wind tunnel models called for under Item 8 shall be made upon completion of such models and delivery thereof to the destinations designated by the Contracting Officer.

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ARTICLE 17.—**Place of Inspection.**—(a) Unless otherwise provided herein, if any aircraft are required to be furnished to the Government hereunder and the same are to be flown away, such aircraft shall be finally inspected and accepted by the Government at a flying field or fields to be approved by the Government in the vicinity of the Contractor's plant or plants specified in paragraph (b) of this Article or in the vicinity of any other plant or plants of the Contractor approved for such purpose in writing by the Contracting Officer. Unless otherwise provided herein, such inspection and acceptance shall be accomplished in accordance with the provisions of AAF Specification No. R-1800-E.

(b) Except as otherwise herein provided, the plant or plants of the Contractor at Columbus, Ohio,

are designated as the point or respective points for final inspection and acceptance by the Government of all the supplies (other than aircraft to be flown away, if any) to be furnished under this contract.

(c) At the option of the Contracting Officer any of the supplies to be furnished hereunder may be accepted without Government inspection upon receipt of a certificate of the Contractor attached to an invoice for said supplies reading substantially as follows:

"I hereby certify that I did, on the ..... day of ....., 194....., ship via ....., in accordance with shipping instructions issued by the Contracting Officer, the supplies called for by Article 15 of Contract No. W 33-038 ac-6266; that such supplies were in the quantities and of the quality called for, and were in all respects in accord with the applicable specifications. This statement is furnished to support payment of the attached invoice."

(d) Notwithstanding any provisions of the certificate above referred to, the liability of the Contractor with respect to the supplies covered by this contract will, after inspection by the Government, or after the expiration of a reasonable time following delivery to the Government within which inspection may be made, whichever occurs first, be limited (except as to supplies rejected upon such inspection) to liability for latent defects, fraud or such gross mistakes as amount to fraud.

(e) The provision of paragraph (c) of Article 4 reading as follows:

"but failure to inspect and accept or reject materials or supplies shall not impose liability on the Government for such materials or supplies as are not in accordance with the specifications"

shall not be applicable to any supplies accepted without Government inspection pursuant to the foregoing provisions of this Article.

(f) The following provisions are not applicable to this contract: The respective points for final inspection and acceptance by the Government of all the supplies (other than aircraft to be flown away, if any) to be furnished under this contract shall be, in addition to the plant or plants of the Contractor specified in paragraph (b) of this Article, any other plant or plants of the Contractor or any plant or plants of a subcontractor or vendor of the Contractor hereunder, provided that such other plant or plants of the Contractor or such plant or plants of a subcontractor or vendor shall have been approved for such purpose in writing by the Contracting Officer. It is expressly understood by the Contractor that request by it for the approval referred to in the preceding sentence must be made as soon as practicable to permit the Government to make necessary arrangements for inspection and acceptance, and that the Government is not obligated to make such final inspection and acceptance at any point so approved until a reasonable period after the date of such approval.

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(g) Final inspection and acceptance of the work called for under Items 1a, 1c and 1d of Article 15 (a) has been accomplished on behalf of the Government at the Contractor's plant at Buffalo, New York.

(h) Headquarters, Air Materiel Command, Wright Field, Dayton, Ohio, is designated as the place for final inspection and acceptance by the Government of the data called for by Items 1b and 1e, and of the data called for under Item 9, of Article 15 (a).

(i) Subject to the provisions of Article 16 (j) hereof, final inspection and acceptance of the airplanes called for under Items 5 and 6 of Article 15 (a) will be accomplished in accordance with Contractor's Specification No. 9566, dated 15 September 1945, Revision "A", dated 1 January 1946, at a flying field approved by the Government at or near the Contractor's plant at Columbus, Ohio.

(j) The plant of the Contractor, Columbus, Ohio, is designated as the place for preliminary inspection by the Government of the Wind Tunnel Models called for under Item 8 of Article 15 (a) hereof. Final inspection and acceptance of such Wind Tunnel Models by the Government will be accomplished at such destination or destinations as may be designated in writing by the Contracting Officer pursuant to paragraphs (1) and (o) of Article 16.

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ARTICLE 20. - Inspection by Contractor and Report. - The Contractor shall provide an acceptable and complete system covering the inspection of all material, fabrication methods and finished parts. This system shall be approved by the Government representative who shall be assigned at the Contractor's plant. Records of all such inspection work shall be kept complete and shall be available to the Government representative at all times. The work of construction shall at all times be open to the duly authorized Government representative for the purpose of inspection, and every facility shall be afforded such inspectors for the prosecution of their work. The Government shall have the right to require replacement of parts not in accordance with applicable drawings and specifications or showing inferior workmanship or materials. The Government representative shall conduct sufficient spot checks on a surveillance basis to insure compliance of parts and assemblies with applicable contractual drawings or applicable specifications. The Contractor shall inform the inspector when materials or parts are ready for inspection. The Contractor shall, in the manufacture of the articles to be supplied under this contract, be required to use such jigs, fixtures, and/or other devices and appliances in all processes which are conducive to the fabrication of two (2) experimental type airplanes. Such jigs, fixtures and/or other devices and appliances may be of temporary type construction but shall be adequate to maintain the dimensions of the airplane as called for in the applicable drawings. The passing as satisfactory of any particular part or piece of material by the Government representative does not relieve the Contractor from any responsibility regarding faulty workmanship or material which may be subsequently discovered prior to final acceptance.

ARTICLE 21. - Furnishing of Materials and Supplies by the Government. - The Contracting Officer may at his option from time to time furnish the Contractor with materials and/or supplies not readily obtainable in the open market and which are required by the Contractor for the performance of this contract. In such event, an equitable adjustment in the contract price shall be made as provided in Article 2 hereof.

ARTICLE 22. - Government Property. - (a) - Furnishing Thereof. - If any material, articles or equipment be listed as Government-furnished in the specification or specifications, herein referred to, pursuant to which the supplies called for hereunder are to be furnished, or be elsewhere listed in this contract as being furnished by the Government (except such materials and/or supplies furnished under the terms of Article 21 hereof), the Government shall furnish to the Contractor, without cost therefor, for installation or incorporation in such supplies, all such material, articles and equipment so listed. If any aircraft be called for under this contract, the Contractor shall balance and install all detachable blade propellers, whether or not Government-furnished, without additional cost to the Government.

(b) Delay in Delivery Thereof. - In the event that any material, articles or equipment listed as Government-furnished as aforesaid are not delivered to the Contractor within the period required by the Contractor in order that the delivery dates specified in this contract may be met, and

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the Contractor notifies the Contracting Officer in writing of such delay, the Government agrees that the specified delivery dates shall be extended as to the supplies the delivery of which is delayed thereby. Such extension, however, shall not exceed the period of delay actually caused by the late delivery of the Government-furnished material, articles or equipment.

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ARTICLE 30—Termination at the Option of the Government. (a) The performance of work under this contract may be terminated by the Government in accordance with this article in whole, or from time to time in part, whenever the contracting officer shall determine any such termination is for the best interests of the Government. Termination of work hereunder shall be effected by delivery to the contractor of a Notice of Termination specifying the extent to which performance of work under the contract shall be terminated, and the date upon which such termination shall become effective. If termination of work under this contract is simultaneous with, a part of, or in connection with, a general termination (1) of all or substantially all of a group or class of contracts made by the War Department for the same product or for closely related products, or (2) of war contracts at, about the time of, or following, the cessation of the present hostilities, or any major part thereof, such termination shall only be made in accordance with the provisions of this article, unless the contracting officer finds that the contractor is then in gross or willful default under this contract.

(b) After receipt of a Notice of Termination and except as otherwise directed by the contracting officer, the contractor shall (1) terminate work under the contract on the date and to the extent specified in the Notice of Termination; (2) place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portions of the work under the contract as may not be terminated; (3) terminate all orders and subcontracts to the extent that they relate to the performance of any work terminated by the Notice of Termination; (4) assign to the Government, in the manner and to the extent directed by the contracting officer, all of the right, title and interest of the contractor under the orders or subcontracts so terminated; (5) settle all claims arising out of such termination of orders and subcontracts with the approval or ratification of the contracting officer to the extent that he may require, which approval or ratification shall be final for all the purposes of this article; (6) transfer title and deliver to the Government in the manner, to the extent and at the times directed by the contracting officer (i) the fabricated or unfabricated parts, work in process, completed work, supplies and other material produced as a part of, or acquired in respect of the performance of, the work terminated in the Notice of Termination, and (ii) the plans, drawings, information and other property which, if the contract had been completed, would be required to be furnished to the Government; (7) use his best efforts to sell in the manner, to the extent, at the time, and at the price or prices directed or authorized by the contracting officer, any property of the types referred to in subdivision (6) of this paragraph; provided, however, that the contractor (i) shall not be required to extend credit to any purchaser and (ii) may retain any such property at a price or prices approved by the contracting officer; (8) complete performance of such part of the work as shall not have been terminated by the Notice of Termination; and (9) take such action as may be necessary or as the contracting officer may direct for protection and preservation of the property, which is in the possession of the contractor and in which the Government has or may acquire an interest.

(c) The contractor and the contracting officer may agree upon the whole or any part of the amount or amounts to be paid to the contractor by reason of the total or partial termination of work pursuant to this article, which amount or amounts may include a reasonable allowance for profit, and the Government shall pay the agreed amount or amounts. Nothing in paragraph (d) of this Article prescribing the amount to be paid to the contractor in the event of failure of the contractor and the contracting officer to agree upon the whole amount to be paid to the contractor by reason of the termination of work pursuant to this article shall be deemed to limit, restrict or otherwise determine or affect the amount or amounts which may be agreed upon to be paid to the contractor pursuant to this paragraph (c).

(d) In the event of the failure of the contractor and contracting officer to agree as provided in paragraph (c) upon the whole amount to be paid to the contractor by reason of the termination of work pursuant to this article, the Government, but without duplication of any amounts agreed upon in accordance with paragraph (c), shall pay to the contractor the following amounts:

(1) For completed articles delivered to and accepted by the Government (or sold or otherwise disposed of as provided in paragraph (b) (7) above) and not theretofore paid for, forthwith the contract price for the articles or the proportionate part of such price as may be applicable to such articles, if the articles are covered by an applicable contract;

(2) In respect of the contract work terminated as permitted by this article, the total (without duplication of any items) of (i) the cost of such work exclusive of any costs attributable to articles paid or to be paid for under paragraph (d) (1) hereof, (ii) the cost of settling and paying claims arising out of the termination of work under subcontracts (exclusive of the amounts paid or payable on account of supplies or materials delivered or services furnished by the subcontractor prior to the effective date of the termination of work under this contract, which amounts shall be included in the cost on account of such

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which payment is made under subdivision (i) above; and (iii) a sum equal to 2% of the part of the amount determined under subdivision (i) which represents the cost of articles or materials not processed by the contractor, plus a sum equal to 8% of the remainder of such amount, but the aggregate of such sums shall not exceed 6% of the whole of the amount determined under subdivision (i), which for the purpose of this subdivision (iii) shall exclude any charges for interest on borrowings;

(3). The reasonable cost of the preservation and protection of property incurred pursuant to paragraph (b) (3) hereof; and any other reasonable cost incidental to termination of work under this contract, including expense incidental to the determination of the amount due to the contractor as the result of the termination of work under this contract.

The total sum to be paid to the contractor under subdivisions (1) and (2) of this paragraph (d) shall not exceed the total contract price reduced by the amount of payments otherwise made and by the contract price of work not terminated. Except for normal spoilage and to the extent that the Government shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the contractor as provided in paragraph (d) (1) and paragraph (d) (2) (i), all amounts allocable to or payable in respect of property, which is destroyed, lost, stolen or damaged so as to become undeliverable prior to the transfer of title to the Government or to a buyer pursuant to paragraph (b) (7) or prior to the 60th day after delivery to the Government of an inventory covering such property, whichever shall first occur.

(e) The obligation of the Government to make any payments under this article: (1) shall be subject to deductions in respect of (i) all unliquidated partial or progress payments, payments on account theretofore made to the contractor and unliquidated advance payments, (ii) any claim which the Government may have against the contractor in connection with this contract, and (iii) the price agreed upon or the proceeds of sale of any materials, supplies or other things retained by the contractor or sold and not otherwise recovered by or credited to the Government, and (2) in the discretion of the contracting officer shall be subject to deduction in respect of the amount of any claim of any subcontractor or supplier whose subcontract or order shall have been terminated as provided in paragraph (b) (5) except to the extent that such claim covers (i) property or materials delivered to the contractor or (ii) services furnished to the contractor in connection with the production of completed articles under this contract.

(f) In the event that, prior to the determination of the final amount to be paid to the contractor as in this article provided, the contractor shall file with the contracting officer a request in writing that an equitable adjustment should be made in the price or prices specified in the contract for the work not terminated by the Notice of Termination, the appropriate fair and reasonable adjustment shall be made in such price or prices.

(g) The Government shall make partial payments and payments on account, from time to time, of the amounts to which the contractor shall be entitled under this article, whether determined by agreement or otherwise, whenever in the opinion of the contracting officer the aggregate of such payments shall be within the amount to which the contractor will be entitled hereunder.

(h) For the purposes of paragraphs (d) (2) and (d) (3) hereof, the amounts of the payments to be made by the Government to the contractor, shall be determined in accordance with the Statement of Principles for Determination of Costs upon Termination of Government Fixed Price Supply Contracts approved by the Joint Contract Termination Board, 31 December 1943, as amended by Regulation No. 5 of the Office of Contract Settlement dated 30 September 1944. The contractor for a period of three years after final settlement under the contract shall make available to the Government at all reasonable times at the office of the contractor all of its books, records, documents and other evidence bearing on the costs and expenses of the contractor under the contract and in respect of the termination of work thereunder.

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ARTICLE 41. - Revision of Prices. - Price revision upon change of wages or employment conditions. - (a) The prices fixed in Article 15 may be revised from time to time in accordance with this Article. As used in this Article, the term "adjustment of wages" shall include any adjustment in wages, salaries or conditions of employment.

(b) Conditions Precedent. If all the following conditions are satisfied, the Contracting Officer shall enter into negotiations with the Contractor for the revision of the prices of items called for under this contract but only to the extent set forth in paragraph (c) of this Article:

(1) To adjust salary, wages or conditions of work at the place or places where the work under this contract is performed, for any of the following reasons:

(i) The provisions of an order of a duly authorized agency of the Government; or

(ii) The terms of an agreement with a duly authorized bargaining agent for the Contractor's employees; or

(iii) A general increase in wage rates in the industry in which the Contractor is engaged or in the locality in which the Contractor's plant is located.

(2) The Contractor shall advise the Contracting Officer in writing of any such adjustment in wages which may materially affect the costs of performing this contract, within twenty days after such wage adjustment has been made. In the event that the wage adjustment has been made prior to the inclusion of this Article 41 in this contract and has not been finally acted upon, the written advice shall be given at the time of execution of the instrument effecting such inclusion.

(3) The Contractor, prior to the expiration of thirty days (or such greater period as may be agreed upon in writing within said thirty days) after the date of any adjustment in wages, but, in any event, prior to the expiration of one year after the date of delivery of the last item of supplies called for by this contract as it may from time to time be amended, shall submit to the Contracting Officer the following:

A. Substantiation that a wage increase has been granted and the need therefor.

B. A written demand that the parties negotiate to revise the contract prices of items delivered

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and to be delivered under the contract during a period stated in the demand, which period shall not commence at a date earlier than the first day on which the adjustment in wages becomes effective.

C. Estimates of the probable effects of such adjustment in wages upon the Contractor's costs of producing the items delivered or to be delivered during the period stated in the demand. These estimates shall give due effect to estimates of completed items and work in process on hand at the beginning of such period and to the fact that the full effect of such adjustment will not normally be reflected immediately in the cost of items delivered under the contract. The estimates shall be accompanied by estimates of the effect of such adjustment on the direct and indirect labor costs of the items delivered and to be delivered during the stated period.

D. Proposed revised prices for the items delivered or to be delivered under the contract during the stated period.

(c) Negotiations. - Upon the filing of the estimates and data required by paragraph (b) (3) of this Article, the Contracting Officer and the Contractor will negotiate promptly in good faith to agree upon revised prices for the items delivered or to be delivered during the stated period, the cost of producing which has been affected by such adjustment in wages. In the negotiation the Contracting Officer and the Contractor in good faith will estimate the effect of such adjustment upon the cost of such items. It is recognized that it will not be practicable to make precise computations of the effect of any such adjustment on the Contractor's costs and therefore it is the intention of the parties that negotiation and determination of any revision in price under this article shall be on the basis of the estimates of the effect of the adjustment. The prices payable for the items to be delivered and to be delivered will be revised to reflect, to an extent which is deemed reasonable under all the circumstances, such estimated effect on costs.

(d) Limitation on revision. - The Contractor agrees that it will not request and shall not be entitled to receive a price revision under this Article except to the extent that such adjustment in wages operates to make the price under this contract less than a fair and reasonable one under all the circumstances. In no event shall any such revision exceed the amount of the estimated effect of such adjustment in wages on the Contractor's costs hereunder during the stated period specified in the written demand mentioned in subparagraph (b) (3) B of this Article.

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(e) Supplemental Agreement. - Any agreement reached under this Article will be incorporated in a supplemental agreement to this contract which shall be subject to the written approval of: "the Under Secretary of War or his duly authorized representative" and which shall state (1) the revised prices to be effective with respect to deliveries during a specified period to be set forth in such agreement and (2) the method of adjusting the payments therefor.

(f) Disagreements. - If within thirty (30) days after the time for filing the estimates and data required by paragraph (b) (3) of this Article (or such further period as may be fixed by written agreement) the Contracting Officer and the Contractor fail to agree to revised prices, the failure to agree shall be deemed to be a disagreement as to a question of fact which shall be disposed of in accordance with Article 12 (Disputes).

(g) Effect of Article. - Any provision of this Article and any action thereunder shall be without prejudice to (1) the determination of the existence of any excessive profits of the Contractor under the Renegotiation Act; and (2) to any order fixing the price of articles to be furnished or services to be rendered hereunder made under Section 901 of the Revenue Act of 1943.

(h) Effect of Prior Renegotiation. - If, prior to any revision of the price under this Article the final or contingent cost of retroactive wage adjustments increasing the cost of performing this contract has been included and allowed for the purpose of the final determination (by agreement or unilateral determination) for a fiscal period, as to the Contractor's liability to repay to the Government excessive profits under the Renegotiation Act, appropriate weight shall be given to the results of the proceedings in renegotiation in determining the sums, if any, to be paid or credited to the Contractor in connection with the revision of the price under this Article, it being the intent of the parties that the net result shall be substantially the same as it would have been if the revision had preceded such final determination.

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Article 42 - Letter Contract. - This is the definitive contract [illegible] Letter Contract referred to in the Memorandum to the Secretary of War dated [illegible] and designated "Amendment to Letter Contract No. [illegible]-6266", as amended, and the definitive contract [illegible] Letter Contract, as amended, except as to [illegible] No. 15 [illegible] Agreement [illegible] hereto. In the event of conflict between [illegible] Letter Contract, and this definitive contract, the [illegible] shall govern.

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ARTICLE 45. - Special Tooling. - (a) The Contractor recognizes that the price for the items listed in paragraph (a) of Article 1 hereof includes an allowance to compensate the Contractor for the special tooling (such as jigs, dies, fixtures, special punches, special cutting tools, patterns, special gauges and other special manufacturing aids) to be provided by the Contractor to produce such items (but excluding any special tooling used for the manufacture of parts or assemblies which are not peculiar to military aeronautical materiel), all of said tooling being hereinafter called the "special tooling". If, within sixty (60) days after the Contractor has completed delivery of all such items, the Contracting Officer gives written notice (including appropriate shipping instructions) to the Contractor to deliver to the Government the special tooling or any specified part thereof, the Contractor shall as soon as practicable thereafter deliver to the Government such part of the special tooling specified in such notice as the Contractor has on hand at that time. The special tooling to be delivered to the Government under the foregoing provisions shall be delivered, in accordance with the Contracting Officer's shipping instructions, f.o.b. the plant or plants of the Contractor, or of any subcontractor or subcontractors at which the same may then be situated. Upon such delivery title to all the special tooling delivered shall vest in the Government, if not at that time already vested pursuant to the provisions of the article of this contract, if any, entitled "Partial Payments". The Contractor shall comply with the directions, if any, contained in such notice as to the preservation, protection and/or packaging of the special tooling, or any specified part thereof. In order to assist the Contracting Officer in determining the best interests of the Government with respect to the special tooling, the Contractor shall from time to time until the expiration of said sixty (60) day period, if requested by the Contracting Officer, furnish to the Contracting Officer such information as it may have in its possession with respect to the special tooling and, if so requested, shall permit the Contracting Officer to inspect the special tooling and whatever records it has thereon.

(b) It is recognized that during the performance of this contract a portion of the special tooling may become useless for the performance of this contract by reason of engineering changes made in the work called for hereunder. Whenever an engineering change is made, having the effect of making useless for the performance of this contract a portion of the special tooling, the Contractor shall determine as soon as practicable whether or not the parts or assemblies changed are interchangeable with the new parts or assemblies to be substituted therefor. If the Contractor determines that any such part or assembly is not so interchangeable it shall notify the Contracting Officer in writing to that effect, requesting instructions with respect to the portion of the special tooling made useless for the performance of this contract by the change in question. The Contracting Officer may, within sixty (60) days after receipt of such notification, give written notice to the Contractor to deliver to the Government the special tooling, so made useless for the performance of this contract or any part thereof, whereupon all the provisions of paragraph (a) shall be applicable as in the case of the notice therein provided for.

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(c) Except to the extent, if any, that delivery of the special tooling or of a specified part thereof is required by a written notice of the Contracting Officer pursuant to paragraphs (a) or (b), the Contractor shall retain all rights to the special tooling as fully as if this Article were not contained in this contract, subject to the provisions of paragraphs (e) and (g). It is expressly recommended that the Contractor has the right to scrap or salvage any portion of the special tooling which (i) at any time during the performance of this contract the Contractor has determined to have become useless by reason of wear or tear or (ii) has been made useless for the performance of this contract by an engineering change, where the Contractor has determined that the parts or assemblies changed are interchangeable with the new parts or assemblies. Any of the special tooling being scrapped or salvaged by the Contractor pursuant to the foregoing provisions shall be subject to inspection by the Contracting Officer, and the Contractor shall at the request of the Contracting Officer, afford him all reasonable means for such inspection.

(d) Between the beginning of the respective sixty (60) day periods referred to in paragraphs (a) and (b) and, whichever is earlier, (i) delivery by the Contracting Officer of a written notice to deliver any special tooling as therein provided, (ii) delivery by the Contracting Officer to the Contractor of a written notice stating affirmatively that delivery of any or a specified portion of the special tooling will not be required, or (iii) the expiration of the sixty day period, the Contractor (1) shall take such steps as are reasonably necessary to preserve and protect the special tooling or portion thereof, delivery of which may be ordered, and (2) may initiate and proceed with reasonable measures for clearance of the special tooling or such portion thereof from its plants, including packaging the same for domestic shipment or preparation thereof for temporary storage on its premises. Any work performed pursuant to the foregoing sentance, and any work involved in complying with any written notice for delivery of the special tooling, or any portion thereof, shall be deemed a change made pursuant to Article 2 hereof and the Contractor shall be entitled to the equitable adjustment specified in said Article 2 with respect thereto.

(e) Unless it shall be stated at the conclusion of this Article that the price set forth in Article 15 hereof for the items called for hereunder makes allowance for the estimated scrap and salvage value of special tooling the Contractor shall account to the Government for the scrap value of any portion of the special tooling (i) scrapped or salvaged by it during the performance of this contract pursuant to the provisions of the second sentence of paragraph (c) and (ii) on hand at the date of completion delivery of all the items listed in paragraph (a) of Article 15 but not required to be delivered to the Government pursuant to the provisions of paragraph (a) of this Article. If the statement mentioned in the preceding sentence is set forth at the conclusion of this Article, the Contractor shall not be obligated to account to the Government for any portion of the special tooling scrapped or salvaged by it pursuant to said provisions.

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(f) In the event the Government terminates this contract in whole or in part under Article 30, or exercises its right of termination under article 5, the rights of the parties with respect to any part of the special tooling then on hand, produced or acquired in respect of the performance of the work terminated, shall be the same as if this Article was not contained in this contract.

(g) If on the receipt of the notice referred to in paragraphs (a) or (b) above, the Contractor does not have on hand for delivery to the Government any part of the special tooling referred to in said notice, or if the Contractor at any time scraps or salvages any item of special tooling otherwise than in accordance with the provisions of this Article, the Contractor shall not be liable to the Government for such thereof as is not on hand or for such thereof as has been so scrapped or salvaged, unless the absence thereof or such scrapping or salvaging thereof is found to be due to wilful misconduct or failure to exercise good faith on the part of the Contractor's corporate officers or other representatives having supervision or direction of the whole of the Contractor's business or of the whole of any plant operated by the Contractor in the performance of this contract; provided, however, that the Contractor shall account for the scrap value of any part of the special tooling so scrapped or salvaged, unless the statement mentioned in the first sentence of paragraph (e) is set forth at the conclusion of this Article. The Contractor shall, however, be liable to the Government whenever the absence of such special tooling or such scrapping or salvaging is found to be due to such wilful misconduct or failure to exercise good faith.

(h) The provisions of this Article shall not be deemed to be applicable to any special tooling acquired or produced by any subcontractors of the Contractor pursuant to any subcontract under this contract.

(i) In the event that upon the completion of this contract all or any part of the special tooling is needed by the Contractor for the performance of any then existing prime contract with the Government acting through the AAF or of any then existing subcontract under any such prime contract, the Contractor gives written notice to that effect to the Contracting Officer within five (5) days after completion of this contract or within such longer period as the Contracting Officer shall allow, the Contractor shall have the right to retain and use the special tooling or such part thereof for the performance of such contract or subcontract and for the performance of any subsequent similar contract or subcontract contemplating continuous production. All the provisions of this Article shall remain applicable according to their terms to the special tooling or part thereof so retained, except that (I) the date of completing delivery under each of the respective contracts and subcontracts for the performance of which any part of the special tooling has been so retained shall be substituted for the date of completing delivery of the items listed in paragraph (a) of Article 15 hereof, provided, however, that the sixty (60) day period referred to in paragraph (a) of this Article shall begin to run with respect to the part of the special tooling so retained

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for the performance of any particular contract or subcontract only when the Contractor has notified the Contracting Officer in writing of having completed delivery thereunder; and (II) the words "the performance of this contract" shall be deemed to refer to the performance also of such respective contracts and subcontracts. In consideration of the right to retain and use such special tooling, the Contractor shall not include and hereby represents that it will not include in the price of any contract or subcontract on which the special tooling is used, any charge for depreciation or amortization that has previously been charged against this contract.

(j) The price of all the items called for under this contract makes allowance for the estimated scrap and salvage value of the special tooling required by the Contractor for the performance of this contract.

ARTICLE 46. - Special Provisions Reference Inspection. - The airplanes called for in this contract are designated as experimental development type articles. The Contractor may, in order to facilitate the performance of this contract (a) substitute materials which are not in exact accordance with applicable drawings and specifications but which are adequate insofar as safety and strength of structure is concerned; (b) make changes in the drawings which may result in the scope of "variations" as defined in ANC Regulation 70-43 dated 5 March 1945 without the approval of the Government, except that changes which amount to "deviations" from Contractor's Model Specification shall first be submitted to the Air Materiel Command for approval; (c) use drawings in the performance of this contract of such nature as are determined by the Contractor to be sufficient for expeditious fabrication and adequate inspection of parts produced, which drawings shall be prepared in accordance with current engineering practices but need not comply with requirements of Specification AN-A-12. Drawings and/or specifications shall indicate the proper material required by the design and whenever substitutions of material are made, as hereinabove permitted, the Contractor shall promptly inform the AAF Plant Representative and shall maintain complete and up-to-date records of all substitutions, which records shall show the additional weight built into each airplane by reason of such material substitutions.

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SECTION II

The parties recognize:

(1) That the Contractor has prior to the date of this Supplemental Agreement completed and/or delivered articles called for under Article 1b (a) - Items 1a, 1b, 1c, 1d, 1e, 2, 3 and 4 and the Government has prior to said date of approval finally inspected and accepted said articles and that the Contractor is entitled to be paid or to receive credit therefor at the unit prices therefor specified in Article 1b of the Supplies Contract, as amended hereby, the total amount which the Contractor is so entitled to be paid or for which he is so entitled to receive credit at the date of approval of this Supplemental Agreement being hereinafter referred to as the "Completed Amount";

(2) That the Government has prior to the date of this Supplemental Agreement, or may have prior to the date of approval thereof, paid sums to the Contractor by way of reimbursement for cost and on account of payment of the fixed fee under the Supplies Contract, the total amount of such sums so paid at the date of approval of this Supplemental Agreement being hereinafter referred to as the "Reimbursement Amount"; and

The parties agree as follows:

(a) If the Reimbursement Amount exceeds the Completed Amount, the amount of such excess is to be treated as a partial payment under Article 44 of the Supplies Contract, as amended hereby, notwithstanding any limitation in said Article 44 set forth; and if the Completed Amount exceeds the Reimbursement Amount, the amount of such excess shall be paid by the Government to the Contractor as soon as practicable after the date of approval of this Supplemental Agreement in accordance with Article 16 (p).

(b) The fact that the amount treated as partial payments under the Supplies Contract, as amended hereby, pursuant to clause (a) of this Section II may exceed the limit for partial payments set forth in Article 44 of the Supplies Contract, as amended hereby, shall not be construed to entitle the Contractor to any further partial payments in excess of such limitation.

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SECTION III

[illegible] herein contained in this Supplemental Agreement shall invalidate or constitute an default with respect to any action taken or omitted to be taken by either party in the performance of or in connection with the Supplies Contract or of the Letter Contract addressed to Contractor by the War Department under date of 12 May 1945 (designated as Supplement to Contract No. [illegible] ac-6266) hereinafter referred to as the Letter Contract, (including, without limiting the generality of the foregoing, any use by the Contractor of any Government bills of lading and/or any transmission by the Contractor of telegrams, cable rates, and radiograms at Government rates) which action or omission to act was at the time proper under the provisions of the Supplies Contract or of the Letter Contract applicable thereto. Any of the articles called for hereunder, which prior to the date of approval of this Supplemental Agreement have been furnished by the Contractor to the Government in accordance with the Supplies Contract or of the Letter Contract shall be deemed to have been delivered hereunder, if called for under Article 15 of Section I hereof. Under the terms of this Supplemental Agreement, the Government releases to the Contractor, subject to the provisions of Section I hereof, all right, title and interest acquired under the Supplies Contract or under the Letter Contract in and to all materials, supplies and work in process under the Supplies Contract or under the Letter Contract or owned, other than Government-furnished equipment and other than surplus units furnished by the Government for use in the performance of the Supplies Contract, as amended hereby, or the Letter Contract and in and to all tools, dies, dies, fixtures, drawings and specifications produced or acquired especially in connection with the performance of the Supplies Contract, or the Letter Contract, excluding, however, such property as shall have been or shall be incorporated in supplies delivered to and accepted by the Government.

SECTION IV

It is recognized by the parties hereto that prior to the execution and approval of this Supplemental Agreement, Government-owned property other than Government-furnished equipment may have been transferred to Contractor for performance of the Supplies Contract, or the Letter Contract, by or transfer of accountability and that property for which Contractor was reimbursed under the Supplies Contract and title to which was vested in the Government may have been transferred pursuant to the instructions of the Government. Contractor agrees to submit within thirty (30) days after the date of approval of this Supplemental Agreement to the Contracting Officer a list of all such transferred property with Contractor's estimates of the fair value thereof as of the date of such transfer. Contractor and the Contracting Officer shall thereafter negotiate to agree upon the value of such property transferred and such adjustment, if any, as may be equitable shall be made in the contract prices set forth in Article 15 of the Supplies Contract as amended by this Supplemental Agreement, said adjustment to be set out in a change order or supplemental agreement to the Supplies Contract as amended. Failure to agree under the provisions of this section shall be deemed a dispute as to a question of fact determinable under the Disputes Article of the Supplies Contract, as

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amended by this Supplemental Agreement. Nothing contained herein shall be deemed to apply to any property transfer heretofore made as a purchase or sale with the purchase or selling price properly reflected in the contract prices of the articles set forth in Article 15 of the Supplies Contract as amended by this Supplemental Agreement.

SECTION V

The prices for the Items called for under this Supplemental Agreement No. 1 have been established on the basis that the Contractor's plant at Columbus, Ohio, now being utilized by the Contractor in the performance of the work called for under this Supplemental Agreement No. 1 under a lease from the Reconstruction Finance Corporation will continue to be available to the Contractor. In the event that the Contractor's lease of said plant at Columbus, Ohio, is terminated by the Reconstruction Finance Corporation prior to the completion of the work under this Supplemental Agreement, as the same may be from time to time amended, the Government and the Contractor shall, upon written request by the Contractor made within thirty (30) days after the termination of such lease, negotiate in good faith to revise the contract price or otherwise bring this supplemental agreement within the ability of the Contractor to perform. Any such revision shall be evidenced by an appropriate written amendment. Failure of the parties to agree upon an equitable revision of the contract price or in the terms of performance of this Supplemental Agreement shall be deemed to be a question of fact and shall be determined pursuant to the provisions of Article 12 (Disputes) as added by Section I of this Supplemental Agreement.

SECTION VI

In the event that subsequent to 27 September 1946, and prior to the effective date of this Supplemental Agreement, any Notice of Termination is given with respect to any of the work called for under the Supplies Contract (including work added thereto by this Supplemental Agreement No. 1), such notice shall be deemed to have been given under Article 30 - Termination at the Option of the Government - of the Supplies Contract, as amended by this Supplemental Agreement.

SECTION VII

This Supplemental Agreement shall be subject to the written approval of the Secretary of War or such individual as said Secretary may designate and shall not be binding until so approved.

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I[illegible] T[illegible], the parties hereto have executed this Supplemental Agreement as of the day and year first above written.

NOTE: Type or print names under all signatures.

The Contractor:

Adriene H. Fisher

Adriene H. Fisher

Wesley J. Thompson

Wesley J. Thompson

[illegible]

[illegible]

Contracting Officer
(Official Title)

[illegible]
(ATOMIC ENERGY DIVISION)
(Contractor)

By

Erwin J. Ducayet

Representative
(Title)

Columbus, Ohio
(Business Address)

I, G. M. Pryor, certify that I am the Assistant Secretary of the corporation named as Contractor herein; that Erwin J. Ducayet who signed this Supplemental Agreement on behalf of the Contractor, was then Representative of said corporation; that said Supplemental Agreement was duly signed for and on behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

G. M. Pryor (Corporate seal)

I hereby certify that, to the best of my knowledge and belief, [illegible] observation and inquiry, [illegible] who signed this Supplemental Agreement on behalf of [illegible] (ATOMIC ENERGY DIVISION), had authority to execute the same, and is the individual who signed said Supplemental Agreement on behalf of this corporation with the public generally.

(Contracting Officer)

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APPENDIX I TO
SUPPLEMENTARY AGREEMENT NO. 1
TO CONTRACT NO. [illegible]-AC-6966

WAR DEPARTMENT PROVISIONING APPENDIX FOR USE IN
CONTRACTS WITH CONTRACTORS
FOR AIRCRAFT

Provisioning of Spares - (a) The selection, delivery and distribution of spare parts and the items and quantities thereof to be furnished under those items of the contract which provide that spare parts shall be furnished in accordance with this Appendix shall be made as hereinafter provided.

(b) In order to meet the needs of delivery of spare parts simultaneously with delivery of the first aircraft called for under the contract, the Contractor, commencing as early as practicable after the approval of this contract, and continuing from time to time thereafter as rapidly as the progress of the design permits, shall select the spare parts and quantities thereof which in his judgment shall be furnished. Such selection will be made by the Contractor on the basis of his own best judgment and in the light of all information available to him in conjunction with and/or according to general principles laid down by the Engineering Division of the Air Materiel Command. At appropriate intervals, as items and quantities of spare parts are so selected, the Contractor shall prepare a list including the items and quantities so selected (hereinafter referred to as "Preliminary Spare Parts Lists").

(c) As each Preliminary Spare Parts List is prepared it will be submitted to the Chief, Engineering Division, Air Materiel Command for approval. Such approval shall, in turn, be transmitted to the Contractor through the Contracting Officer assigned to the AAF Procurement Field Office administering this contract, hereinafter referred to as the "local Contracting Officer". The approval of the local Contracting Officer will be endorsed on a cover sheet attached to such Preliminary Spare Parts List and, upon such approval, six (6) copies thereof (which need not be reproducible and need not include the copy bearing the endorsement of approval) will be forwarded to the Government by the Contractor.

(d) When the written approval of the local Contracting Officer is endorsed upon any Preliminary Spare Parts List, it shall become and be known as an approved Production List, and the Contractor will be obligated to furnish the items and quantities of spare parts listed thereon; the Government will be obligated to take delivery of spare parts so furnished, and the Contractor will be entitled to fair and just compensation therefor; provided, that the obligations of both parties will be limited to an amount of work the total price of which will not exceed the total amount specified for spare parts in the contract.

(e) If, at any time, it appears to the Contractor that the total price of the total quantity of spare parts to be selected as hereinabove provided is likely to exceed the total amount specified for spare parts in the contract, the Contractor will promptly notify the Government, in writing,

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setting forth the estimated amount of the excess and such information as may be necessary to enable the Government to determine the amount, if any, by which such total amount is likely to be exceeded. Within thirty (30) days after receipt of such notice, the Government will either notify the Contractor that it elects to increase the total amount provided in the contract for spare parts (which will be accomplished by change order or supplemental agreement to the contract) or will notify the Contractor of the items and/or quantities to be deleted from the list in order to bring it within the total amount provided in the contract for spare parts. To the extent that the Government fails to effect such increase or to indicate the deletions to be made, the Contractor will select items and/or quantities to be deleted to effect the necessary reduction.

(f) At any time after the first approved Production List has been established the Contractor may prepare a Proposed Spare Parts exhibit consisting of a compilation of approved Production Lists with the unit and total prices of each item of spare parts shown thereon. At any time prior to the selection, as herein provided, of all the spare parts, if the Contractor desires that the portion thereof which has, at such time, been selected and priced, become the Proposed Spare Parts Exhibit, such portion may be deemed to be the Proposed Spare Parts Exhibit and may consist of a compilation of only those Approved Production Lists that have been established at such time. In such event the Proposed Spare Parts Exhibit shall be so entitled as to identify it as a part of the Proposed Spare Parts Exhibit, and each succeeding compilation of Approved Production Lists, shall be similarly entitled and show its sequence as a part of the entire Proposed Spare Parts Exhibit.

(g) A vellum and at least ten (10) copies of each Proposed Spare Parts Exhibit (or part thereof) will be prepared and delivered to the Local Contracting Officer. Cover of said copies shall carry on each page thereof a notation that prices are preliminary and subject to approval. The seven (7) copies bearing the notation referred to above shall be forwarded by the Local Contracting Officer to the Chief, Engineering Division, Air Material Command.

(h) The Local Contracting Officer will review the unit and total prices settled in each Proposed Spare Parts Exhibit (or part thereof) for the mathematical accuracy of extensions and additions. The approval of the Local Contracting Officer, if given, will be indorsed on the cover sheets which will be attached to the vellum, and the three copies not bearing the notation provided for in paragraph (g) of this Appendix. The Local Contracting Officer will then forward the vellum and two (2) such approved copies to the Aircraft Section, Procurement Division, Air Material Command, Wright Field, Dayton, Ohio, Attn: [illegible] and one (1) such approved copy to the Contractor.

(i) Upon approval of each Proposed Spare Parts Exhibit (as revised, if revision is necessary) whether partial or complete, it will be identified and attached to and made a part of the contract as the Spare Parts Exhibit, or as a part thereof, to the contract.

Appendix (t)
Supplemental Agreement No. 1 to Contract No. W33-038 ac-6266

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(j) In the total price set forth in a Spare Parts Exhibit, or, in the case of a part of a Spare Parts Exhibit, if the total price set forth therein, when added to the total price of all other parts of the Spare Parts Exhibit previously attached to the contract, is more than the dollar amount of the spare parts provided in the item of the contract calling for spare parts listed in the Spare Parts Exhibit, a change order or supplemental agreement will increase the dollar amount to such an extent as may be necessary, subject to the allotment of funds therefor. If the total price set forth in a complete Spare Parts Exhibit is less than the dollar amount of the spare parts provided in the item of the contract calling for the spare parts listed in the Spare Parts Exhibit, a change order or supplemental agreement will decrease such dollar amount to such an extent as may be necessary. In the case of a part of a Spare Parts Exhibit, if the total price set forth therein, when added to the total price set forth in all other parts of the Spare Parts Exhibit previously attached to the contract, is less than the dollar amount of the spare parts provided for in the items of the contract calling for the spare parts listed in the Spare Parts Exhibit, no action shall be taken to reduce such dollar amount until such Spare Parts Exhibit is made complete. The Government may give notice to the Contractor that a part of a Spare Parts Exhibit completes its spare parts requirements under the item of the contract calling for spare parts to be listed in the Spare Parts Exhibit. In such event, if the total price of all the parts of the Spare Parts Exhibit theretofore attached to the contract, including the part as to which such notice is given, is less than the dollar amount provided in the item of the contract calling for the spare parts listed in the Spare Parts Exhibit; the change order or supplemental agreement will decrease such dollar amount to such an extent as may be necessary.

(k) If the local Contracting Officer takes exception to any of the unit and total prices specified in any Proposed Spare Parts Exhibit, and such exceptions cannot be resolved within a reasonable time through negotiation with the Contractor, the items as to which disagreement exists shall be referred to the Aircraft Section, Procurement Division, Air Materiel Command, Wright Field, Dayton, Ohio, Attention: MCSPAM-1, for further consideration and negotiation with the Contractor. No change order or supplemental agreement making any Spare Parts Exhibit, or part thereof, a part of this contract shall be prepared unless and until all negotiations in regard thereto have been concluded to the satisfaction of the parties.

(l) In the event this contract is terminated by the Government after the delivery to the Government of any spare parts, the prices of which have not been submitted to or approved by the local Contracting Officer, the parties will, nevertheless and as promptly as practicable, take the action prescribed herein to establish the prices of such items and quantities of spare parts as have been delivered to the Government prior to the effective date of such termination and in respect of which the Contractor may be entitled to payment pursuant to the Article of the contract regarding termination by, or for convenience of, the Government.

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

[illegible] 1-[illegible]

RRA:RW: [illegible]

Subject: Contract W[illegible]-[illegible] ac-[illegible]
Model XP-87 Airplanes
Installation of Allison [illegible]
Engines on No. 1 Airplane

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: [illegible]RRA

Through: AAF Officer In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) CW Ltr EJL/ef-[illegible] dated 27 July 1[illegible]

Enclosure: (A) Cost Estimate Breakdown
(B) Summary of Major Items Involved In Substitution of [illegible]-35 Engines

1. This Contractor's letter reference (a) submitted an advance informal quotation for installing [illegible]-35 Engines in one XP-[illegible] Airplane. It was understood that this amount ($[illegible]) was to be used by the Air Materiel Command for planning purposes only. Inasmuch as it is understood that the Air Materiel Command desires a firm quotation for substituting the Allison engines in one XP-[illegible] Airplane, such a firm proposal is submitted herewith.

2. For installing the Allison [illegible]-35 Engines on XP-[illegible] Airplane No. 1 in lieu of four Westinghouse [illegible]-[illegible] Engines, this Contractor quotes an estimated price increase of $[illegible]. A breakdown of this figure is contained in Enclosure (A) attached hereto.

3. It will be noted that the above quoted amount is based on the assumption that such engine substitution will be accomplished on Airplane No. 1, the instrumented airplane. Furthermore, this quotation is based on the condition that flight testing of the airplane with [illegible]-35 Engines installed will be included in the Phase [illegible] Flight Test Program. However, such testing will be subject to separate negotiation. This condition is made because the accomplishment of such engine substitution would be scheduled subsequent to Phase AI and prior to Phase [illegible] flight testing. This quotation is further based on the following conditions:

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(a) That the basic wing structure and fixed nacelle remain unchaged

(b) That each of the two J-33 Engines received as GFE will be adaptable for the installation of two G-2 generators

(c) That items normally considered GFE will be furnished by the Government

(d) That all work involved in the substitution will be performed at this Contractor's plant with no provisions for overtime

4. It is estimated six months will be required for preliminary engineering and the completion of fabricated parts for the J-33 installation. After receipt of the airplane, an additional period of three months will be required for the actual installation. Inasmuch as present scheduling indicates that the No. 1 Airplane will be available after Phase II flight testing early next year, it appears that immediate go-ahead for the J-33 program is required in order that delays will not be experienced as a result of fabricated parts not being completed. Therefore, it is requested that an amendment be issued immediately to the Letter of Intent for Contract W33-038 ac-6266 authorizing coverage for this program.

5. A detailed listing of the major work items involved in accomplishing this proposed engine change is contained in Enclosure (B) attached hereto. The Air Materiel Command's attention is invited to the fact that this quotation reflects labor increases recently granted by this Contractor.

6. This quotation cancels and supersedes the informal quotation submitted by reference (a). The Air Materiel Command's comments on this over proposal are requested at the earliest possible date so that a definitive understanding of the status of the proposed substitution of Allison engines may be reached.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J. Ducayet
Contracts Manager

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ENCLOSURE (A)

SUBSTITUTION OF J-33 ENGINES - -

Summary of Costs

PRODUCTIVE		
Material		$ 14,346.30
Labor Hours	(41,151)	
Labor @ $1.57/hr		64,607.07
Overhead @ 160%		103,371.31
Total Productive		$182,324.68
TOOLING		
Material		4,119.50
Labor Hours	(25,250)	
Labor @ $1.57/hr		39,642.50
Overhead @ 160%		63,428.00
Total Tooling		$107,190.00
ENGINEERING DESIGN		
Material		- - - - -
Labor Hours	(42,632)	
Labor @ $1.90/hr		81,000.00
Overhead @ 100%		81,000.00
Total Engineering		$162,000.00
TEMPLATES		
Material		500.00
Labor Hours	(5,526)	
Labor @ $1.90/hr		10,500.00
Overhead @ 100%		10,500.00
Total Templates		$21,500.00
GRAND TOTAL		$473,014.68
Profit @ 10%		47,301.47
TOTAL PRICE		$520,316.15

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ENCLOSURE (B)

SUMMARY OF MAJOR ITEMS

INVOLVED IN SUBSTITUTION OF J-33 ENGINES

1. Disassembly
2. Modification of Fixed Nacelle
3. Fabrication and Installation of J-33 Removable Nacelles
4. Fabrication and Installation of New Landing Gear Doors
5. Fabrication and Installation of New Landing Gear Strut Doors
6. Fabrication and Installation of New Landing Gear Door Actuating Mechanism
7. Fabrication and Installation of New Engine Access Doors
8. Fabrication and Installation of New Nacelle Tail Cone
9. Modification of Nacelle Fixed Equipment
10. Assembly and Installation of J-33 Power Plant
11. Fabrication and Installation of Water Injection System
12. Modification of Engine Controls
13. Modification of Cockpit Installations
14. Reinstallation of Furnishings and Equipment
15. Modification of Instrumentation
16. Ground Test and Pre-flight

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TSB Form No. 71-26A
(Rev 8 May 47)

Execute in triplicate	
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Class—	01

CHANGE ORDER

ARMY AIR FORCES
Air Materiel Command
Wright Field, Dayton, Ohio

Date 6 October 1947
Change Order No. 2 to
Contract No. W 33-038 ac-6266
as amended

To: Curtiss-Wright Corporation (Airplane Division) Columbus 16, Ohio

SUBJECT: Modification of Two Airplanes

1. In the manufacture and construction of two (2) Airplanes, Model AP-8J Serial Nos. 45-59000 and 45-522, called for under the terms of Items 5 and 6 respectively of Paragraph (a) of Article 15 of Contract W 33-038 ac-6266, as amended, the Contractor shall comply with each of the following requirements:

(a) Delete wing and tail covers called for under Contractor's Model Specification No. 9566, dated 1 November 1947 at a unit reduction in price of $664.61; total reduction in price for two Airplanes - $1,329.22

(b) Install Government-furnished in lieu of Contractor-furnished components of air position indicator system, namely, right angle drives and flexible transmission shafts at a unit reduction in price of $45.62, total reduction in price for two Airplanes - $ 91.24

(c) Revise windshield and anti-icing provisions to provide selective de-icing of either the pilot's windshield alone or both the pilot's and radar observer's windshields. The first selection shall utilize the entire output from a 2500 VA inverter to de-ice the pilot's windshield only. The second selection shall utilize the full output of a 2500 VA inverter to de-ice both the pilot's and radar observer's windshields delivering 1250 VA to each windshield, at a unit increase in price of $808.50, total increase in price for two airplanes - - - - - - - - - - - - - $1,617.00

2. The Government-furnished equipment referred to in Paragraph 1(b) above shall be delivered to the Contractor pursuant to the provisions of Article 21 of the Contract, as Amended.

3. The effect of the change set forth in Paragraph 1(c) hereof on the weight empty and useful load of the airplanes is set forth below:

Weight Empty	Useful Load
+18.0	0.0

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ATSC Form No. 71-5018

Total increase in fixed price $ 256.54

in [redacted] $

[redacted] $

This Change Order has been negotiated pursuant to Public Law 708, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the [redacted] First War Powers Act, 1941, and Executive Order No. 9001, 27 December, 1941.

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

THE UNITED STATES OF AMERICA

18 December 1947
(Date)

BY: /s/Stepehen Lovas
Contracting Officer.

Stephen Lovas

1ST INDORSEMENT

TO: CONTRACTING OFFICER:

Columbus 16, Ohio 18 December 1947
(Place) (Date)

1. Contractor hereby accepts the above Change Order.

Curtiss-Wright Corporation
(Airplane Division) (SEAL)
(Contractor)

BY: /s/Edwin J. Ducayet
(Signature of Official with Office held)

Edwin J. Ducayet, Representative

AFP No.: 421049

E.O. 430-256

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Debit: 2180705, 802-7004 P 611-09 S 33-038

Change Order No. 2 to Contract No. W 33-038 ac-6266

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File 7(1/4)

Report of Conference

9 Oct. '47

A conference was held at the plant of Curtiss-Wright Corporation on Wednesday, 9 October 1947, for the purpose of outlining the modification of the No. 2 XP-87 airplane necessary to fulfill the recent directive from AC/AS-4 relative to the exploitation of the photographic reconnaissance possibilities of the XP-87 airplane. Representatives from Hdq. USAF, AC/AS-3 and Tactical Air Command, Langley Field, in addition to AMC personnel were present at the conference. A list of all personnel attending is attached hereto.

General Discussion:

1. Captain Salome of the Photographic Laboratory, Engin. Div., AMC, acted as Chairman of the meeting in the absence of Col. Goddard, and opened the discussion by outlining the Curtiss proposal for a photographic nose to be made interchangeable with the simulated turret nose for the No. 2 XP-87 airplane. Following this discussion the Aircraft Projects representative requested a clarification of the photo reconnaissance directive recently received from Washington from Major Reynolds representing Hdq. USAF, AC/AS-3. Major Reynolds stated that he was familiar with the directive and that the intent of Hdq. USAF was to have the No. 2 XP-87 airplane completely modified for photographic reconnaissance purposes, which includes the photographic nose plus cockpit modification plus bombay modification. The Aircraft Projects representative then asked if Major Reynolds was in receipt of the letter written by the Chief of Fighter Branch, Aircraft Projects Section to Hdq. USAF as a result of a recent conference in the office of the Chief, Aircraft Projects Section in which the matter of priority between the photo reconnaissance nose and the simulated turret nose was discussed and information requested as to the production configuration of the airplane. Major Reynolds then answered that the letter had not been received in Hdq. USAF at the time of his departure, however, that the decision had previously been made to produce only photographic reconnaissance airplanes in fiscal year 1949. This point established, the meeting then

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resolved into a discussion of the equipment requirements and modification necessary in order to fulfill as closely as possible, the military characteristics for a tactical reconnaissance airplane. The proposed nose section was reviewed by representatives from Tactical Air Command and Hdq. USAF, who expressed satisfaction with the camera installation as presently visualized.

2. Next the matter of the cockpit modifications was discussed. These modifications involve the installation of a direct vision view finder on the pilot's side of the cockpit. After some discussion on the means of installing the view finder, it was concluded that the view finder could be installed in the space presently occupied by the A-1 gun sight. In addition to the view finder and in order to fully comply with the military characteristics, the installation of Loran and Shoran navigational equipment is necessary. However, a brief discussion on these equipments resulted in the revelation that their installation in the present cockpit is physically impossible. Therefore, as a substitute for Loran and Shoran, the ground position indicator was proposed as the next best method of accomplishing long and short range navigation. The ground position indicator is presently under development and the first experimental article is to be delivered within 30 days. This piece of equipment could be fitted into the cockpit in a position under the radar (rator's instrument panel between the foot rests.

3. Next the modification necessary to incorporate flash bombs in the bombay was discussed. It is believed that this modification will involve only straight forward engineering problems since the basic airplane originally had a bombay and since structural provisions are still present for the installation of bombay doors in lieu of skin panels. The only problem visualized in this connection would be the matter of ejecting the flash bombs from the bombay by some mechanical means, inasmuch as aerodynamic characteristics of the present flash bomb are such that violent tumbling and/or difficulty in clearing the bombay area will probably be experienced if the flash bombs are simply released in the same manner as a large size demolition bomb.

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File 9(3/4)

Conclusions:

1. The requirements for modification of the No. 2 XP-87 airplane definitely extend beyond simply the installation of a photographic nose and include the complete modification of the airplane in order to fulfill the tactical reconnaissance mission.

2. The Photographic Laboratory of the AMC will investigate the desirability of using the ground position indicator in lieu of Loran and Shoran navigational equipment.

3. The Photographic Laboratory, AMC will investigate the latest methods of dropping flash bombs in order to determine whether or not a conventional bombay door arrangement will be satisfactory or whether the flash boms will have to be ejected through a small opening in the fuselage skin.

4. The Photographic Laboratory, AMC, after investigating the above two conditions, will prepare a memorandum report or letter to be coordinated in both the Engineering Division and Procurement Division and transmitted to Washington, outlining the Photographic Laboratory's recommendations as to the equipment to be used in the airplane and presenting the latest information available on the means of flash bomb ejection. This letter or report will then request a directive from Washington to proceed with the airplane modification on the basis of the [redacted] recommendations of the AMC.

5. The contractor will submit in the near future, a quotation for the complete photo reconnaissance of the No. 2 airplane, dividing the quotation into three parts consisting of: 1. the photo nose installation; 2. the cockpit modification; and 3. the bombay & modification.

Att:
List of Personnel attending conference.

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[illegible] 29, 1947

Maj. Fred L. Kennels, Jr.	- Hdq. USAF A-3 Requirements Division
Mr. Fred D. Donne	- Chicago Aerial Survey Co.
Maj. Jesse G. Johnston	- TSEFF Wright Field
Lt. Col. John L. Dyas	- 363-RCN Group, TAC, Langley Field, Va.
Lt. Col. Albert J. McChristy	- TAC Hq. Langley Field, Va.
Lt. Col. George T. Walker	- 16ist RCN Sqdn. - 363 RCN Group, TAC, Langley Fd.
Maj. Frank P. Nicolson	- Hdq. USAF A-3 Requirements Division
Mr. E. B. Thornton	- Aircraft Projects Section, Wright Field
Mr. T. B. McCollister	- Photo. Lab., Wright Field
Mr. J. A. Weatherford	- Equipment Lab., Wright Field
Capt. [illegible] Peckstrom	- Equipment Lab., Wright Field
Maj. Fred [illegible] Dyer	- TAC
Mr. [illegible] Ronta	- NEPA
Capt. James [illegible] McDonald	- [illegible] - Photo. Lab., Wright Field

Capt. Malone
[illegible] Hamm
Mr. Bob Pollister

Curtiss-Wright

Messrs. Tucayet
Noonan
Turrely
Griswold
Tynon

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CFAM-745

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COORDINATION
CG AR DEP CG
ADJUTANT GENERAL
CHIEF OF ADMIN.
AIR INSPECTOR
PUBLIC RELATIONS
JUDGE ADVOCATE
PERSONNEL (T-1)
INTELLIGENCE (T-2)
ENGINEERING (T-3)
SUPPLY (T-4)
PLANS (T-5)
BASE C. O.
OTHER

AMC Form No. 10-508
(Rev 2 Apr 47)
(PRINT SYMBOL, DATE AND INITIALS IN APPROPRIATE BLOCK)

Basic ltr, CG, AAF, 21 Aug 47, to CG, AMC, subj: "Engine Installation, P-87 Airplane"

2d Ind THEHEB(TSECOR-4)OBT/wma

Hq AMC Wright Field, Dayton, Ohio, 9 Oct 1947

TO: Chief of Staff, United States Air Force, Washington 25, D. C., ATTN: AC/AS-4

1. Action is being initiated by this Command to comply with paragraph 2 of second indorsement hereto by providing for the installation of two R-35-C6 engines in the number one XP-87 airplane, serial No. 45-59600, following completion of Phase XI of the flight test program.

2. Since the configuration of the C-6 engine is identical to the C-5, the contractor will begin the engineering required for the C-5 installation in the near future in order that the actual installation of C-6 engines may be made as soon as these engines become available.

FOR THE COMMANDING GENERAL:

Earl Smith Maj. AC.

for WILLIAM M. MORGAN
Brigadier General, U. S. Air
Chief, Engineering Operations
Engineering Division

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AMC Form No. 10-508 (Rev 2 Apr 47)

(PRINT SYMBOL, DATE AND INITIALS IN APPROPRIATE BLOCK)

CG OR DEP CG

ADJT & GENERAL

[redacted](T-4)

CHIEF OF ADMIN.

AIR INSPECTOR

PUBLIC RELATIONS

JUDGE ADVOCATE

PERSONNEL (T-1)

INTELLIGENCE (T-2)

ENGINEERING (T-3)

DAVIS BPA Klein Griswold Ginjin

SUPPLY (T-4)

PLANS (T-5)

BASE C. O.

OTHER

T8EOA-4/PBK/sm

24 October 1947

Contract W33-038 ac-6266
Production Program for P-87 Aircraft

Chief of Staff
United States Air Force
Washington 25, D. C.
ATTN: AC/AS-4

file

1. The Summary Minutes of the first meeting of the USAF Aircraft and Weapons Board held 19, 20, 21 and 22 August 1947 states in par. 3j that the 60 P-87's and/or FP-87's are to be procured in FY 1949.

2. The 1st Indorsement to AMC letter to AAF dated 23 July 1947, subject: Photographic Installation in XP-87 Aircraft (1st Indorsement signed by Major General Craigie, AC/AS-4) states a requirement for full exploitation of the photographic possibilities of the XP-87.

3. As the initial step in modifying the XP-87 for photographic use, it is planned to fabricate and install a photographic nose, make provisions for carrying flash bombs, engineer the installation of a view finder, and study the cockpit changes required to accommodate these items on the No. 2 airplane. It is expected that this airplane so modified will be available for flight test about 1 May 1948.

4. The first experimental flexible nose turrets for the XP-87 are not scheduled to be delivered until 30 June 1949. It will be impossible to procure an XP-87 (all weather version), tactically equipped, during FY 1949 unless the flexible nose turret is supplemented by an installation incorporating fixed forward-firing guns. To check aerodynamic characteristics and power requirements of the flexible turret, this command plans on installing a semi-flexible nose turret on No. 2 airplane after the photographic nose tests.

5. It is assumed that the term FP-87 connotes the P-87 modified as described in par. 3 above, rather than a complete modification of the P-87 to include all the features normally desired in a tactical reconnaissance airplane. The cost of the modifications required to convert an XP-87 into an FP-87 was not budgeted in the FY 1948 program and consequently the 611-1 R & D Program will have to be adjusted to take care of this additional cost.

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Ltr, AMC, 24 Oct '47, to AC/AS-4, Subject: "Production Program for P-87 Aircraft"

6. In view of the comments above the following information is desired:

a. As first priority is it the desire of Headquarters, Air Force to procure FP-87's out of FY 1949 funds and in what numbers?

b. Is it the desire of Headquarters, Air Force to procure P-87 airplanes in FY 1949 with fixed nose guns or should they be equipped with a removable dummy nose for which the flexible turrets can be substituted when they become available and in what numbers?

FOR THE COMMANDING GENERAL:

WILLIAM M. MORGAN
Brigadier General, U. S. A.
Chief, Engineering Operations
Engineering Division

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MDAC-266-A-WA 3 1-15-48M

WAR DEPARTMENT
AR[redacted]ION
AIR MATERIEL COMMAND
ENGINEERING DIVISION
MEMORANDUM REPORT ON [redacted]

T3E0A-4/OBT/hw

Date 28 October 1947

SUBJECT: Engineering Acceptance Inspection, XP-87 Airplane, Serial No. 45-59600

SECTION: Aircraft Projects Section

SERIAL No.: T3E0A-4-1387

Contract No.
Expenditure Order No. W33-038-AC-6266
Purchase Order No. 430-256

DATE
CHF. DIV.
TECH. EXC.
ADM. EXC.
C. O.
BUD. OFF.
EXP. ENG.
PROD. ENG.
CONTRACT
INSP.
A. S. C.
I. P. S.
OTHERS

A. PURPOSE:

1. To report the results of the Engineering Acceptance Inspection the Curtiss-Wright XP-87 airplane, Serial No. 45-59600, which is the first of two experimental airplanes being procured under the terms of Contract W33-038-AC-6266.

B. FACTUAL DATA:

1. The Engineering Acceptance Inspection was held at the plant of Curtiss-Wright Corporation, Columbus, Ohio on 6 - 8 October 1947.

2. Personnel attending the inspection were as follows:

Committee Members

Mr. O. B. Thornton ..... Aircraft Projects Section, Fighter Branch

Mr. Perry Banta ..... Procurement Division, Fighter

Lt. Col. J. L. Brownewell ..... Aircraft Lab., Design Branch

Technical Advisors

Aircraft Projects Section:

Colonel P. B. Klein
Lt. Col. H. A. Griffith

Aircraft Laboratory:

Mr. John L. Carrell ..... Structures and Controls
Mr. Sorro Prete ..... Landing Gear and Hydraulics

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Eng. Div. Memo. Rpt. No. TSEOA-4-1387
Engin. Acceptance Inspec., XP-87 Airplane,
Serial No. 45-59600
28 October 1947

Armament Laboratory:

Mr. Everrett Rorer ..... General Armament

Aero Medical Laboratory:

Mr. C. Castellano .....Installations
Dr. W. F. Grether ..... Cockpit Arrangement (psychological)

Components & Systems Laboratory:

Mr. R. M. Damm ..... Radio and Radar

Equipment Laboratory:

Mr. J. F. Randack ..... Electrical
Mr. John Weatherford ..... Instruments & Navigation
Mr. L. W. Larson ..... Mechanical
Mr. Edward Hass ..... Autopilot

Power Plant Laboratory:

Mr. J. DeRemer .....Installations
Lt. Wolfe ..... Installations

Fighter Br., Procurement Division:

Capt. R. W. Kimbell
Mr. Austin

ACAS-4

Capt. Lee Standifer

ACAS-3

Lt. Col. O. B. Johnson
Lt. Col. C. A. Thorpe

Bu Aero

Comm. J. T. Blackburn
Mr. G. C. Danch

MX-745

[redacted]

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[redacted]

Eng. Div. Memo. Rpt. No. [illegible]
Engin. Acceptance Inspec., [illegible],
Serial No. 45-59000
of October 1947

3. The airplane was physically complete upon the arrival of the inspecting party, however, in view of the ultimate disassembly of the airplane and shipment to Muroc Lake, California for flight testing, certain tests and clean-up items had not been accomplished. These items are listed in Appendix "A" as necessary items to be accomplished prior to shipment of the airplane to Muroc. Also included in Appendix "A" are all safety changes deemed necessary by the Board to be accomplished prior to shipment.

4. Appendix "B" includes disposition of all comments not considered as safety changes submitted by the engineering inspection party.

5. Appendix "C" includes disposition of comments on special tools and ground handling equipment as reported in Memorandum Report No. [illegible].

6. It should be noted that only those items of the Local Army First Article Inspection Report that require additional action prior to shipment to Muroc are included in this report. All additional items as included in the First Article Inspection Report are satisfactory for the purposes of the "X" model airplanes or are covered by comments contained in Appendices "A" or "B" to this report.

C. CONCLUSIONS:

1. Certain changes as listed in Appendix "A" hereto are necessary to the airplane in order to assure flying safety.

D. RECOMMENDATIONS:

1. It is recommended that the contractor accomplish those changes as listed in Appendix "A" hereto subject to local Army approval prior to shipment of the airplane to Muroc.

2. It is recommended that the contractor take action on all items as listed in Appendices "B" and "C" in accordance with the Engineering Inspection Acceptance Board disposition of each individual item.

3. It is recommended that the contractor submit to the Air Materiel Command as soon as is practicable, Revision [illegible] to Model Specification 9366, including therein all changes and deviations authorized subsequent to the

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[redacted]

Engr. Div. Memo. Rpt. No. [illegible]-4-1387
Engin. Acceptance Inspec., XP-87 Airplane,
Serial No. 45-59600
28 October 1947

issuance of Revision "A" to the above noted Specification in order that appropriate contractual action may be taken by this Command.

Prepared by _____
MAJ. U. S. [illegible], USAF.

Approved by _____
P. B. [illegible], Colonel, AC
Chief, Fighter Project Section
Aircraft Projects Section

Approved by _____
[illegible] F. [illegible], Colonel, [illegible]
Chief, Aircraft Projects Branch
Engineering Division

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Aviation Ord. Engr. Office
~~Quality Control Sec., Proc. Div.~~
Aero Medical Lab.
Aircraft Lab. (3 cys)
Armament Lab.
Equipment Lab.
Components & Systems Lab.
Power Plant Lab.
Equipment Br., Aire. Proj. Sec.
Fighter Br., Aire. Proj. Sec.

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APPENDIX "A"

A. Equipment Laboratory; Instrument & Navigation Section:

1. Calibrate fuel quantity gages in pounds in lieu of gallons.

Reason: Required by Specification 21100.

Result: Comply on both "X" model airplanes.

2. Make provisions for water drain plug at dive flap limit pressure switch.

Reason: To prevent moisture trap in pressure line.

Result: Comply on both "X" airplanes.

3. Mark engine instruments and fuel quantity indicators to indicate their use.

Reason: Handbook requirement.

Result: Comply on both "X" airplanes.

4. Provide covers for API amplifier and S-1 control gyro.

Reason: To protect amplifier and gyro from dirt and dust picked up by the nose gear.

Result: Provide on both "X" airplanes.

B. Equipment Laboratory; Electrical Unit:

1. Delete the wording "Ground Here" from all fuel filler neck caps and install fuel nozzle grounding receptacles, in accordance with Drawing No. AND 10439, for all fuselage tanks.

Reason: To provide for grounding fuel nozzle during re-fueling operations.

Result: Comply on both "X" airplanes.

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2. Install guards in accordance with AAF Drawing No. 45A21662 in lieu of the guards presently installed. Also install the generator switches so that the "on" position is forward.

Reason: To conform to AAF requirements and specifications. The guards should have the word "generator" on top.

Result: Comply on both "X" airplanes.

3. Install a static ground wire on the landing gear.

Reason: To provide for discharging the airplane upon landing.

Result: Comply on both "X" airplanes.

4. Identify all junction boxes by stenciling identification of the box on the cover.

Reason: To properly identify all junction boxes.

Result: Comply on both "X" airplanes.

5. Install practical wiring diagrams on the inside of all junction box covers.

Reason: To comply with Specification AN-A-42.

Result: Comply on both "X" airplanes.

6. Conduct temperature tests (flight and ground operations) in the main junction boxes and submit report to the AMC.

Reason: To assure that adequate ventilation is supplied for the voltage regulator.

Result: Comply on both "X" airplanes.

7. Install adequate protection for the inverters and other equipment located in the nose wheel well.

Reason: To prevent damage to equipment caused by stones, mud, dirt, water, etc. thrown up by the nose wheel.

Result: Provide on both "X" airplanes.

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8. Revise the battery rack to provide more clearance between the rack channel and battery rack mounting strips.

Reason: To facilitate maintenance and prevent mechanical damage to the batteries.

Result: Comply on both "X" airplanes.

9. Redesign the battery hold-in bracket and series connector so that hold-in pressure is applied at both sides of both batteries. Install AN3156-1 battery quick disconnect clamps in lieu of using nuts.

Reason: To provide adequate hold-in support and eliminate possible damage to the batteries caused by vibratio shock, etc. To provide quick disconnection of the batteries.

Result: Comply on both "X" airplanes.

C. Equipment Laboratory, Mechanical Branch:

1. Change fire detector wiring to fire resistant wire in all potential fire zones.

Reason: Present wiring is not suitable for high temperatures and in case of fire may be burned through before fire signal is given.

Result: Comply on both "X" airplanes.

2. A fire detector should be mounted immediately in front of each of the air exit louvers on the cowling under the engine compressor.

Reason: All air exits should be guarded to provide complete fire detection coverage.

Result: Comply on both "X" airplanes.

3. The left and right hand detectors on the engine cowling under the burner and turbine section should be moved 4 to 6 inches further out from the nacelle centerline.

Reason: To get detectors more completely into the path of air flow.

Result: Comply on both "X" airplanes.

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4. Place fire extinguishing control switch between fire detection lights in position now occupied by test switch and move test switch to right of lights. Switch should be two positions, momentary "on" with center "off".

Reason: To bring switch within convenient reach of the pilot and make switch easier to locate and operate.

Result: Comply on both "X" airplanes.

5. Improve fire detector wiring in region of nacelle near fuel and hydraulic pressure gages.

Reason: Present wiring is sloppy with slack wire running diagonally across back of gages and wiring to top detector is in same bundle with copper instrumentation tubing. These defects may cause shorts in wiring.

Result: Comply on both "X" airplanes.

6. Add a fire detector under the engine accessories.

Reason: This is a region where fires may originate, therefore a detector should be located near by for early detection.

Result: Comply on both "X" airplanes.

V. Equipment Laboratory, Automatic Pilot Unit:

1. Provide a cover to protect the automatic pilot components which are mounted in the nose wheel well, from dirt and water being thrown up by the nose wheel.

Reason: To increase the dependability and service life of the automatic pilot.

Result: Comply on both "X" airplanes.

2. Delete "A-12 gyro pilot" from the nameplate of the directional gyro control.

Reason: To eliminate confusion in servicing.

Result: Comply on both "X" airplanes.

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E. Electronics Subdivision, Components & Systems Laboratory:

1. Apply decal on each side of plastic fin tip antenna housing and other plastic antenna housings to warn personnel not to paint same before reading aircraft instruction manual. Insert appropriate painting instructions in manual.

Reason: To prevent antenna housings from being re-painted with improper type of finish.

Result: Comply on both "X" airplanes.

2. Safety all plugs and connectors in radio installation that are not readily accessible for pre-flight inspection.

Reason: To insure reliable radio operation.

Result: Comply on both "X" airplanes.

F. Power Plant Laboratory, Installations Unit:

1. Remove quick disconnect in oil in lines.

Reason: The disconnect is not approved for power plant fluid systems.

Result: Comply on both "X" airplanes.

2. Provide 1/2 inch drainage holes at all low places in bottom of fuel cell compartments.

Reason: To avoid dangerous collection of fuel due to faulty maintenance of tank fittings, battle damage, or fitting failure.

Result: Comply on both "X" airplanes.

G. Aero Medical Laboratory:

1. Change length of "G" suit disconnect assembly to 1 1/2 feet and delete bumper, bracket, and plug.

Reason: To provide a simplified disconnect assembly for the ejection seat.

Result: Comply on both "X" airplanes.

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2. Provide cleaner routing of personal leads from instruments to seat.

Reason: To prevent interference with seat and other equipment and damage to leads.

Result: Comply on both "X" airplanes.

3. Provide better mounting bracket for relief tubes.

Reason: Present brackets do not hold horn and appear very flexible.

Result: Comply on both "X" airplanes.

4. Provide a safety gate on the landing gear control to hold control in neutral position.

Reason: To prevent inadvertent operation of the landing gear.

Result: Comply on both "X" airplanes.

5. Install a wheel shaped knob on the landing gear control.

Reason: To aid in identification of the control in line with most recent shaped coding practice.

Result: Comply on both "X" airplanes.

6. Reverse the action of the elevator trim tab switch so that motion forward and up will cause nose down trim effect, and vice versa.

Reason: Present direction of motion is un-natural and the reverse of elevator trim control of other jet aircraft.

Result: Comply on both "X" airplanes.

H. Aircraft Laboratory, Hydraulics Unit:

1. Incorporate Curtiss-Wright redesign of hydraulic system which routes return line from booster servo valve directly to reservoir under emergency operation conditions.

Reason: To prevent locking of ailerons when landing gear or deceleration flap valves are in the open or closed position. To obtain smooth operation of ailerons in any position of the above valves.

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Result: Provide redesigned system on No. 2 "X" model airplane and future production articles. Provide by-pass for deceleration flaps on first "A" model airplane. Incorporate aileron boost manual cut-off on all airplanes.

2. Incorporate a positive detent in the landing gear control lever to indicate neutral position.

Reason: Neutral position of the control handle cannot be easily determined and will result in the handle being moved pass neutral inadvertently when operation of the gears is completed.

Result: Comply on both "X" airplanes.

3. Eliminate excessive play in aileron control which can be felt with power on or off.

Reason: To obtain smooth and continuous operation of ailerons.

Result: Eliminate if possible on both "X" airplanes.

4. Provide satisfactory brake pressure gage and have installation and operation checked by resident AAF Inspector.

Reason: Brake pressure gage as presently installed is defective and requires replacement.

Result: Accomplish on both "X" airplanes.

5. Re-route leads from micro-switch on landing gear scissors to prevent leads from contacting brake discs.

Reason: Brake disc becomes red hot and will damage the lead.

Result: Comply on both "X" airplanes.

6. Remove black paint on right aileron cylinder nameplate.

Reason: Information on nameplate is difficult to read.

Result: Accomplish as required.

7. Relocate reservoir nameplate.

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Reason: Servicing instructions cannot be read due to obstruction by other equipment.

Result: Provide on both "X" airplanes.

8. Repair leaks in left main gear brake lines near the brakes.

Reason: To prevent loss of fluid.

Result: Repair leaks subject to local Army inspection.

I. Aircraft Projects Section:

1. Provide a positive method of assuring that the control wheel cannot be engaged when not properly aligned with ailerons.

Reason: Flying safety.

Result: Provide on both "X" airplanes.

J. AC/AS-3:

1. Provide a positive lock for the landing gear control lever to indicate neutral position.

Reason: To prevent inadvertent operation of the landing gear.

Result: Comply on both "X" airplanes.

K. Aircraft Laboratory, Structures Branch:

1. Provide a safety on the seat hand grip that will prevent pulling of the ejection trigger before hand grips are locked into the up position.

Reason: Flying safety.

Result: Provide on both "X" airplanes.

L. Aircraft Laboratory, Design Branch:

1. Incorporate microphone and headset personal leads in disconnect fitting at leading edge of pilot and navigator seats.

Reason: To provide for easy disconnection on seat ejection.

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Result: Provide on both "X" airplanes.

2. Change marking on cockpit ventilation circuit breaker to include canopy actuation.

Reason: To properly identify circuit breaker.

Result: Provide on both "X" airplanes.

3. Make cabin temperature control hot and cold switch both actuated forward if two switches are used and if one switch is used make the cold position forward.

Reason: To avoid confusion and to standardize cabin temperature control.

Result: Provide on both "X" airplanes.

M. Local Army Inspection Clean-Up Items:

1. The following items extracted from the Local Army First Article Report require additional action by the contractor and acceptance by the local Army Inspector in charge prior to shipment of the No. 1 airplane to Muroc:

a. Provide drain holes and ventilation holes in wing panels and control surfaces.

b. Make necessary correction to insure that the hydraulic brake line will not fail at the fittings which are installed and held by strap-tight clamps just above the torque arm linkage.

c. Install a guard over the inside canopy operating switch.

d. Install brackets for correction cards, for a compass, and temperature.

e. Safety all cannon plugs forward of instrument panel.

f. Install aircraft data plate.

g. Correct excessive play in operation of seats fore and aft.

h. Provide adequate support for the fuel vent line installed over the main fuselage tank.

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i. Install filters in accordance with Paragraph E-6B(19) of Model Specification 9566.

j. Install radio call plate.

k. Assure that the landing light limit switches have sufficient actuation for dependable operation.

l. Investigate the condition of open contact relays being installed in areas where fuel vapor is apt to be present and replace with vapor proof types if necessary.

m. Provide drip loops in accordance with Specification AN-W-14a.

n. Complete marking of instrument panel to indicate use of instruments and controls.

o. Reduce the excessive play in stabilizer actuator.

p. Re-route or adequately support the flex lines to aileron actuators in wing panels to prevent chafing of the lines.

q. Provide a placard, not necessary in cockpit, to indicate location and type of leveling provisions.

r. Provide legible identification of all electrical wiring.

s. Investigate the operation of oxygen demand regulator when mounted in upside down position and correct mounting position if required.

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APPENDIX "B"

A. Equipment Laboratory, Instruments & Navigation Section:

1. Provide more clearance between light shield and variation knob on air position indicator computer.

Reason: Shield interferes with operation of variation knob.

Result: AMC will consider for redesigned cockpit on production airplanes. No action "X" airplanes.

2. Re-work oil pressure transmitter bracket to accommodate both oil and fuel transmitters.

Reason: To make transmitters accessible for convenient servicing and maintenance .

Result: AMC will consider for future production. No action on "X" airplanes.

3. Provide a more suitable method or type of indicator for trim tab position indication.

Reason: Scales are too short and hard to read.

Result: AMC will consider for production airplanes. No action "X" airplanes.

4. Re-locate the flush static ports to a position uneffected by gun blast.

Reason: Flush static will be effected by gun blast.

Result: Determine optimum location for flush static ports during flight testing of No. 1 airplane and re-locate ports on all subsequent airplanes.

B. Armament Laboratory:

1. Submit drawings on the proposed photo flash bomb installation in bomb bay of photographic version to the AMC, Attn: Armament Laboratory, TSEPS, for comments and/or suggestions.

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AP-87 Airplane, Serial No. 45-59600

Reason: None

Result: Submit as requested.

2. Re-consider carrying bombs in bomb bay rather than on wing tips.

Reason: To eliminate complicated wing tip adapters and increase bombing range of airplane.

Result: No action by the contractor, AAC and AC/AS-4 will investigate.

3. Equipment Laboratory, Electrical Unit:

1. Install upper and lower fuselage lights, tail lights, and flasher controls in accordance with Figure 3 of U.S. Army Specification 94-32265E.

Reason: To conform with AAF requirements for flashing position lights.

Result: Install when supplied as C.F.P. Switch on No. 1 airplane should agree with lights presently installed.

2. Install ultraviolet cockpit lamp assemblies for instrument lighting in lieu of the red light system. The quantity and location of the lamp assemblies shall be such that the instrument panel is evenly illuminated with ultraviolet light and reflections will not be present in the cockpit.

Reason: To conform with AAF requirements for instrument lighting.

Result: AAC will consider for production airplanes. No action "X" airplanes.

3. Delete the landing gear position indicator instrument and install three green and one red indicator lamp assemblies in lieu thereof.

Reason: To install the proper landing gear position indicating system required by the AAF.

Result: AAC will consider for production airplanes. No action "X" airplanes.

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4. Re-locate the external power receptacle to a position in the fuselage in lieu of the nose wheel well.

Reason: To conform with AAF requirements; to allow retraction of the gear while using external power.

Result: No action "X" airplanes. AMC will consider relocation for production airplanes.

5. Submit certified test reports of tests conducted in accordance with Specification AN-M-10a, or samples of all electrical motors which have not been previously approved by the AMC.

Reason: To assure compliance with AAF requirements.

Result: Submit reports as they become available.

6. Measure the voltage drop between the external power receptacles and starter terminals at 1000 amperes. If the voltage drop exceeds 2 volts, install additional cable or re-locate the receptacles to a position where two volts will not be exceeded.

Reason: Maximum allowable voltage drop at 1000 amperes is 2 volts.

Result: No additional action by the contractor. TSEOA-4, AMC will provide copy of above requested report.

7. Install a jet starter relay assembly (Hartman Part No. A-711 or equal) in the starter circuit in lieu of the timer mechanism. Also install micro X-2033 switches for starter control in lieu of the switches now installed.

Reason: To conform with AAF approved starting system.

Result: AMC will consider for future production airplanes and for C-6 engine change. No present action on "X" model airplanes.

8. Install wing type Dzus fasteners, or equal, on junction box covers in lieu of the screw type where ever practicable.

Reason: To facilitate maintenance.

Result: AMC will consider for production airplanes. No action "X" model airplanes.

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9. Install additional lights on the trailing edge of the wing tip or install the wing tip lights at the center of the wing tips in lieu of the leading edge.

Reason: To conform with AAF requirements for visibility of 180° horizontally and vertically.

Result: AMC will consider for production airplanes. No action "X" model airplanes.

10. Re-route electrical cable (where practicable) to avoid passing under hydraulic lines and accumulators and fuel lines.

Reason: To comply with AAF requirements.

Result: Comply where practicable on "X" airplanes.

D. Equipment Laboratory, Mechanical Branch:

1. Install fire warning lights in accordance with Specification AN-3157-6.

Reason: This is the approved standard light for fire warning purposes.

Result: AMC will consider for production airplanes. No action "X" model airplanes.

2. Submit samples of fire detection circuit disconnects to AMC for test and approval.

Reason: Disconnect is not an approved type and seems to be of a design which may be adversely affected by moisture or corrosion.

Result: Contractor will submit samples as requested.

3. Re-locate hand fire extinguisher to a position on forward side of the armor plate between the seats.

Reason: To make extinguisher more accessible to both crew members.

Result: Provide A-2 fire extinguisher in new location when supplied as G.F.P.

4. Revise anti-icing system to provide for introducing air into chord-wise heating ducts at the leading edge of the wing. Provide anti-icing on slot

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between fuselage and nacelle and provide heat quantity and distribution as required by the "wet air" analysis for condition of 415° F., 0.5 grams per cubic meter, 15 microns diameter water droplets.

Reason: Present anti-icing system is inadequate for ice prevention.

Result: Provide above anti-icing requirements for production airplanes. No action "X" airplanes.

5. Provide the heat for anti-icing by combustion heaters or compressor air bleed in lieu of the present heat exchanger installation. Combustion heaters with blowers for ground operation would be most desirable.

Reason: Either of these suggested heat sources would be lighter in weight than the present installation and if combustion heaters are used ground operation of the system would be possible.

Result: AMC will consider change on C-6 engine installation and future production airplanes. No present action on either "X" model airplanes.

6. Install over-heat detectors in wing or tail structure to detect excessive structural temperatures. This detector or detectors should operate a warning light in the cockpit and actuate the valve closing off the anti-icing air supply.

Reason: To prevent over-heating of wing structure by inadvertent operation of anti-icing system in warm weather or by failure of "Vernay" control unit.

Result: Determine optimum location for over-heat detectors during flight testing of No. 1 article. Install on No. 2 "X" airplane and future production airplanes if necessary.

7. Install air conditioning and pressurization system as called for by Model Specification 9566.

Reason: Contractual requirement. System will be required to bring cockpit temperatures within range of human tolerance for conditions of extremes of temperature speed or altitude.

Result: Install system as required by Model Specification when components become available.

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8. Pressurization and ventilation should be controlled by one lever or switch so that when pressurization is selected the pressure air shut-off valve is opened, the ram air valve is closed, and the pressure regulator is closed and when ram air is selected the above sequence is reversed.

Reason: To simplify air conditioning controls and to make controls in accordance with Handbook of Instructions for Airplane Designers.

Result: AMC will consider for production airplanes. No action "B" airplanes.

9. On any future production models replace the present canopy defrosting tube with a duct employing a slot nozzle to direct the air towards the canopy.

Reason: To improve defrosting by making more efficient use of available air and to make a neater installation.

Result: AMC will consider for future production. No action "B" model airplanes.

10. On any future production of this airplane revise the windshield defrosting to eliminate central defrosting nozzle and direct air to side panels from a duct and slot nozzle running the full length of the panel across the bottom.

Reason: "Mesa Glass" will provide all the defrosting necessary for center panels and present nozzles and ducts for side panels are needlessly complicated and inefficient.

Result: AMC will consider for future production airplanes. No action "B" airplanes.

11. Contractor should conduct sufficient laboratory tests on temperature controls for the "Mesa Glass" to insure proper and safe operation. Tests should include at least high and low temperature and altitude. Test report should be submitted to AMC for approval.

Reason: To insure proper operation of this equipment.

Result: Provide test reports when completed.

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E. Equipment Laboratory, Automatic Pilot Unit:

1. Replace the autopilot disconnect lever now mounted between the seats with two red "T" handles mounted on the floor about 2 inches out from the front edge and each side of the pedestal. Placard side of pedestal "Autopilot Emergency Disconnect".

Reason: To avoid confusion with other levers and to improve accessibility of the autopilot emergency disconnect.

Result: AMC will consider for production articles. No action "X" airplanes.

2. Replace the slide assemblies now used to provide slack in the emergency disconnect cable with a simple spring.

Reason: Present assemblies are too complicated and are subject to possible freezing due to corrosion or dirt.

Result: AMC will consider for future production. No action "X" airplanes.

3. Label junction box cover "F-1 Autopilot Junction Box". Re-locate junction box to a more accessible position if possible. Label terminals according to standard F-1 junction box drawing.

Reason: To facilitate servicing.

Result: Label boxes and terminals as requested. No action to re-locate junction boxes on "X" airplanes.

4. Add autopilot electrical disconnect switch to the left-hand crossbar of the control wheel in a position similar to the aileron trim tab switch.

Reason: No disconnect switch is provided at present. This requires the pilot to pull out the clutch switch on the instrument panel, which is undesirable because the pilot does not have full control of the airplane when the automatic pilot is disconnected.

Result: No action "X" model airplanes.

5. Move automatic pilot power switch and clutch switch from present instrument panel location to a panel on the pedestal adjacent to the turn and pitch controller.

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Reason: To consolidate automatic pilot controls for greater simplicity.

Result: AMC will consider change for C-6 engine installation in future production. No present action on "X" airplanes.

6. Provide better lighting for the vertical gyro control.

Reason: Although the vertical gyro is not used as a primary flight instrument, the present lighting is inadequate for use in case of failure of the universal altitude indicator.

Result: No action on "X" airplanes.

7. Access to the amplifier adapter is essential during calibration flying of the automatic pilot. Access can be provided by temporarily removing the adapter from the nose wheel well and connecting it in the cockpit by means of extension cables or permanently mounting it in the cockpit.

Reason: Access to the amplifier adapter is essential for calibration of the automatic pilot.

Result: Contractor will provide automatic pilot calibration in accordance with airplane model specification by any means desired.

F. Components and Systems Laboratory:

1. Provide a suitable disconnect for loop and sense antennas in canopy. The proposed disconnect to be manually fastened and unfastened by the pilot or co-pilot is not satisfactory.

Result: No action on first "X" airplane. Provide on second "X" airplane and future production.

G. Power Plant Laboratory, Installations Unit:

1. Re-locate fuel line preceding the fuel shut-off valve so as to avoid passing behind the fire wall. If impracticable, remove fire wall shut-off valve.

Reason: Present routing defeats purpose of the fire wall shut-off valve. Main system selector valve can operate as a shut-off if relocating line proves impractical.

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Result: Delete control switch for firewall shut-off valve on "X" airplanes. AMC will consider re-routing fuel lines for future production.

2. Provide sealing between fuel cell compartment and remainder of the fuselage.

Reason: To prevent ignition of leakage from tanks due to fitting failure or battle damage. Radio equipment and various electrical equipment surrounds tank compartments.

Result: AMC will consider a change following receipt of study from contractor. No present action required on "X" airplanes.

3. Study the possibility of cleaning up the fuel control grouping top fuselage to avoid vulnerability to battle damage (armor plating may be considered).

Reason: Present configuration concentrates every vital fuel line into one small area.

Result: No present action required on "X" airplanes. See Comment No. 2 above.

4. Provide more adequate sealing of fire diaphragm between engine burner and compressor sections.

Reason: The presently used rubber seal can deform and become ineffective as a seal. The maximum temperature limit of the seal is approximately 600°F.

Result: AMC will consider change on production airplanes. No action on "X" airplanes.

5. Re-submit oil system design data to AAF for approval.

Reason: Pressurized oil system requires specific approval.

Result: Re-submit as requested.

6. Self-sealing hose may be eliminated for all fuel lines.

Reason: AC/AS-3 directive.

Result: Eliminate at contractor's disposal on "X" airplanes. Comply on future production airplanes.

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7. Re-design all drain outlets which are flush mounted in such a manner that liquid drainage will fall free of aircraft under any and all conditions of operation.

Reason: Possible fire hazard.

Result: AMC will consider for production airplanes. No action "X" airplanes.

8. Provide adequate drainage system for fuel connections compartment over mid-wing section. This system should be proven in a test which sloshes liquid into this compartment and complete observations should assure that drainage is rapid and thorough with no fuel pockets remaining.

Reason: Possible fire hazard due to close proximity of fuel and electrical equipment.

Result: No immediate action on "X" airplanes. Investigate the part of study on sealing of fuel line compartment.

9. Add electrically operated oil shut-off valve as close to forward firewall as possible.

Reason: To have consistent degree of fire protection in installation. It is considered necessary to isolate oil if the total volume exceeds 5 gallons per engine.

Result: No action "X" airplanes. AMC will consider for production.

10. Sufficient bumpers or spacers similar to those presently installed should be added to assure that no surface of any fuel tank under maximum deflection rubs against the aircraft structure or equipment.

Reason: Prevent tank failure and excessive wear and accompanying fire hazards.

Result: Provide if flight tests prove necessity.

H. Aero Medical Laboratory:

1. Re-locate pilot's oxygen pressure gage and flow indicator to a readily accessible position.

Reason: Present position of the pressure gage and flow indicator is unsatisfactory inasmuch as it cannot be seen by the pilot.

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Result: AMC will consider re-location for production airplanes. No action "X" airplanes.

2. Re-locate cabin altimeter to a readily visible position.

Reason: The present position between seats is unsatisfactory inasmuch as the altimeter cannot be readily seen and is necessary for proper use of oxygen and settings on oxygen regulator.

Result: AMC will consider re-location for production airplanes. No action necessary on "X" model airplanes.

3. Locate cabin altimeter altitude warning light and altitude warning light switch together.

Reason: Since these items are interconnected insofar as use is concerned, they should be located together for easy identification and use by pilot.

Result: AMC will consider re-location on production airplanes. No action on "X" model airplanes.

4. Re-locate navigator's anti-"G" valve on navigator's console and install as a unit.

Reason: To place instrument in an accessible position and to facilitate installation and maintenance.

Result: AMC will consider re-location on production airplanes. No action "X" model airplanes.

5. Re-locate navigator's oxygen pressure gage and flow indicator forward on console.

Reason: To place instrument in a position where it can readily be seen.

Result: AMC will consider re-location for production airplanes. No action on "X" model airplanes.

6. Provide one manual control lever for cabin air, ram air, and dump valves. Locate accessible to pilot.

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App. "B" to Eng. Div. Memo. Rpt. No.
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28 October 1947

Reason: One lever required to operate three valves to maintain ventilation. Also simplify the emergency operation which has one valve for ram air, one valve for dump, one switch on navigator's panel for cabin ventilation, and one switch on pilot's panel for cabin ventilation and pressurization.

Result: AMC will consider for production airplanes. No action on "X" model airplanes.

7. Change spring loads on ejection seat fore and aft and vertical adjustment.

Reason: Seat is difficult to move with present spring tension.

Result: No action required.

8. Provide better transparent sections in canopy and side windshield panels.

Reason: Present transparent sections provide too much distortion.

Result: No action on "X" model airplanes. Investigate better materials for future production.

9. Raise and rotate oxygen filler valve box so that it faces inboard.

Reason: To provide for easier reading of instructions and filling of system.

Result: AMC will consider for production airplanes. No action on "X" model airplanes.

10. Provide better access to oxygen fittings for leak testing and tightening.

Reason: Numerous present fittings in console, wheel well and compartment aft of cockpit are inaccessible and would require considerable time for maintenance.

Result: AMC will study methods of moving the oxygen system for production airplanes. No action required on "X" model airplanes.

11. Rear view mirror should conform to AAF Drawing No. 45B7509.

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Reason: To provide the best possible mirror and for standardization.

Result: Comply on production airplanes. No action required on "X" model airplanes.

12. Change design of rudder trim control switch to achieve more logical relation to direction of control effect.

Reason: Knob of present switch resembles rear rim of rudder trim wheel which would move in opposite direction for desired control effect.

Result: No action "X" model airplanes.

13. Re-locate parking brake control from present location to position at right of emergency brake control on pedestal.

Reason: Difficult to find in present location and likely to be confused with wing tank release.

Result: AMC will consider re-location on C-6 engine installation. Re-locate on No. 2 "X" airplane to the front bottom instrument panel adjacent to the rudder pedal adjustment control.

14. Re-locate autopilot release control from present location to position on instrument panel or upper control pedestal.

Reason: Too difficult to locate and likely to be confused with wing tank release or parking brake.

Result: No action on "X" model airplanes. AMC will consider re-location for production.

15. Re-locate the wing tank release control to a more accessible position. Switch control adjacent to fuel selectors is suggested.

Reason: With arm rests for both seats in position and with formation stick in operating position, reaching the wing tank control is very difficult.

Result: AMC will consider re-location on C-6 engine modification for No. 1 airplane. Re-locate on No. 2 "X" model and subsequent production models using manual control.

16. The indicating areas of the trim tab position indicator should be enlarged, pivots for rudder and aileron trim should be at center rather than edge, and instrument should be in more visible location.

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Reason: Present instrument is difficult to read with precision, does not give most natural indication, and is hidden by control column.

Result: No action on "X" model airplanes.

17. Replace control column and wheel with stick.

Reason: The folding column is a hazard and cause of delay during ejection procedure. All necessary controls could be placed on stick grip.

Result: No action on "X" model airplanes.

18. Re-locate the flight control gust lock in a more visible position. Position on left wall of pedestal, with control obstructing pilot's right leg when locked, and flush with panel when unlocked, is suggested.

Reason: Control is invisible and difficult to operate in present location.

Result: No action on "X" model airplanes. AMC will consider new location for production.

19. Remove interference between formation stick and hand hold at right side of pilot's seat.

Reason: Hand hold cannot be moved without striking formation stick.

Result: No action required on "X" model airplanes.

20. Optical distortion of flat glass panels in windscreen is excessive. Panels should be of Grade A, Type I glass.

Reason: Handbook requirement.

Result: No action required on "X" model airplanes. [illegible] better materials for production airplanes.

I. Aircraft Laboratory, Hydraulics Unit:

1. Re-locate access panel for re-filling reservoir such that panel opening is directly above filler opening of reservoir.

Reason: Present opening is located approximately 7 inches [illegible] of the reservoir filler opening, creating an offset which probably [illegible]

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long funnel. Filling reservoir from within baggage compartment appears difficult.

Result: No action required on "X" model airplanes. AMC will consider change for production.

2. Study possibilities of reducing control forces required to operate the ailerons with the power boost system off.

Reason: Reduce anticipated pilot fatigue for operating ailerons when hydraulic pressure is not available.

Result: No action required on "X" model airplanes. Investigate for future production.

3. Provide either a manual override for deceleration of flap valve or by-pass valve as per Curtiss-Wright revised hydraulic schematic diagram.

Reason: To prevent system being charged to 3000 p.s.i. in the event of electrical failure while flap valve is out of neutral. Also to prevent locking of ailerons.

Result: Accomplish on No. 1 and No. 2 "X" model airplanes as per comment contained in Appendix "A".

4. Improve accessibility of the electro-mechanical flap and slat actuator and deceleration flap hydraulic cylinder and correct nomenclature on access panels.

Reason: Present location requires removal of an excessive number of screws.

Result: Correct nomenclature on both "X" airplanes. AMC will consider improved accessibility on future production.

5. Provide facilities for draining main and nose gear oleo struts on subsequent models.

Reason: To facilitate maintenance.

Result: Provide on production airplanes. No action required on "X" model airplanes.

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6. The main and nose gear door operating mechanism operated satisfactorily when tested during the Engineering Acceptance Inspection, but it is considered that the contractor should investigate the possibility of simplifying the mechanism for future production models.

Reason: To reduce the possibility of excessive maintenance.

Result: Contractor will investigate method of improving system for production airplanes. No action required on "X" model airplanes.

7. Brake pedal forces for full brakes appeared excessive, causing difficulty in operating latch for parking brakes.

Reason: None.

Result: Check brake pedal forces during taxi tests and adjust if necessary, subject to AAF local inspection.

8. Study possibility of re-routing the main landing gear brake hose to eliminate the existing condition where hose hangs within approximately 6 inches from the ground.

Reason: To reduce possibilities of damaging brake hose on take-off and landing.

Result: Investigate for future production. No action required on "X" model airplanes.

9. Study feasibility of installing check valves in return lines to reservoir near the reservoir.

Reason: To prevent total loss of fluid if one of the return lines are ruptured by gunfire.

Result: No action required on "X" airplanes. AMC will consider change for future production.

10. Replace existing 3000 p.s.i. hydraulic disconnects (155 series) with new disconnects of improved design.

Reason: Laboratory tests at the AMC revealed that the O-ring seal in the disconnects used in the subject airplane extrude under impulse tests and leak continuously.

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Result: No action required until replacements are necessary. When replacement is necessary, install the improved disconnects.

11. It appears that the down and up line hoses to the nose gear cylinder rub each other during extension and retraction of the gear. This condition should be eliminated on the No. 2 airplane.

Reason: To prevent chafing of hose needlessly.

Result: No action required on "X" model airplanes.

12. Re-route electrical wires running behind accumulator in baggage compartment, and electrical lines running under and adjacent to landing gear down line in the nose compartment.

Reason: Any oil seepage would cause insulation to deteriorate, increasing the possibility of a fire hazard.

Result: Re-route as far as possible consistent with no delay to the "X" model airplane.

13. Reduce spacing between supports on brake lines on front wall of compartment behind nose wheel. Spacing checked approximately 17 inches, whereas specification requires 13 1/2 inches maximum for 1/4 inch lines. The same condition prevails at various other locations. This should be checked and corrected if necessary.

Reason: Required by Specification AN-H-2.

Result: No action necessary on "X" airplanes unless proven necessary by flight testing.

14. Provide rearward towing lugs.

Reason: To facilitate rearward towing and prevent excessive loading of nose wheel strut if pushing is attempted with main wheels frozen to ground.

Result: No action required on "X" model airplanes. AMC will consider for future production.

15. Improve accessibility of emergency brake air bottle on future airplanes.

Reason: To facilitate maintenance.

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XP-87 Airplane, Serial No. 45-59600
28 October 1947

Result: No action required on "A" model airplanes. ANC will consider re-location for future production.

J. AC/AS-3:

1. The mass of the circuit breakers should be removed from the cockpit.

Reason: To clean up the cockpit and allow space for radio installation and other more important items.

Result: No action required by contractor. ANC will study possibility of removing circuit breakers from cockpit as requested by AC/AS-3.

2. Re-locate pilot's oxygen blinker.

Reason: To enable pilot to see instrument.

Result: No action required on "A" model airplanes. ANC will consider re-location for C-6 engine change and future production airplanes.

3. Place brake pressure gage where pilot can see it at night without light from instrument panel.

Reason: Gage cannot be seen in present location without considerable trouble.

Result: No action required on "A" model airplanes. ANC will consider re-location on C-6 engine change and future production airplanes.

4. The control wheel should be completely detachable at top of control column instead of hinging backward.

Reason: To give pilot's feet clearance during seat ejection.

Result: No action required on "X" model airplanes. Contractor will investigate a better method of removing the control wheel from the path of the ejection seat for use on possible future production airplanes.

K. Aircraft Laboratory, Structures Branch:

1. Provide the necessary clearance to prevent the control tube on the left side of the baggage compartment from chafing the electrical wiring.

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28 October 1947

Reason: To prevent damage to electrical insulation and to assure free action of the control system.

Result: Contractor will provide on both "X" airplanes subject to local Army inspection.

2. Re-locate the canopy release knob to the airplane structure.

Reason: For standardization of ejection procedure.

Result: No action required on "X" model airplanes. AMC will consider re-location for production airplanes.

3. Check the mirror installation on the canopy to insure that mirror clears the pilot and armor plate on seat when canopy is ejected.

Reason: To prevent mirror striking the pilot's head or head armor plate.

Result: Investigate and re-locate mirror if necessary on both "X" airplanes.

4. Install the necessary controls for the ejection seat to cause seat to move aft and down when hand grips are raised into position.

Reason: To standardize ejection seat procedure.

Result: No action required on "X" airplanes. AMC will consider for future production.

5. Make the necessary changes to prevent the co-pilot's seat arm rest from catching on the fore and aft adjustment cable when seat is raised or lowered.

Reason: To prevent fouling of the arm rest and adjustment cable.

Result: Provide as requested subject to local Army inspection.

6. Provide some means of insuring that the pins that lock the seat will engage in the seat guide tubes simultaneously.

Reason: To prevent engagement of seat locking pins on one side only.

Result: No action on "X" model airplanes. AMC will consider change on future production airplanes.

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7. The right-hand grip of pilot's seat cannot be raised with the seat in the forward position. Necessary clearance should be provided.

Reason: To prevent interference with the pilot's hand grip and the control pedestal.

Result: No action required on "X" model airplanes. AMC will consider re-design on future production airplanes.

8. Eliminate the crazing of the transparent plastic panels in the windshield.

Reason: To improve visibility and decrease distortion.

Result: No action required on "X" model airplanes. Contractor will investigate better materials for use in future production airplanes.

9. The control wheel cannot be folded forward into position for pilot ejection until column is pulled aft because of interference with instrument panel glare shield. Control column should be re-designed to permit complete removal of the wheel.

Reason: To provide pilot's seat clearance upon seat ejection.

Result: No immediate action required on "X" model airplanes. Contractor will investigate improved methods of removing the control wheel as required by previous comment.

10. The flight control lock handle should be made more accessible and painted a red color.

Reason: To improve accessibility and identification of flight control lock.

Result: No action required on "X" model airplanes. AMC will consider re-location on future production airplanes.

L. Aircraft Laboratory, Design Branch:

1. Provide better legibility of engraving on instruction placards. Several placards are already illegible.

Reason: To improve legibility of instruction placard.

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TSEOA-4-1387, Engin. Acceptance Inspec.,
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28 October 1947

Result: Contractor will replace placards which become illegible.

2. Provide red lights for console lighting on aircraft that may fly at night.

Reason: To insure that equipment mounted on the console may be readily identified and operated at night.

Result: No immediate action required. AMC will consider addition of console lights on the C-6 engine modification and future production airplanes.

3. Provide greater dimming control on all lights. Present maximum dimming still provides too much light for night operation.

Reason: None

Result: No action required on "X" airplanes. AMC will consider changes for future production airplanes.

4. Re-locate tip tank release approximately 3 - 4 inches to right of rudder pedal adjustment.

Reason: To improve accessibility and prevent confusion with other controls.

Result: No immediate action required on either "X" airplane. AMC will consider re-location in C-6 engine change and future production airplanes.

5. Re-locate parking brake approximately 3 - 4 inches to the left of the rudder pedal adjustment.

Reason: To improve accessibility and prevent confusion with other controls.

Result: No action required on No. 1 "X" airplane. Re-locate on No. 2 and subsequent airplanes as required by previous comment.

6. Incorporate the use of the type switch that has the OFF position perpendicular to the switch base. Use a three position switch if necessary and block off rear position.

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28 October 1947

Reason: To standardize the position of all switches while in the "off" position.

Result: No action required on "X" model airplanes. AMC will consider changes on future production airplanes.

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Eng. Div. Memo. Rpt. No. TSEOA-4-1387
Engin. Acceptance Inspec., XP-87 Airplane,
Serial No. 45-59600
28 October 1947

APPENDIX "C"

1. No further action is necessary by the contractor to provide special tools and ground handling equipment for the two "X" model P-87 airplanes. However, for future production airplanes special tools shall be provided and modified in accordance with AMC, Engineering Division Memorandum Report No. TSEPE-430-19 dated 23 September 1947, entitled "Special Tools and Ground Handling Equipment for the XP-87 Airplane".

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TSCAD Form No. 6 (4 APR 47)

TSTEX/5-4102

HEADQUARTERS
AIR MATERIEL COMMAND

Wright Field, Ohio
28 October 1947

TECHNICAL INSTRUCTIONS

SERIAL NO: TI 2087, Addendum No. 3

SUBJECT: Study of XP-87 Photographic Potentialities

TO: Engineering Division
Supply Division

1. Problem Presented:

a. To exploit the photographic potentialities of the XP-87 airplane in order to determine this airplane's adaptability to an all purpose tactical reconnaissance aircraft (to include night photographic reconnaissance) that will overlap the missions of strategic reconnaissance.

2. Factual Data:

a. The fabrication and development of a highly versatile photographic installation capable of meeting the requirements stated in paragraph 1 is highly desirable. It is essential that the photographic study, fabrication and tests of the XP-87 be conducted in such a manner that the results gained will be adaptable to all types of aircraft bordering on sonic speeds that have reconnaissance possibilities.

b. It is also necessary that a special effort be made to incorporate in this study the latest types of reconnaissance and associated equipment. Consideration should be given to all equipment, not necessarily equipment that is in production, but also developmental equipment that might be available within the foreseeable future. Provisions should also be made for a suitable viewfinder installation.

3. Authority:

a. HQ USAF by first indorsement dated 3 Oct 47, subject: "Photographic Installation in XP-87 Aircraft" from AFDRE-2D (AC/AS-

4. Action Desired:

a. Engineering Division will accomplish that required in "Problem Presented" and further amplified in "Factual Data".

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b. Supply Division will furnish any materials and equipment required.

c. A priority of 1-C is assigned this project.

BY COMMAND OF GENERAL McNARNEY:

OFFICIAL:

JAMES F. McCLENDON
Colonel, USAF
Adjutant General

AIR MATERIEL COMMAND OFFICIAL HEADQUARTERS

JAMES F. McCLENDON
Colonel, USAF
Adjutant General

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ADDRESS REPLY TO
ARMY AIR FORCES
WASHINGTON, D. C.

WAR DEPARTMENT
HEADQUARTERS OF THE ARMY AIR FORCES
WASHINGTON, D. C.

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SUBJECT: Request for Permission to Negotiate Procurement

TO: Chief, Current Procurement Branch
Supply, Service and Procurement, AAF

1. Pursuant to Procurement Regulation dated 1 November 1947, the U.S. Air Force requests authority to negotiate the following procurement:

a. Contractor: Curtiss-Wright Corporation, Columbus 16, Ohio.

b. Supplies: Modification of one (1) XP-87 airplane, Serial Number 45-59600 and installation of a J-35 power plant to be followed by ground testing and furnishing of engineering data covering the J-35 power plant installation which shall include calculated performance report, master index of drawings, weight report, and appropriate supplements or revisions to the Pilot's Handbook of Operating Instructions and the Erection and Maintenance Handbook. In addition, contractor shall prepare a list of spare parts which will not exceed $15,000 in cost to be used as replacements for modified portions of the airplane and to aid engine installation.

c. Price: Estimated price is $975,317.00.

d. Time of Performance: All work is to be completed by 1 August 1948.

e. This is the first time this particular type of work has been requested in connection with the XP-87 airplanes; however, it is in the nature of an extension of the work called for under Contract W33 038 ac-5266 with Curtiss Wright Corporation which covers Phase I and Phase II requirements for the XP-87 airplane.

f. Funds to be obligated: 1948 Fiscal Year.

2. Negotiation of this procurement is authorized by APR-4-115.

3. Procurement by negotiation is necessary for the following reason: Contractor will have to modify the XP-87 airplane built by Curtiss Wright. This modification will include fabrication and installation of removable nacelles for the J-35 engine, new landing gear and landing gear strut doors, new engine access doors, new nacelle tail cone, and water injection system. It will require modification of nacelle fixed equipment, engine controls, cockpit

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

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(F[illegible], USAF, LT[illegible], re: Request for Permission to Negotiate Procurement., to: [illegible]f, Cur.Proc. Br., Supply, Service & Procurement, USAFA.)

installations, [illegible] normal and flight test instrumentation. Since contractor is most familiar with the aircraft and has much of the tooling and machinery, drawings, all know-how acquired while producing the two (2) XF-[illegible] airplanes, it is considered more economical, quicker, and reliable to have Curtiss-Wright do the work necessary to carry out this modifications.

[illegible]

Ralph J. Cannon

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

6 November 1947
RRA:EW:714

Subject: Contract W33-038 ac-[illegible]
Model XP-87 Airplane
Power Turret Proposal for No. 2 Airplane

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: [illegible]

Through: USAF Officer in Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

References: (a) CW Ltr RRA:EW:107 dated 1[illegible] March 1947
(b) CW Ltr RRA:EW:651 dated 2[illegible] September 1947

Enclosure: (A) Cost Estimate Breakdown

1. This Contractor's letter reference (a) submitted a cost proposal for the incorporation of a simulated turret in No. 2 XP-87 Airplane, such installation to be accomplished in its entirety before the airplane was to have left this Contractor's plant. However, reference (b) quotation superseded reference (a) inasmuch as it was understood that contractual coverage could not be issued for the entire installation at that time. Reference (b), therefore, quoted for installing the power turret in two different phases. Phase II to be accomplished at a later date on the return of the airplane to this Contractor's plant.

2. As a result of a further informal inquiry from the Air Materiel Command, this Contractor has prepared an estimate of the costs involved in accomplishing subject installation as an integrated program, with no time interval between shell and mechanism installation. For accomplishing such a complete nose turret installation in the XP-87 No. 2 Airplane, this Contractor quotes herewith a total price of $98,[illegible]8.67. A breakdown of this quotation is contained in Enclosure (A) attached hereto.

3. It will be noted that this quotation reflects a reduction of $1,241.33 from that price quoted by reference (b), such credit resulting primarily from the following changes which would be applicable in the event of a single phase program:

(a) Deletion of ballast provision modifications
(b) Reduction in fitting and installation costs
(c) Reduction in preflight operations

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The actual credits resulting from these changes are made less substantial because of the delay involved in establishing a definite go-ahead for the entire program. An integrated program, as proposed originally, would have resulted in a reduction in engineering costs. However, since the basic engineering for Phase I has already been accomplished and since all items of Phase II will be required for either program, no reduction can be made. Further, the delay in initiating the program prevented subcontracting of certain major components, which factor it is estimated will extend the delivery schedule at least three months, thereby nullifying any schedule and cost reduction. Column 3 of Enclosure (A) reflects the additional tooling charges which are necessitated in the construction of a temporary tool for line-up of the nose assembly pending receipt of the turret rotating actuating mechanism. Column 4 of Enclosure (A) reflects the net charges resulting from a consideration of all credit and debit items involved as discussed above.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J. Ducayet
Contracts Manager

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION-COLUMBUS PLANT

COLUMBUS 16, OHIO

[redacted] 7 November 1947

Subject: Contract W33-038-ac-6266
Simulated Turret for Second Airplane

To: Commanding General
Air Material Command
Wright Field
Dayton, Ohio

Attention: Unit TSEOA-1

Through: USAF Officer in Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

OBT/Rw
con-4 ac 6266

Reference: (a) C-W letter [illegible], dated 26 Sept. 1947,
(b) C-W letter [illegible], dated 6 Nov. 1947.

1. This Contractor, in an effort to insure compliance with guarantees and satisfactory operation of component parts in the XB-47 airplane, has at its own expense, (in over $[illegible]), fabricated and tested a simulated turret to obtain power plant data, as well as fabricating a high speed wind tunnel model and testing same in the Wright Tech. Consol. The results of these tests have been very gratifying.

2. This Contractor considers the turret installation to be one of the outstanding design features of the XB-47 and as a result has conducted numerous theoretical analyses to show its superiority over a tail turret installation. Due to faith in this analysis and the realization that problems existed which could be solved only by actual flight testing, this Contractor proceeded to engineer the entire simulated turret, fabricate the gun shell based on the indication by Wright Field that contractual coverage would be made subsequently. Approximately $[illegible] has been spent by this Contractor to date on the simulated turret. Basic tests by Wright Field, with a B-29 airplane on gun barrel protuberances at various angles substantiated this Contractor's contention that only by all the testing could certain results be acquired as no theoretical data could determine the loss in speed, drag, and g's value between gun turrets necessary.

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From: [redacted]

To: Commanding General
Air Materiel Command
Wright Field
Dayton, Ohio

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3. It is this Contractor's opinion that the simulated turret will bridge the gap of unknowns that now exists between the P-80 tests and the actual turret being manufactured by Martin under Contract W33-038-ac-14264. Some of these unknowns are as follows:

a. Drag and buffeting effects on the airplane at variation of speeds, angular gun setting and rotational gun setting.

b. Effects on stability and degree of trim changes necessary to compensate for sudden changes in gun positions.

c. Effects on stability and control resulting from gun recoil loads at positions approaching normal.

d. Loads required to meet turret accelerations specified.

e. Accuracy of turret when manually controlled and fired at tow targets.

f. Check of installation as a whole and airworthiness of the platform.

4. Investigation into the procurement of purchased parts for the simulated turret reveals that the 60 inch dia. bearing ring will require about 5 months for delivery from time of go ahead. Since this Contractor cannot incur further expenditures on this subject without contractual coverage, it is urged that action toward this coverage be initiated at once to gain all possible time advantage in obtaining flight data which could be utilized for the actual turret.

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Subject: Contract [illegible]-ac-4266
Simulated Turret for Second Airplane

To: Commanding General
Air Materiel Command
Wright Field
Dayton, Ohio

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5. Since present indications are that the experimental turret will not be available for at least 18 months, in this Contractor's estimation, the simulated turret would not only represent an insurance on a considerable investment by the A.A.F.C. of the actual turret, but would also represent an insurance against possible drastic delays due to design difficulties.

6. Air Materiel Command action on the above is strongly recommended.

Very truly yours,

CURTISS-WRIGHT CORPORATION
Airplane Division

E. J. Lacayo
Contracts Manager

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

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The following is an account of the accident as reported to the writer:

The convoy arrived at the intersection at approximately 11:15 A.M. and stopped to service the trucks and the personnel ate lunch. The bridge at the intersection, being in sight of the stop, was questioned by the truck driver and was assured by the escorting State Highway Patrol Officer that the road clearance was 15 feet. The trailer height being 14 feet 8 inches, the clearance was considered adequate. At this stop the escort was to be changed and another State Highway Patrol car with two Officers arrived to take over. Starting at approximately 12:00 noon the driver was again assured that the clearance was adequate and there was no need to by-pass the bridge (which could have been done easily). The Highway Patrol car led the convoy under the bridge and the truck driver did not stop for a clearance check thereby striking the upper fittings of the fin on the bridge understructure. At the time of impact, the truck (according to the driver) was going between 4 and 5 M.P.H. and was stopped before the rear fitting of the fin passed under the bridge. The trailer was tipped to the left enough to lift the right trailer wheel from the ground. The trailer was backed out from under the bridge and the convoy awaited the arrival of Mr. Vaughn and the writer and the decision as previously covered. Actual dimensional clearance of the bridge as checked after the accident shows maximum height 14 feet 4 inches.

L. Parnely
L. Parnely,
Project Engineering (473)

LP:ld-9020E
;USAF Officer in Charge
USAF Inspector in Charge
Foelm
Stewart
Tyler
Vaughn
Zimmerman

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War Department
Army Air Forces
Air Materiel Command
Office of AAF Officer in Charge
Curtiss Wright Corporation
Columbus 16, Ohio

JVR:jo

12 November 1947

Subject: Shipping Accident - XP-87 Airplane - Contract W33-038-AC-6266

To: Commanding General
Air Materiel Command
Wright Field
Dayton, Ohio

Attn: TSECA-4

1. The USAF Inspector in Charge and the USAF Assistant Inspector in Charge were notified at approximately 1500 9 November 1947 and arrived at the Curtiss Wright Corporation at 1530 9 November 1947 to investigate the accident and damage to the XP-87 Airplane, and report is hereby submitted:

a. Under USAF armed escort enroute to Muroc Army Air Field by U. S. Airplane Carrier Inc. trucks the XP-87 Airplane convoy was involved in a shipping accident at the intersection of U.S. Route #40 and #42. (Route #42 is bridged over Route #40).

b. The lower fin of the fuselage was damaged while passing under the bridge understructure at approximate 1200 9 November 1947.

c. The convoy was returned to Curtiss Wright Corporation, Columbus, Ohio, and the damaged fin was removed for repair. The fuselage was inspected outside and ins'e 100% and found to have suffered no damage.

d. The XP-87 Airplane was again started on its way minus the fin at 1300 10 November 1947. The damaged fin will be reworked to standard at this facility, then shipped by airplane to destination.

e. The following USAF personnel were connected with the convoy:

(1) S/Sgt. Samuel A. Furman, NCO in Charge of Escort, Sqdn. "B", 4000 Base Unit, Patterson Field, Dayton, Ohio.

(2) S/Sgt. Willis B. Burris, Sqdn. "B", 4000 Base Unit, Patterson Field, Dayton, Ohio.

(3) Sgt. Gene B. Coppess, Sqdn. "A", 4000 Base Unit, Patterson Field, Dayton, Ohio.

(4) Cpl. Earl Shonkwiks, Sqdn. "A", 4000 Base Unit, Patterson Field, Dayton, Ohio

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JVB:jc

Basic Ltr. USAFCIC, Curtiss Wright Corp., Columbus, Ohio., 12 Nov 47

f. Employees of The U. S. Airplane Carrier Inc., Dover, Dela.:

(1) Clarence Carney, (Driver of truck in accident), Cheswold, RFD #1, Del..

(2) Joseph Wingle, (Truck Driver), 220 N. New St., Dover, Dela.

(3) Robert E. Courtney, (Truck Driver), Camden, Dela. Box 173.

(4) Ely Jelliffe (Observer), 69 Maiden Lane, New York, N. Y.

g. Employees of Curtiss Wright Corp., Columbus, Ohio:

(1) Charles James Bolleck (Observer), 46 Broad St., Pataskala, Ohio.

(2) Melvin Gorrell, 1002 Rose Place, Columbus 2, Ohio.

FOR THE USAF OFFICER IN CHARGE:

JOHN V. [illegible]
USAF Inspector in Charge

1 Incl.
Curtiss Report, 10 Nov 47

cc: TSZXF-3
TSZXF-2A
Los Angeles USAF OFO

- 2 -

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CG OR DEP CG

AMC Form No. 10-508
Rev 12 Aug 46

PRINT SYMBOL AND INITIALS IN APPROPRIATE BLOCK

ADJT GENERAL

Basic: Ltr dtd 11 Sep 47, Hq, AAF, Wash 25, D.C., subj: "Design of All-weather Fighters"

1st Ind TSEST-9/REP/mh

Hq, AMC, Wright Field, Dayton, Ohio, 13 November 1947

CHIEF OF ADMIN.

TO: Chief of Staff, United States Air Force, Washington 25, D.C.
Attention: AFDRD-AP

AIR INSPECTOR

Subject designation will be utilized when applicable in future editions.

PUBLIC RELATIONS

FOR THE COMMANDING GENERAL:

JUDGE ADVOCATE

S. E. PRUDHOMME
Colonel, Air Corps
Chief, Engineering Standards Section
Engineering Division

PERSONNEL T-1

INTELLIGENCE T-2

ENGINEERING T-3

SUPPLY T-4

PLANS T-5

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452.1 Jet Propulsion Aircraft, UR.E-1946-47

AF MD-33 (20 MAY 44)

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO.	
FILE NO.	

SUBJECT: Letter from AMC Regarding Production Program for F-87 Aircraft

TO: Requirements Division, DC/S, Operations — DATE 13 November 1947

FROM: Director of Research & Development, DC/S, Materiel — COMMENT No. 1 Capt Strathy/bkw/6235

1. Air Materiel Command has the following letter before this office regarding the production program for the F-87.

a. "The Summary Minutes of the first meeting of the USAF Aircraft and Weapons Board held 19, 20, 21 and 22 August 1947 states in par. 3 j that 60 F-87's and/or FR-87's are to be procured in FY 1949.

b. "The 1st Indorsement to AMC letter to AAF dated 23 July 1947, subject: Photographic Installation in XF-87 Aircraft (1st Indorsement signed by Major General Craigie, AC/AS-4) states a requirement for full exploitation of the photographic possibilities of the F-87.

c. "As the initial step in modifying the F-87 for photographic use, it is planned to fabricate and install a photographic nose, make provisions for carrying flash bombs, engineer the installation of a view finder, and study the cockpit changes required to accommodate these items on the No. 2 airplane. It is expected that this airplane so modified will be available for flight test about 1 May 1948.

d. "The first experimental flexible nose turrets for the F-87 are not scheduled to be delivered until 30 June 1949. It will be impossible to procure an F-87 (all weather version), tactically equipped, during FY 1949 unless the flexible nose turret is supplanted by an installation incorporating fixed forward-firing guns. To check [illegible] rodynamic characteristics and power requirements of the flexible turret, this command plans on installing a semi-flexible nose turret on No. 2 airplane after the photographic [illegible]se tests.

e. "It is assumed that the term FR-87 connotes the F-87 modified as described in par. 3 above, rather than a complete modification of the F-87 to include all the features normally desired in a tactical reconnaissance airplane. The cost of the modifications required to convert an F-87 into an FR-87 was not budgeted in the FY 1948 program and consequently the 611-1 R & D program will have to be adjusted to take care of this additional cost.

f. "In view of the comments above, the following information is desired:

(a.) As first priority is it the desire of Headquarters, Air Force to procure FR-87's out of FY 1949 funds and in what numbers?

(b.) Is it the desire of Headquarters, Air Force to procure F-87 airplanes in FY 1949 with fixed nose guns or should they be equipped with a removable dummy nose for which the flexible turrets can be

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AF HQ-53 (20 MAY 44)

HEADQUAR_RS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	
FILE NO.	

SUBJECT: Letter from AMC Regarding Production Program for F-87 Aircraft

TO: Requirements Division, DC/S, Operations

DATE 13 November 1947

COMMENT No. 1 (Cont'd)
Capt. Strathy/bkw/6235

FROM: Director of Research & Development,
DC/S, Materiel

substitutes when they become available and in what numbers?"

2. It is felt that DC/S, Operations can best answer the questions posed in the last paragraph.

J. S. HOLTONER
Colonel, Air Corps
Chief, Aircraft Branch

AFMRD-3B Capt Cgstrathy

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COORDINATION
CG OR DEP CG
ADJUTANT GENERAL
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CHIEF OF ADMIN.
AIR INSPECTOR
PUBLIC RELATIONS
JUDGE ADVOCATE
PERSONNEL (T-1)
INTELLIGENCE (T-2)
ENGINEERING (T-3)
O B Hunter
P R Smith
SUPPLY (T-4)
PLANS (T-5)
BASE C. O.
OTHER

AMC Form No. 10-508
(Rev 2 Apr 47)
(PRINT SYMBOL, DATE AND INITIALS IN APPROPRIATE BLOCK)

[redacted]-4)

[redacted]-4/CBT/mw

17 November 1947

Contract W33-038-ac-6266, XP-87 Airplane, J-33 Engine Installation

Curtiss-Wright Corporation
Airplane Division--Columbus Plant
4300 East Fifth Avenue
Columbus 16, Ohio

1. The contractor is hereby notified that the installation of J-33 engines in the XP-87 airplane, Serial Number 45-59600, will result in an airplane model designation change. The new designation for the modified XP-87 will be XP-87A. Future correspondence in regards to this modification should refer to the airplane as indicated above.

2. For the contractor's information, action has been initiated by the AMC to procure five (5) J33-A8 engines with "D" type accessory housing and diffuser type mountings for use in the above-mentioned modification.

FOR THE COMMANDING GENERAL:

J M Klein Col A.C.
GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

Cys to:
C-W, Dayton
USAF OIC, C-W
Fighter Br., Proc. Div.

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COORDINATION
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ADJUTANT GENERAL
CHIEF OF ADMIN.
AIR INSPECTOR
PUBLIC RELATIONS
JUDGE ADVOCATE
PERSONNEL (T-1)
INTELLIGENCE (T-2)
ENGINEERING (T-3)
SUPPLY (T-4)
PLANS (T-5)
BASE C. O.
OTHER

AMC Form No. 19-598
(Rev 2 Apr 47)
(PRINT SYMBOL, DATE AND INITIALS IN APPROPRIATE BLOCK)

TSEMA-4/OBT/hw
21 November 1947

Contract W33-038-AC-6266, XP-87 Airplane

Curtiss-Wright Corporation
Airplane Division--Columbus Plant
4300 East Fifth Avenue
Columbus 16, Ohio

- attached

Reference is made to the contractor's letter MS:ld-8869E dated 7 November 1947. Inasmuch as adequate spare 240 engines for the No. 2 XP-87 airplane will become available at the time of the C-6 engine modification of the No. 1 XP-87 airplane, the AMC approves the contractor's recommendations to substitute production type 240-43 engines in the No. 1 XP-87 airplane at the earliest possible moment, provided that this engine change can be accomplished at no additional cost to the Government.

FOR THE COMMANDING GENERAL:

GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

Cys to:
C-W, Dayton
USAF CIC, C-W
Equipment Br.
Fighter Br., Proc. Div.

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AF HQ-33 (30 MAY 44) 452.1 [illegible]

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	[illegible]
FILE NO	

SUBJECT: Letter from AMC Regarding Production Program for P-87 Aircraft.

TO: Director of Research & Development, DC/S, Materiel — DATE: 24 NOV 44

FROM: Requirements Division, Directorate of Training & Requirements, DC/S, Operations — COMMENT No 2 Maj Rennels/med/6848

1. Reference paragraph 5e. The assumption is made that a complete modification of the P-87 to include all the features normally desired in a tactical reconnaissance airplane is not required. This assumption is erroneous. It is anticipated that the article modified for reconnaissance should be modified to the extent that the full potential of the airplane will be determined. Anything short of full exploitation will not meet the requirements.

2. Reference paragraph 6 (a) (1) concerning priority. The photographic installation and the initial armament installation should receive similar priority. The initiation of work on either of the installations should be determined by the availability of the equipment. If the photographic installation is not available at the completion of the second experimental aircraft—the fixed gun installation will be made on Number 2 aircraft. It is intended that the Number 1 experimental article will be modified with the installation not made on the Number 2 aircraft upon its return to Curtiss Wright from Muroc. (2) The basic estimate on the availability of funds indicates that the following types will be procured from the 1949 budget:

15 FP-87's
28 P-87's

If the supplemental 1949 budget is approved, the following will be procured from 1949 funds:

14 FP-87's
40 P-87's

3. Reference paragraph 6 (b). It is anticipated that P-87 airplanes will be procured in FY 1949, and it is the desire of this division that they be procured with the photographic installation, the fixed gun installation, the semi-flexible gun installation, and the fully-flexible automatic gun installation. The above installations are to be made as the equipment becomes available.

AFORQ/R
AFORQ/F
AFORQ/A

F. M. SMITH, JR.
Brigadier General, USAF
Chief, Requirements Division

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File 7 30(1/3)

CURTISS-WRIGHT CORPORATION
Airplane Division
Columbus 16, Ohio

3 December 1947
NRA:EW:784

Subject: Contract W33-038 ac-6066, Model XP-87 Airplanes
Westinghouse Engine Change No. 22

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: TSEOA-4

Through: USAF Officer In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

References: (a) CW Ltr JAM:EW:733 dated 6 August 1947
(b) CW Ltr NRA:EW:749 dated 12 November 1947
(c) November 17 Conference Between Army and CW Personnel in the Office of the USAF Officer In Charge

Enclosure: (A) Cost Estimate Breakdown

1. By reference (a) this Contractor submitted a quotation covering costs involved in incorporating Westinghouse Engine Notice No. 22 in two X24C-4A engines in No. 1 XP-87 Airplane. Although some changes in the original conception of the work involved in this installation were made subsequent to the submission of reference (a), this Contractor's letter reference (b), pointed out that such changes would result in an overall net price which would be comparable to that already quoted by reference (a). Therefore, it was requested that the quotation in the amount of $311.81 as originally submitted be allowed to stand without further modification. However, during the course of reference (c) conference, this Contractor was requested to re-investigate subject change with a view to submitting a revised cost quotation therefor.

2. The Air Materiel Command's attention is invited to the fact that actual cost data now available for this change indicates that the Contractor's quotation of reference (a) reflected an underestimate of the costs which would be involved. A more realistic quotation based on such cost data would now result in a total price of $586.85 in lieu of the original price of $311.81. A breakdown of the above noted revised price as a result of more recent investigations, is contained in Enclosure (A) attached hereto.

Rec reply
Orig. to TSEPA4-1 12/12/47
Saw attached Routing Slip

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3. The above noted price increase is forwarded for the Air Material Command's information and does not constitute a revised price quotation from the Contractor for subject change. It is desired only to point out that the Contractor's original quotation was based on estimated costs and did not anticipate installation changes as follows:

1. Substitution of a GFP B-2 temperature gauge

2. Elimination of the circuit switch

3. Revised instrument arrangement to accommodate the B-2 gauge

4. The above changes in the installation plan were found necessary because of the impracticality of connecting the thermocouples for Engines No. 1 and No. 3 to the existing gauge through a selector switch. As a result of these changes the engineering estimated costs increased from $92 for four man days to $334.40 for eleven man days direct labor. This change resulted in the issuance of six Engineering Orders and an entirely new detailed drawing for the instrument mounting provisions. These engineering increases account substantially for the entire increase noted in Enclosure (A), inasmuch as very little additional productive labor is involved in the installation change.

5. In view of the above mentioned circumstances which resulted in accrued costs greater than those quoted originally by both references (a) and (b), it is hereby requested that the quotation as originally submitted be accepted by the Air Material Command as a reasonable price for incorporation of subject Westinghouse change.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Erwin J Ducayet
Contracts Manager

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ESTIMATED COST OF [illegible]

Contract No.

ENGINEERING

Material
(Labor Hours)
Labor @ $1.[illegible]
Overhead @ 160%

Total Productive [illegible]

ENGINEERING

Material
(Labor Hours)
Labor @ $1.[illegible]
Overhead @ 160%

Total Engineering Cost

TOTAL COST

Profit @ 10%

TOTAL PRICE

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FILE NO. 2021-44
V-3

CASE HISTORY OF THE XF-87 ALL-WEATHER FIGHTER AIRPLANE

DOCUMENTS 110 - 230 (1945 - 1949) & EXHIBITS

March 1945 - June 1949

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CASE HISTORY OF THE XF-87 ALL-WEATHER FIGHTER AIRPLANE

March 1945 - June 1949

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24 Jun 64
Auth: CG, AMC
Initials: MRL
Date: 12-23-49

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DOCUMENTS 110 - 230 (1947 - 1949) AND EXHIBITS

CASE HISTORY OF THE XF-87 ALL-WEATHER FIGHTER AIRPLANE

March 1945 - June 1949

Prepared by
Historical Office
Executive Secretariat
Air Materiel Command
Wright-Patterson Air Force Base
January 1950

SECRET
Auth: C.G. AMC
Initials: JMPL
Date: 12-22-49

By

Helen W. Schulz
Historian

Prepared under provision of AF Regulation No. 210-3 as a part of the USAF Historical Program.

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ARMY AIR FORCES, AIR TECH[illegible] COMMAND

Wright Field, Dayton, Ohio

110

CONTRACT CHANGE NOTIFICATION NO. [illegible]

[illegible] Corporation
[illegible]
[illegible]

Purchase Contract
[illegible]

[illegible]

[illegible]

a. The [illegible] Corporation is [illegible] period [illegible] 30-MAY-[illegible]. [illegible] to Dayton Army Air Field [illegible] [illegible] to flight clearance [illegible].

b. The Contractor is authorized to [illegible] Army Air Field [illegible] [illegible] pilots.

c. The Contractor will maintain adequate [illegible] [illegible] the repair work which becomes [illegible] [illegible] in alternate adjustments

Authority for Issuance
[illegible]

[illegible]

[illegible]

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

11 December 1947
RRA:HW:797

Subject: Contract W33-038 ac-5206
Model AP-57 Airplane
Additional Phase I Flight Test Hours

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: Unit TSEPA-1

Through: USAF Officer In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) CW Ltr LLD/af-100 dated 13 March 1947
(b) CW Ltr LLD/tc(af-399) dated 25 August 1947

Enclosure: (A) Estimated Costs for Phase I-A
(B) Estimated Costs for Phase II
(C) Summary of Phase I-A and II Costs

1. This Contractor by reference (a) submitted a Muroc flight test proposal for subject airplane covering a total of 28½ hours of flight time. Subsequently, however, the Air Materiel Command requested the Contractor to re-quote on the basis of a Phase I Program of not more than ten hours. Such a quotation was contained in this Contractor's letter reference (b). Since the submission of reference (b), the Contractor has again been informally requested to revise the Muroc flight test quotation to cover 20 additional hours of flight over and above the ten-hour program already covered by reference (b). This additional program is understood to be required to determine the following factors:

1 - Buffet boundary limitations

2 - High-speed limitations

3 - Maximum gross weight at take-off

The addition of hours to cover the above determinations will, in effect, bring the entire Phase I Flight Test Program to a total of 30 hours, or 1½ hours more time than was originally quoted by reference (a). Further, in addition to such a twenty-hour extension to Phase I, the Air Materiel Command has now informally requested the submission of a cost quotation covering this Contractor's service and maintenance assistance at Muroc during the Phase II Program to be conducted by the Army.

P.R. 19390

Exh. "C" to P.R. #19390 dtd. 5 Dec '47

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2. For conducting the additional twenty-hour Phase I-A Program at Muroc to determine the limitations noted in Paragraph 1 above, together with a Phase II Assistance Program of two weeks duration, this Contractor quotes herewith a total price increase of $87,561.60. A breakdown of this amount by phases is contained in Enclosure (C) attached hereto. Enclosures (A) and (B) respectively reflect the derivation of the Phase I-A and Phase II costs.

3. The Air Materiel Command's attention is invited to the fact that this quotation is based on the assumption that no time interval will be necessary between the Contractor's originally quoted Phase I Program and the inception of the Phase I-A Program. Likewise, the costs quoted herewith are based on the assumption that Phase II tests will follow immediately upon completion of Phase I-A. If time intervals become necessary this quotation will be amended accordingly, inasmuch as additional costs will be incurred in maintaining the Contractor's personnel and equipment at Muroc.

4. This quotation has been compiled on the assumption that the additional twenty hours of flight time will consume not more than nine consecutive work-weeks at Muroc. Therefore, Phase I-A will be considered complete at the end of twenty hours flight time or at the end of nine weeks time, whichever occurs first. Concerning the Phase II Assistance Program, the Contractor has no way of determining the time required by the Army to complete the Phase II tests. Therefore, an assumption has been made that such program will necessitate two consecutive work-weeks. If the Phase II Test Program is concluded under two weeks time, or if such test program extends beyond the two weeks period, the cost quotation for Contractor assistance during Phase II will be adjusted accordingly.

5. The quotation for both the Phase I-A and Phase II Programs assumes that no more than a 52-hour work-week will be required to maintain schedules at Muroc. The labor rates utilized in this quotation are based on the actual rates of personnel who have been assigned to the project and, as established in the Contractor's previous Muroc flight test quotations, an overhead rate of 35% has been applied to cover payroll taxes, insurance and administrative expenses. The special terms and conditions applicable to the basic Phase I Proposal as contained in Paragraph 3 of letter reference (b), are likewise applicable to this quotation.

6. It will be noted that this proposal contains coverage for flight pay in the amount of $20,000, which figure accounts for the increase in this quotation over and above the amount for such work estimated informally for Air Materiel Command personnel. The flight pay quoted herewith, added to that amount($4,120) contained in the reference (b) quotation, totals $24,120. This total flight pay figure is proportionate to the amount previously estimated and quoted in this Contractor's 26½-hour program, reference (a).

P.R 19390 5-6-47

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7. In view of the fact that the No. 1 XP-67 Airplane has arrived at Muroc and subject program is well under way, the Air Materiel Command's early consideration of the entire Phase I Program as revised herewith, together with the assistance program for Phase II, is respectfully requested.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

P. R, 19390

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"EXHIBIT "A"
To Purchase Request No. 1/390 dtd. 6 Jan. 1945

1. The contractor shall conduct an additional 26 hours of flight testing at Muroc Lake, California on XP-[illegible] airplane, Serial No. 43-[illegible], substantially in accordance with the schedule attached as Exhibit "B" hereto. (Changes to the proposed schedule may become necessary as the tests are carried out and will be mutually agreed upon by the contractor and the Government. For the additional work involved in conducting the additional hours of Phase I flight testing the cost of Item 9, Article 1 of Contract W[illegible]-[illegible]-6266 shall be increased by ---------- 72,757.39.

2. The contractor shall upon completion of Phase II flight testing, provide for a two weeks period of maintenance and servicing to the airplane, instrumentation, and equipment during which time Army Phase II flying will be conducted. For the maintenance and servicing of the airplane, instrumentation and equipment for a period of two weeks the cost of Item [illegible], Article 15 of Contract shall be increased by ---------- [illegible],774.21.

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ENCLOSURE (A)

ESTIMATED COSTS FOR PHASE I-A

PRODUCTIVE	Material	Labor	Overtime Premium
1. Labor Costs	$ - - - - -	$ 9,588.00	$ - - - -
2. Per Diem Expense	4,851.00	- - - -	- - - -
3. Misc Material Cost	7,370.03	- - - -	- - - -
4. Replacement Personnel	644.00	184.00	28.00
5. Maintenance of Automotive Equipment	1,080.00	- - - -	- - -
6. Depreciation of Automotive Equipment	286.20	- - - -	- - -
Totals	$ 14,231.23	$ 9,772.00	$ 28.00

ENGINEERING			
1. Labor Cost	$ - - - -	$12,385.00	$ 217.00
2. Per Diem Expense	6,135.00	- - - -	- - -
3. Material Cost - Transportation	1,500.00	- - - -	- - -
4. Material Cost - Equipment	450.00	- - - -	- - -
Totals	$ 8,145.00	$12,385.00	$ 217.00

SUMMARY

PRODUCTIVE	
Material	14,231.23
Labor	9,772.00
Overhead @ 35%	3,420.41
Overtime Premium	28.00
Total Productive Cost	$ 27,452.24
ENGINEERING	
Material	8,145.00
Labor	12,385.00
Overhead @ 35%	4,334.75
Overtime Premium	217.00
Total Engineering Cost	$ 25,081.75
Flight Pay	$ 20,000.00
Total Cost of Phase I-A	$ 72,533.99
Profit @ 10%	7,253.40
Total Price of Phase I-A	$ 79,787.39

P.K. 14-3-46

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ENCLOSURE (B)

ESTIMATED COSTS FOR PHASE II

PRODUCTIVE	Material	Labor
Labor Costs	$ - - - -	$ 1,940.80
Per Diem Expense	1,029.00	- - - - -
Miscellaneous Materials	400.00	- - - - -
Maintenance of Automotive Equipment	230.00	- - - - -
Depreciation of Automotive Equipment	57.88	- - - - -
Totals	$ 1,776.88	$ 1,940.80
ENGINEERING		
Labor Costs	$ - - - -	$ 1,404.00
Per Diem Expense	886.00	- - - - -
Totals	$ 886.00	$ 1,404.00

SUMMARY

PRODUCTIVE	
Material	$ 1,776.88
Labor	1,940.80
Overhead @ 39%	831.38
Total Productive Costs	$ 4,549.06
ENGINEERING	
Material	$ 886.00
Labor	1,404.00
Overhead @ 55%	772.20
Total Engineering Costs	$ 3,062.20
Total Cost of Phase II	$ 7,611.26
Profit @ 10%	761.13
Total Price Phase II	$ 8,372.39

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ENCLOSURE (C)

SUMMARY OF PHASE I-A COSTS

	Phase I-A	Phase II	Total Cost
PRODUCTIVE			
Material	$ 14,231.25	$ 1,776.88	$ 16,008.08
Labor	9,772.50	1,943.90	11,716.40
Overhead @ 35%	3,420.41	681.38	4,101.79
Overtime Premium	28.00	- - - -	28.00
Total Productive Costs	$ 27,452.24	$ 4,405.06	$ 31,857.31
ENGINEERING			
Material	8,145.00	686.00	8,831.00
Labor	12,385.00	1,464.00	13,849.00
Overhead @ 35%	4,334.75	512.40	4,847.15
Overtime Premium	217.00	- - - -	217.00
Total Engineering	$ 25,081.75	$ 2,662.40	$ 27,744.15
Flight Pay	20,000.00	- - - - -	20,000.00
TOTAL COST	72,533.99	7,067.46	79,601.45
Profit @ 10%	7,253.40	706.75	7,960.15
TOTAL PRICE	$ 79,787.39	$ 7,774.21	$ 87,561.60

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AAF FORM NO. 13-567
(EXCEPT NOV 46)

ROUTING SLIP

TO: OFFICE AND INDIVIDUAL IN TURN.

	SYMBOL	NAME	DATE FWD.
1	[illegible]	Peyton PPO	12/12/47
2	[illegible]-1	Mr. Levan	
3			
4			
5			

FOR: FOLLOWING ACTION (S) AS CHECKED

	APPROVAL		INVESTIGATION		RECOMMENDATION
	CONFERENCE		INFORMATION		SIGNATURE
	COMPLIANCE		NOTE AND FILE		SEE OR PHONE ME
	COORDINATION		NOTE AND RETURN		VERBAL REPORT
	COMMENT		PREP. OF REPLY		
	DISTRIBUTION		REPLY DIRECT TO WRITER		

REMARKS:

The original quotation for this change ($311.41) is included as Item 9 of Purchase Request 42[illegible] dated 5 September 1947. It is the opinion of this office that the original cost should be allowed and the P.R. processed accordingly.

Capt. O. B. Harrison/hw

FROM: OR TO: WHEN FOLDED HERE FOR RETURN

SYMBOL	NAME	PHONE
[illegible]-4	Fisher Br.	2-3230

WP-1-18 SEP 47 (MIL ADD)

NOTE: This routing slip refers to letter (Document No. 109) from the Curtiss-Wright Corporation, dated 3 December 1947.

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[illegible] January 1948

To: The Chief of Staff, USAF, (AMC), Wright
Air Director, Procurement & Industrial Planning.

Attention is invited to the attached "Findings and Determinations" authorizing negotiation of a contract for modification of one (1) XB-47 airplane, to incorporation of one J-35 power plant to be followed by [illegible] of engineering data covering the J-33 power plant installation, [illegible] basic consolidation.

[illegible]

[illegible]
[illegible], Ohio
[illegible], Present procurement project
[illegible], Engr & Procurement Division

[illegible]

[illegible]

Attention is invited to preceding [illegible].

[illegible]

[illegible] Comptroller USAF
[illegible]

[illegible]

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5 January 1948

Findings and Determinations

AC-19837

1. I hereby find:

a. That the USAF proposes to enter into a negotiated contract with Curtiss Wright Corporation, Columbus 16, Ohio, for modification of one (1) XP-87 airplane and installation of a J-33 power plant to be followed by ground testing and furnishing of engineering data covering the J-33 power plant installation. In addition the contract is to call for a list of spare parts not to exceed $15,000 in cost to be used as replacements for modified portions of the airplane due to engine installation.

b. That this modification will include fabrication and installation of removable nacelles for the J-33 engine, new landing gear and landing gear strut doors, new engine access doors, new nacelle tail cones and water injection system. It will require changes in the nacelle fixed equipment, engine controls, cockpit installations and normal and flight test instrumentation.

c. That high starting costs, many hours of engineering expended by the staff of the supplier, and production of special tooling have gone into production of the experimental airplane to be modified, and contractor is accordingly most familiar with the aircraft and has much of the tooling and machinery, drawings, and "know-how" for performing the work required more quickly and economically. Important design changes are contimming through the production stage of this model airplane.

d. That the procurement is required in the interests of the National Defense, payable from fiscal year 1948 funds.

2. Upon the basis of the foregoing findings, I hereby determine:

a. That the proposed contract is for modification of one (1) XP-87 airplane and installation of a J-33 power plant to be followed by ground testing and furnishing of engineering data covering the J-33 power plant installation.

b. That the supplies to be procured are of a specialized or technical nature requiring a substantial initial investment, an extended period of preparation for manufacture, and would be unduly delayed if procured by formal advertising.

c. That procurement of the above described supplies by advertising is not feasible because if in the event another bidder unfamiliar with the production of this airplane is awarded the contract by virtue of being the lowest bidder, the Government would lose the benefit of technique, tooling, equipment, and production experience developed by the proposed supplier, delaying the ultimate production and requiring a duplication of investment and preparation.

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d. The estimated cost of the contract is $535,317.00.

3. The above supplies may therefore be procured by negotiation pursuant to the Paragraph 4-115 of the Army Procurement Regulations.

By direction of the Secretary of the Army

[illegible]
Col.
[illegible] Branch

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[redacted]

Contract [redacted]
XB-47 Airplane

To

WCPPIV

1. The mock-up [redacted] the subject contract has been [redacted] for the purpose intended. [redacted] subject airplane have been consider[redacted], [redacted] from.

2. It is therefore requested [redacted] to accept the above items and [redacted] for any desired use for the ra[redacted]

MX-745

[redacted]

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WF-L-24 OCT 47 1500**

CONTINUE ON OTHER SIDE

3 H.R.

AFSCAD Form No. 6 (4 APR 47)

RESTRICTED

MCCPAT/6-2333

HEADQUARTERS
AIR MATERIEL COMMAND

Wright Field, Chic
9 January 1948

TECHNICAL INSTRUCTIONS

SERIAL NO: TI 2073, Addendum No. 22

SUBJECT: Armament for P-87 and P-89 Aircraft

TO: Engineering Division
Procurement Division

1. Problem Presented:

a. To revise the requirement for armament equipment which is to be installed in P-87 and P-89 aircraft in order that these aircraft will be equipped during production with the most modern armament equipment available at that time and to retrofit any of these aircraft which, during production, are not equipped with fully automatic flexible gun turrets.

2. Factual Data:

a. Production schedules indicate that the armament equipment scheduled for installation in the subject aircraft must be revised.

b. All aircraft during production will be equipped with four (4) fixed 20 mm guns with, if possible, the best air interception radar available at that time. This is an emergency measure which will not be followed if either turret mentioned below becomes available to meet aircraft production schedules.

c. The four (4) fixed guns mentioned above are to be replaced (during production if possible) by a flexible gun hand-controlled turret as soon as such a turret becomes available. This will be the desired interim installation until such time as the fully automatic flexible gun turret becomes available.

d. The requirement for a fully automatic flexible gun turret incorporating inter-connection with interception radar will remain firm. The interim armament installations mentioned above are necessary as automatic turrets are not available and as manually operated turrets will probably not be available to meet aircraft production schedules.

RESTRICTED

TI 2073, Add No. 22 — 9 January 1948

3. Authority:

a. Letter from Hq USAF dated 18 November 1947, subject: "Armament for P-87 and P-89 Aircraft", from Director, Research and Development, DCS/M.

4. Action Desired:

a. Engineering Division will provide the necessary engineering data.

b. Procurement Division will insure that production aircraft are equipped with the latest available armament as stated in "Problem Presented".

BY COMMAND OF GENERAL McNARNEY:

OFFICIAL

JAMES F. McCLENDON
Colonel, USAF
Adjutant General

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MCAAH (1)
MCI (1)
MCC (1)
MCH (1)
MCCA (2)
DCS/M(Wash)(3)
AFMSS (Wash)(4)

OFFICIAL:

JAMES F. McCLENDON
Colonel, USAF
Adjutant General

JAN 13 1948

CURTISS-WRIGHT CORPORATION
Airplane Division
Columbus 16, Ohio

13 January 1948
RRA:HW:13

Subject: Contract W33-038 ac-6260, Model XP-87 Airplane
Photo Reconnaissance Proposal

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: MCPPXA (TSEPA-15)

Through: USAF Officer In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference:
(a) CW Ltr RRA:HW:437 dated 19 June 1947
(b) Conference between Curtiss and AMC personnel at Curtiss-Columbus 29 October 1947
(c) CW Ltr LJD/ef-484 dated 7 November 1947
(d) Conference between AMC and Curtiss personnel at Curtiss-Columbus 5 January 1948

Enclosure:
(A) Photo Reconnaissance Cost Breakdown
(B) Three Copies of Drawing L-29-441, Proposed Location of Camera View-finder and Radar Scope
(C) Three Copies of Drawing L-29-443, Pre-loaded Photo-Flash Bomb-rack Installation
(D) Three Copies of Drawing L-29-444, Photographic Nose Proposal
(E) Three Copies of Drawing L-29-445, Aerial Night Strip Projector Proposal
(F) Three Copies of Sketch 29642, Cockpit Controls
(G) Three Copies of Sketch 29643, Radio and Radar Installation
(H) Three Copies of Drawing L-29-446, Photo Recon. Instru. Panel

1. This Contractor's letter reference (a) submitted the original quotation for modifying an existing XP-87 for photo reconnaissance purposes. Subsequent to the submission of reference (a), however, further conferences, including those of references (b) and (d), have served to amplify and clarify the requirements for such a photo reconnaissance version. Therefore, since these detailed requirements are now sufficiently definitive to allow the formulation of an engineering and cost proposal for the conversion of the No. 2 XP-87 to a photo reconnaissance type, such quotation is submitted herewith.

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2. For accomplishing the conversion of No. 2 XP-87 Airplane to a photo reconnaissance type in general accordance with the stipulations and requirements outlined in conferences, references (b) and (d), a nd in accordance with the interim discussions since the submission of the reference (a) quotation, this Contractor quotes herewith a total estimated price increase of $209,892.54. A breakdown of this amount by installation items is contained in Enclosure (A) attached hereto. It will be noted that the conversion program as proposed herewith is comprised of the following general items:

(a) Photo modifications
(b) Camera nose
(c) Radio and radar
(d) Flash bomb and infra-red
(e) Cockpit modifications
(f) Cleanup, pre-flight and tests

3. A complete engineering outline of the modifications and new installations proposed herewith for the conversion project is contained in Enclosure Blueprints (B) through (H) attached hereto. The preliminary planning and scheduling information as outlined in the reference (d) conference is assumed to be applicable to this proposal, inasmuch as that conference outlined a somewhat detailed program for the scheduling of photo reconnaissance project items. In brief, the planning resulting from that conference indicates that design and fabrication of the photo reconnaissance plane should be well under way by the first of April 1948 and that assembly work on the airplane (as a photo reconnaissance type) will begin approximately 1 July 1948. This planning further indicates that the photo reconnaissance airplane would be available for flight testing approximately 1 October 1948, such flight testing to continue through the end of January 1949. It should be pointed out that this scheduling information is preliminary and is entirely contingent upon receipt of early go-ahead approval from the Air Material Command.

4. Inasmuch as this quotation supersedes the reference (a) letter and is a proposal in the same category as those referred to in the reference (c) letter, it is requested that any contract resulting from this proposal include a Form 4 Redetermination Article under which the prices may be redetermined after completion of the work either upward or downward, with a ceiling of 20% of the total price applicable to an upward revision. Further, it is requested that the contract, which is forthcoming for this conversion project, include provisions for for partial payments.

5. Since this Contractor's continued efforts to obtain quotations for a photographic view-finder as Contractor-furnished equipment have been unsuccessful to date, it is a condition of this proposal that procurement of this item be

negotiated separately from the basic conversion contract as proposed herein. Likewise, no costs are included in this quotation for flight testing of the photo reconnaissance airplane, inasmuch as it is assumed that all such testing will be negotiated separately for the various modification types.

6. In view of the fact that this Contractor has made every effort to prepare this quotation on an expedited basis in compliance with the urgent requests of the Air Materiel Command as set forth in the reference (b) conference, it is requested that this proposal be given early attention by the Air Materiel Command so that unnecessary delays in the accomplishment of the XP-87 program may be avoided.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

ENCLOSURE (A)

REVISED PHOTO-RECONNAISSANCE PROPOSAL

	Modifications For Photo Instal.	Camera Nose Installation	Radio & Radar Installations	Flash Bomb & Infra-Red Instal.	Photo Instal. Totals
PRODUCTIVE					
Material	$ 55.00	$ 5,743.00	$ 516.00	$ 2,774.00	$ 9,088.00
(Labor Hours)	(702)	(10,903)	(1,016)	(7,091)	(19,772)
Labor @ $1.57/hr	1,102.00	17,212.00	1,595.00	11,133.00	31,042.00
Overhead @ 100%	1,763.20	27,539.20	2,552.00	17,812.80	49,667.20
Total	$ 2,920.20	$50,494.20	$ 4,663.00	$ 31,713.80	$ 89,797.80
TOOLING					
Material	$ 5.00	$ 415.00	$ 46.00	$ 588.00	$ 1,050.00
(Labor Hours)	(13)	(2,325)	(172)	(783)	(3,293)
Labor @ $1.57/hr	20.00	3,650.00	270.00	1,230.00	5,170.00
Overhead @ 160%	32.00	5,840.00	432.00	1,968.00	8,272.00
Total	$ 57.00	$ 9,905.00	$ 748.00	$ 3,784.00	$ 14,492.00
ENGINEERING					
Material		$ 50.00	$ 85.00	$ 50.00	185.00
(Labor Hours)		(11,248)	(240)	(3,848)	(15,336)
Labor @ $2.00/hr		22,496.00	480.00	7,696.00	30,672.00
Overhead		22,496.00	480.00	7,696.00	30,672.00
Total		$ 45,042.00	$ 985.00	$ 15,442.00	$ 61,469.00
TEMPLATES					
Material		$ 61.00	$ 2.00	21.00	84.00
(Labor Hours)		(304)	(8)	(104)	(416)
Labor @ $2.00/hr		608.00	16.00	208.00	832.00
Overhead		608.00	16.00	208.00	832.00
Total		$ 1,277.00	$ 34.00	437.00	$ 1,748.00
TOTAL COST	$2,975.20	$100,718.20	$ 6,430.00	$ 51,382.80	107,506.20
Profit @ 10%	297.52	10,071.82	643.00	5,138.28	16,720.62
TOTAL PRICE	$ 3,272.72	$117,390.02	$ 7,073.00	$ 56,521.08	$ 184,250.82

ENCLOSURE (A)

	Photo Installation Totals	Cockpit Installations	Cleanup, Pre-Flight & Tests	Total Cost Photo Process
PRODUCTIVE				
Material	$ 9,088.00	$ 543.00	$ 2,409.00	$11,840.00
(Labor Hours)	(19,772)	(2,710)	(950)	(23,432)
Labor @ $1.57/hr	31,042.00	4,255.00	1,492.00	36,789.00
Overhead @ 160%	49,607.20	6,808.00	2,387.20	58,862.40
Total	$ 89,737.20	$ 11,406.00	$ 6,288.20	$ 107,491.40
TOOLING				
Material	1,050.00	45.00		1,095.00
(Labor Hours)	(5,293)	(86)		(5,379)
Labor @ $1.57/hr	9,170.00	135.00		5,305.00
Overhead @ 160%	8,272.00	216.00		8,488.00
Total	$ 14,492.00	$ 396.00		$ 14,888.00
ENGINEERING				
Material	125.00	25.00		150.00
(Labor Hours)	(15,330)	(1,204)		(16,600)
Labor @ $2.00/hr	30,672.00	2,528.00		33,200.00
Overhead	30,672.00	2,528.00		33,200.00
Total	$ 61,469.00	$ 5,081.00		$ 66,550.00
TEMPLATES				
Material	$ 84.00	$ 0.00		$ 90.00
(Labor Hours)	(416)	(32)		(446)
Labor @ $2.00/hr	832.00	64.00		896.00
Overhead	832.00	64.00		890.00
Total	$ 1,748.00	$ 134.00		$ 1,882.00
TOTAL COST	$ 167,500.20	$17,017.00	$ 6,288.20	$ 190,811.40
Profit @ 10%	16,750.02	1,701.70	628.82	19,081.14
TOTAL PRICE	$ 184,256.82	$18,718.70	$ 6,917.02	$ 209,892.54

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CURTISS-WRIGHT CORPORATI
Airplane Division
Columbus 16, Ohio

EJD/ef-41
4 February 1948

Subject: Contract W 33-038 ac-6266
Contract W 33-038 ac-19837
XP-87 Airplanes

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio
Attention: MCPPEA

Thru: AF Officer in Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Enclosure: (A) Experimental and Production Program

1. General: Since the first XP-87 airplane is very nearly ready to fly and consideration is being given by the Air Materiel Command to production procurement of additional quantities, the Contractor believes that it is desirable at this time to summarize the general program for the experimental airplanes in order to clarify the status of the various items still to be accomplished and point out their relationship to production. With this in mind, an experimental and production program has been outlined on Enclosure (A). In the following paragraphs, the major items are discussed in detail with an indication in each case of the status of the item and certain action required. The chart is believed to be self-explanatory and is in general accordance with the thinking of Air Materiel Command personnel as a result of various informal discussions.

2. First XP-87 Airplane - Original Program: The first airplane is being reassembled at Furoc and is scheduled to fly early in February. Upon completion of Phases I, IA and II flight test, the airplane will be accepted by the Government under Contract W 33-038 ac-6266 and will then be returned to the Contractor for further modification under Contract W 33-038 ac-19837. All of the following contractual items require action by Air Materiel Command as indicated below.

(a) Miscellaneous changes covered by AFP 425289:
Quotations submitted by Contractor in August 1947.
Negotiated with District Contracting Officer 14 January 1948.
Contractor awaiting receipt of Change Order from Air Materiel Command.

(b) Miscellaneous changes covered by AFP 19376:
Check at Air Materiel Command 16 January indicates this AFP replaced by AFP 19381 which was currently in Budget. Reason for new AFP not known by Contractor. Contractor awaiting Change Order.

(c) Phase I Flight Test:
Currently covered by Amendment No. 18 to Letter of Intent, which was superseded by Definitive Contract. Price negotiation completed 13 January 1948. Contractor awaiting Change Order.

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(d) Phases IA and II Flight Test:
Quotation submitted by Contractor's letter, hrA:HW:797 dated 11 December 1947. Quotation discussed with District Contracting Officer 23 December and approved. Change Order to Contract urgently needed as Phase I flight test is well along and Contractor has no authorization to proceed further.

(e) Spares:
Preliminarily covered by Contract, but formal Change Order required.

(f) Engine Changes:
Difficulties with Westinghouse engines necessitating changes and return of engines for modification needs contractual coverage by CCN.

3. First XP-87 - Modification Program: As stated in paragraph 2 above, upon completion of Phase II flight test and acceptance of the airplane by the Government, the airplane is to be returned to the Contractor for modification and assembly to incorporate Allison J-33 engines and a simulated turret. Thereafter the airplane will undergo a brief flight test program to prove out the engine installation and ance will proceed with Phase III flight test. Below is the status of these various items.

(a) Allison J-33 Engine Installation:
Contractor's quotation submitted 6 October 1947. Go-ahead should have been received 1 December 1947 to allow six months for design and fabrication and be ready for modification and assembly work upon completion of Phase II flight testing on 1 June. Contract W 33-038 ac-19837 has now been written, negotiated and returned to Wright Field and work can start upon receipt of approved copy. To prevent further delay, Contractor is attempting to reduce total time required from nine months to eight months by further overlapping fabrication and assembly work.

(b) Simulated Turret:
Final proposal covering simulated turret submitted 6 November 1947. CCN was issued against Contract W 33-038 ac-6266 but returned unexecuted as this work should be accomplished under Contract W 33-038 ac-19837. Awaiting action by Air Materiel Command. Immediate go-ahead needed due to long procurement time on certain purchased and subcontracted parts.

(c) J-33 Flight Test:
Contractor preparing quotation. Should be covered by Amendment to Contract W 33-038 ac-19837.

(d) Phase III Flight Test:
Contractor preparing quotation. Should be covered by Amendment to Contract W 33-038 ac-19837.

4. Second XP-87 - Original Program: This airplane is currently being completed in the factory and will undergo Phases I and II flight tests in its original configuration utilizing a dummy nose which this Contractor has built on its own, since no Government furnished turret or other nose is available. This dummy nose will ultimately become a part of the simulated turret for the first airplane.

(a) Contractor preparing quotation to cover cost involved in flying the airplane at some field other than Columbus Airport.

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5. Second XP-87 - Modification Program: The general program for this airplane is shown on the chart, Enclosure (A), and the following comments are submitted:

(a) Photo Reconnaissance Proposal:
Contractor's quotation submitted by letter, RBA:[illegible]:13 dated 13 January 1948. This work can be covered by Amendment to Contract W 33-038 ac-19837. Contractor awaiting go-ahead.

(b) Photo Reconnaissance Flight Test:
It is believed that the majority of this work will be accomplished by the Air Materiel Command. It is requested that the Contractor be advised if any of the flight test is to be conducted by the Contractor in order that a quotation may be submitted.

(c) Fixed Gun Nose:
Since the Government furnished turrets originally intended for the airplanes will not be available for experimental work or for early production, Contractor is preparing a quotation covering the design and fabrication of a fixed gun nose. It is understood that the nose will be assembled on a test rig and will be gunfire tested at Wright Field after which it will be installed on the No. 2 airplane and flight tested.

6. As can be seen from the chart, Enclosure (A), it is necessary that immediate contractual action be taken on all of the above-mentioned experimental items in order that they will properly dovetail into the experimental and subsequent production programs and allow completion of flight test as early as possible. Even with the earliest possible completion of all of these items, it will be necessary to proceed with engineering, planning, tooling and fabrication for production airplanes before all of the experimental installations will have been proven out in order to meet the production schedule shown on Enclosure (A). The Contractor's Engineering Department is currently in critical condition due to lack of work. The experimental engineering will somewhat relieve this situation, but real relief can only be obtained through receipt of production go-ahead. Furthermore, since there are various studies which must be accomplished before much of the production engineering can be started, it is essential that production go-ahead as requested by our letter, EJD/af-31 dated 28 January 1948, be given at the earliest possible date. It is believed that it would be extremely desirable to discuss this entire experimental and production program with Air Materiel Command personnel at an early date in order that complete understanding may be arrived at and in order that the Contractor may have adequate time in which to properly plan for all parts of the program.

Respectfully,

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J. Ducayet
Contracts Manager

cc: MCPPXV
MCREOA
MCPPAA - 3 Ltr w Copies
Messrs. R. C. Blaylock, T. B. Focke, E. L. Noonan, (3) W. Tydon

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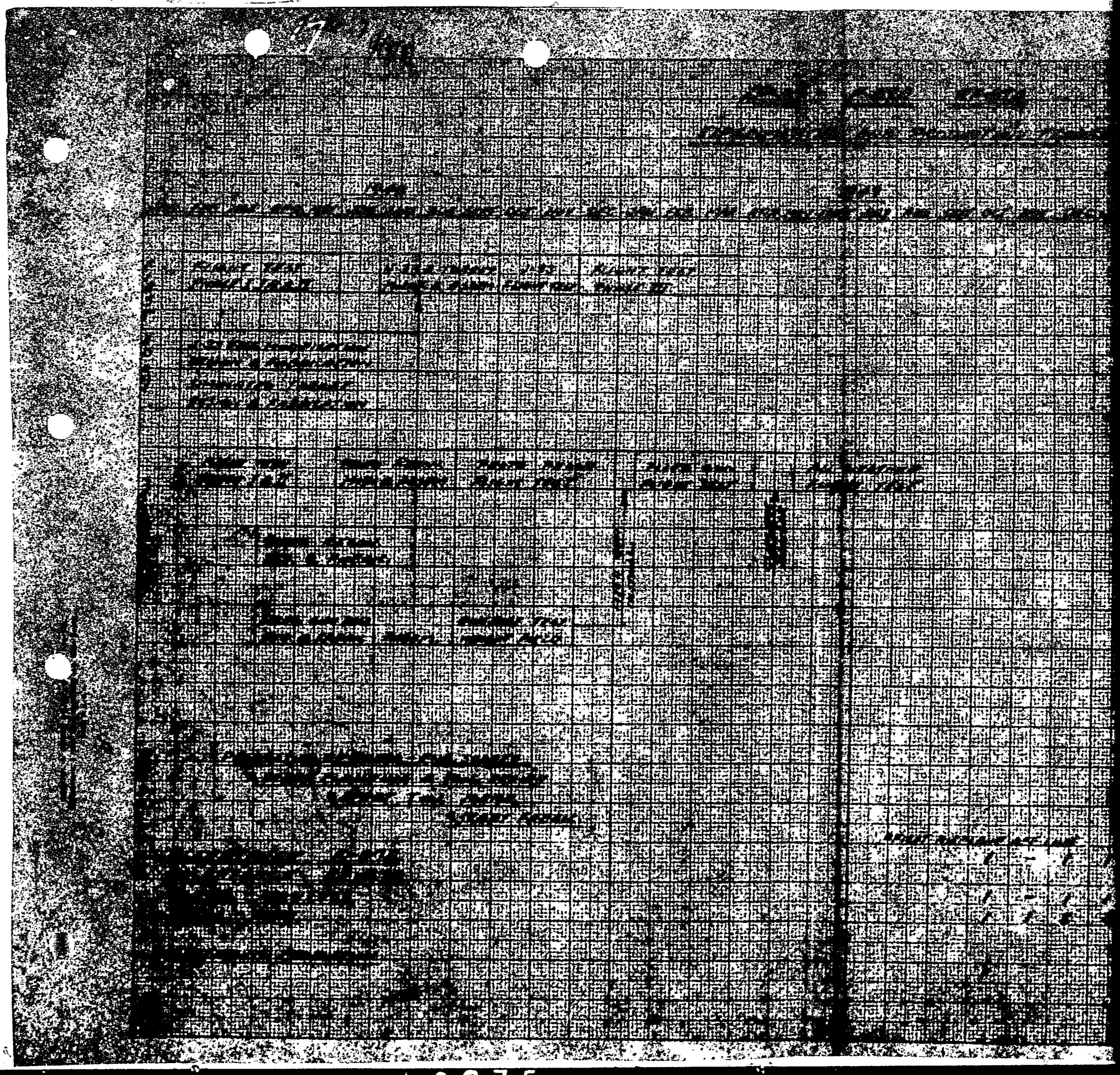

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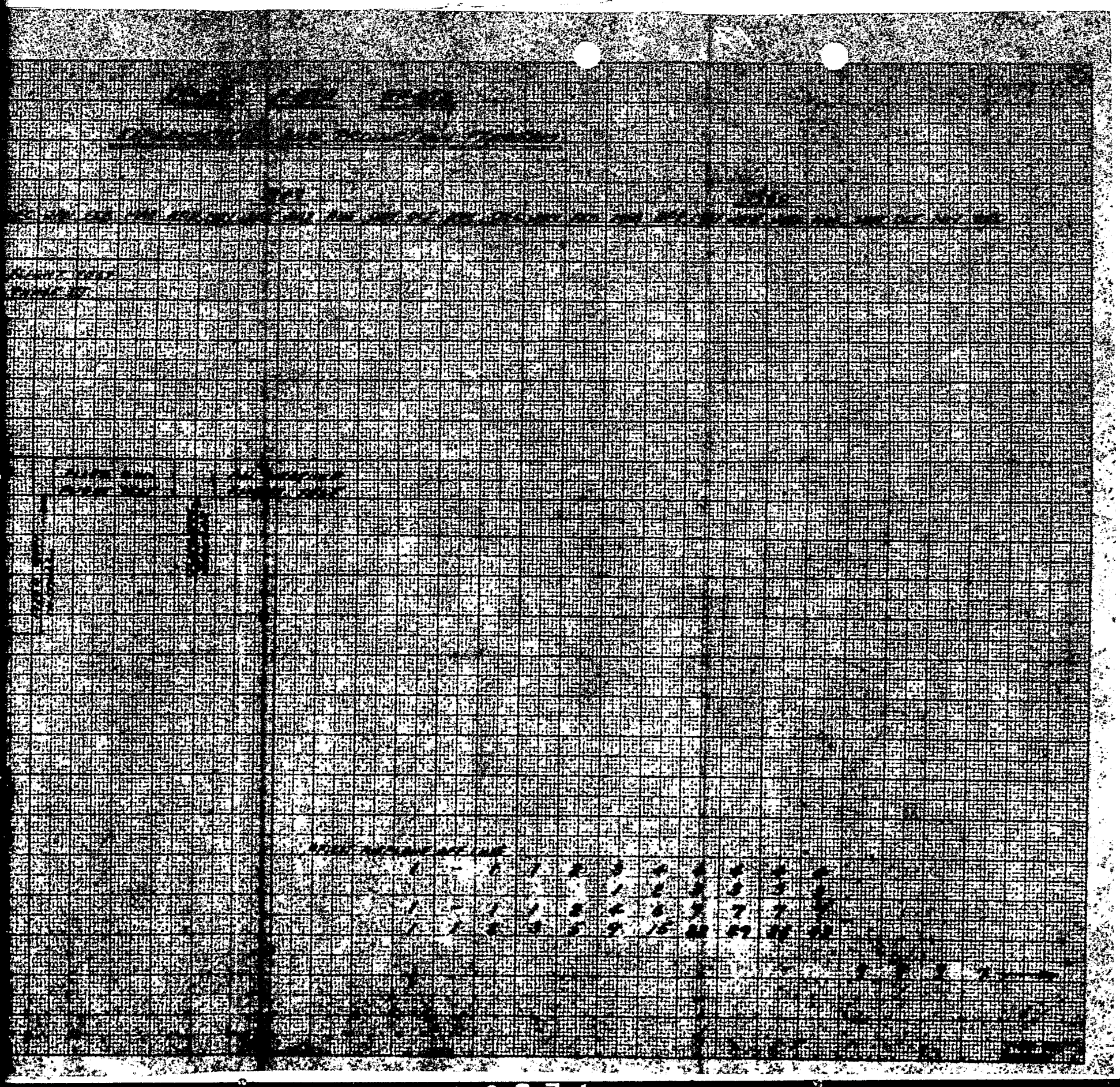

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CURTISS-WRIGHT CORPORATION
(Airplane Division)
Columbus, Ohio

Contract W 33-038 ac-19837

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APPROVED: 11 February 1948
By Direction of the Secretary of the Air Force under the provisions of Public Law 703, 76th Congress (as amended by Section 13 of Public Law 580, 77th Congress); Title II of the First War Powers Act, 1941 and Executive Order No. 9001 dated 27 December 1941.

/s/ H. A. Shepard
H. A. SHEPARD
Brigadier General, USAF
Chief, Procurement Division

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Contract No. W 33-038 ac-19637 (S-19431)

CONTRACT

(SUPPLIES)

Preference Rating
DIW:llh:ch

WAR DEPARTMENT

CURTISS-WRIGHT CORPORATION (AIRPLANE DIVISION)
(Contractor)

Contract for **Modification of XP-37 Airplane and Spares** *Amount,* Not to Exceed $ **585,000.00**

Place, Air Materiel Command, **Wright Field, Dayton, Ohio**

The Finance Officer, U. S. Army, **Wright Field, Dayton, Ohio, attention: FINKE-H** is designated as the officer to make payments in accordance with this contract. The supplies and services to be obtained by this instrument are authorized by, are for the purposes set forth in, and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover the cost thereof.

2150705 802-7004 P 611-07 833-038

PR: 19377 - Initiator: Mr. O. B. Thornton, MCREOA - Class: 02-A

Contractors' invoices, or VSD's used as invoices, shall be made out to the Finance Officer designated to make payments hereunder, and shall be sent by the Contractor, for recording, to the Dayton USAF Procurement Field Office, Wright Field, Dayton, Ohio (MCPPXV) which has been designated as the place of AF administration for this contract.

This Contract has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

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CONTRACT FOR SUPPLIES

THIS CONTRACT, entered into this day of . 19 by THE UNITED STATES OF AMERICA, hereinafter called the Government, represented by the Contracting Officer executing this contract, and CURTISS-WRIGHT CORPORATION (AIRPLANE DIVISION)

a corporation organized and existing under the laws of the State of Delaware

~~a partnership~~

~~an individual trading as~~
of the city of Columbus , in the State of Ohio
hereinafter called the Contractor, witnesseth that the parties hereto do mutually agree as follows:

ARTICLE 1. **Definitions and Miscellaneous Provisions.**—(a) The term "Secretary of War" as used herein shall mean the Secretary of the Air Force with respect to such functions as have been or shall be transferred to and vested in the latter pursuant to law, and shall mean the Secretary of the Army with respect to functions not so transferred or vested; and the term "his duly authorized representative" shall mean any person (other than the Contracting Officer) or board authorized to act for the Secretary concerned.

(b) Except for the original signing of this contract, and except as otherwise stated herein, the term "Contracting Officer" as used herein shall include (i) his duly appointed successor or his authorized representative and (ii) any and all Contracting Officers, acting within the scope of the orders respectively appointing them Contracting Officers.

(c) Unless otherwise expressly provided herein, all the supplies to be furnished hereunder shall be manufactured and supplied in strict accordance with the specifications, schedules and drawings respectively applicable thereto, as stated herein. Unless otherwise provided herein, all specifications, schedules and drawings referred to herein or in any exhibit or appendix attached hereto are hereby made a part hereof.

ARTICLE 2. **Changes.**—Where the supplies to be furnished are to be specially manufactured in accordance with drawings and specifications, the Contracting Officer may at any time, by a written order, and without notice to the sureties, make changes in the drawings or specifications. Changes as to shipment and packing of all supplies may also be made as above provided. If such changes cause an increase or decrease in the amount due under this contract, or in the time required for its performance, an equitable adjustment shall be made and the contract shall be modified in writing accordingly. Any claim for adjustment under this Article must be asserted within 90 days from the date the change is ordered, provided, however, that the Contracting Officer, if he determines that the facts justify such action, may receive, consider and adjust any such claim asserted at any time prior to the date of final settlement of the contract. If the parties fail to agree upon the adjustment to be made the dispute shall be determined as provided in Article 12 hereof. But nothing provided in this Article shall excuse the Contractor from proceeding with the contract as changed.

ARTICLE 3. **Extras.**—Except as otherwise herein provided, no charge for extras will be allowed unless the same have been ordered in writing by the Contracting Officer and the price stated in such order.

ARTICLE 4. **Inspection.**—(a) All material and workmanship shall be subject to inspection and test at all times and places and, when practicable, during manufacture. In case any articles are found to be defective in material or workmanship, or otherwise not in conformity with the specification requirements, the Government shall have the right to reject such articles, or require their correction. Rejected articles, and/or articles requiring correction shall be removed by and at the expense of the Contractor promptly after notice so to do. If the Contractor fails to remove promptly such articles and to proceed promptly with the replacement and/or correction thereof, the Government may, by contract or otherwise, replace and/or correct such articles and charge to the Contractor the excess cost occasioned the Government thereby, or the Government may terminate the right of the Contractor to proceed as and subject to the conditions provided in Article 5 of this contract, the Contractor and surety being liable for any damage to the same extent as provided in said Article 5 for terminations thereunder.

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(b) If inspection and test, whether preliminary or final, is made on the premises of the Contractor or subcontractor, the Contractor shall furnish, without additional charge, all reasonable facilities and assistance for the safe and convenient inspections and tests required by the inspectors in the performance of their duty. All inspections and tests by the Government shall be performed in such a manner as not to unduly delay the work. Special and performance tests shall be as described in the specifications. The Government reserves the right to charge to the Contractor any additional cost of inspection and test when articles are not ready at the time inspection is requested by the Contractor.

(c) Final inspection and acceptance of materials and finished articles will be made after delivery, unless otherwise stated. If final inspection is made at a point other than the premises of the Contractor or a subcontractor, it shall be at the expense of the Government except for the value of samples used in case of rejection. Final inspection shall be conclusive except as regards latent defects, fraud, or such gross mistakes as amount to fraud. Final inspection and acceptance or rejection of the materials or supplies shall be made as promptly as practicable, but failure to inspect and accept or reject materials or supplies shall not impose liability on the Government for such materials or supplies as are not in accordance with the specifications. In the event public necessity requires the use of materials or supplies not conforming to the specifications, payment therefor shall be made at a proper reduction in price.

ARTICLE 5. **Delays—Damages.**—(a) If the Contractor refuses or fails to make deliveries of the supplies within the time specified in Article 16, or any extension thereof, the Government, subject to the provisions of paragraph (b) below, may, by a notice in writing from the Contracting Officer to the Contractor of its intention to terminate under this Article, terminate the right of the Contractor to proceed with delivery of the supplies or such parts thereof as to which there has been delay. In such event, the Government may (1) require the Contractor to deliver to the Government such completed supplies, partially completed supplies and materials, parts, plans, drawings, information, and contract rights of the Contractor, (hereinafter called manufacturing material), as the Contractor has produced or acquired for the performance of such portion of this contract as to which the right to proceed with delivery is terminated, and accomplish or secure the completion or manufacture of supplies therewith; and, in addition thereto or in lieu thereof (2) purchase in the open market or secure by contract or otherwise, the manufacture and delivery of supplies similar to those called for by this contract in an amount which together with the supplies, if any, completed under (1) above shall not exceed the amount of supplies the right to proceed with delivery of which is terminated. If delivery is made pursuant to clause (1) of the preceding sentence the Government shall pay to the Contractor, less any previous payments, the following: (a) For each unit of the completed supplies accepted by the Government the unit contract price, and (b) for all partially completed supplies and manufacturing material delivered, the unit contract price for each unit of supplies completed or manufactured therewith, less the cost to the Government of completion or manufacture, but if that cost exceeds the unit contract price, the Contractor and his sureties shall be liable for such excess. If the cost to the Government of supplies procured in accordance with clause (2) above exceeds the corresponding unit price or prices under this contract, the Contractor and his sureties shall be liable for such excess.

(b) The Government shall not have a right of termination under this Article if the delay of the Contractor in making deliveries is an excusable delay, as hereinafter defined. The Contracting Officer shall ascertain the cause of the delay, and his findings of fact thereon shall be final and conclusive on the parties hereto, subject to appeal within thirty days by the Contractor to the Secretary of War or his duly authorized representative, whose decision on such appeal as to the cause of delay shall be final and conclusive on the parties hereto. The term "excusable delay" as used in this paragraph means any delay in making deliveries which results without fault or negligence on the part of the Contractor and which is due to causes beyond his control including, without being limited to, acts of God or of the public enemy, any preference, priority or allocation order issued by the Government or any other act of the Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; and, unless the Contracting Officer shall determine that the materials or supplies to be furnished under a subcontract are procurable in the open market, any delay of a subcontractor which results without fault or negligence on the part of the Contractor, and which is due to causes beyond the control of the Contractor, including without being limited to the types of causes above enumerated.

(c) Delay in delivery resulting from the inability of the Contractor, acting with due diligence, to procure materials or parts required for the manufacture of the articles called for hereunder shall be considered an excusable delay within the meaning of this Article.

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(d) Delay in delivery resulting from the loss of a substantial number of skilled employees through being drafted or volunteering for service in the Armed Forces and inability of the Contractor, despite due diligence, to replace such employees, shall be considered an excusable delay within the meaning of this Article.

ARTICLE 6. **Responsibility for Supplies Tendered.**—The Contractor shall be responsible for the articles or materials covered by this contract until they are delivered at the designated point, but the Contractor shall bear all risk on rejected articles or materials after notice of rejection. Where final inspection is at point of origin but delivery by Contractor is at some other point, the Contractor's responsibility shall continue until delivery is accomplished.

ARTICLE 7. **Increase or Decrease**—A variation in the quantities herein called for will be accepted as a compliance with this contract (and payments shall be adjusted accordingly), but only (i) when caused by conditions of loading, shipping, packing, or allowances in manufacturing processes, and (ii) if and to the extent specified in Article 15 hereof.

ARTICLE 8. **Payments.**—The Contractor shall be paid, upon the submission of properly certified invoices or vouchers, the prices stipulated herein for articles delivered and accepted or services rendered, less deductions, if any, as herein provided. Unless otherwise specified, payments will be made on partial deliveries accepted by the Government when the amount due on such deliveries so warrants; or, when requested by the Contractor, payments for accepted partial deliveries shall be made whenever such payments would equal or exceed either $1,000 or 50 per cent of the total amount of the contract. Invoices or Vendor's Shipping Documents used as invoices, shall be forwarded by the Contractor to the AAF office having administrative responsibility for this contract, for recording and forwarding to the Finance Officer.

ARTICLE 9. **Additional Security.**—Should any surety upon any bond for the performance of this contract become unacceptable to the Government, or if any such surety shall fail to furnish reports as to his financial condition from time to time as requested by the Government, the Contractor must promptly furnish such additional security as may be required from time to time to protect the interests of the Government and of persons supplying labor or materials in the prosecution of the work contemplated by the contract.

ARTICLE 10. **Officials Not to Benefit.**—No member of or delegate to Congress or resident commissioner shall be admitted to any share or part of this contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

ARTICLE 11. **Covenant against Contingent Fees.**—The Contractor warrants that he has not employed any person to solicit or secure this contract upon any agreement for a commission, percentage, brokerage, or contingent fee. Breach of this warranty shall give the Government the right to annul the contract, or, in its discretion, to deduct from the contract price or consideration the amount of such commission, percentage, brokerage, or contingent fees. This warranty shall not apply to commissions payable by contractors upon contracts or sales secured or made through bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business.

ARTICLE 12. **Disputes.**—Except as otherwise specifically provided in this contract, all disputes concerning questions of fact which may arise under this contract, and which are not disposed of by mutual agreement, shall be decided by the Contracting Officer, who shall reduce his decision to writing and mail a copy thereof to the Contractor at his address shown herein. Within 30 days from said mailing the Contractor may appeal in writing to the Secretary of War, whose written decision or that of his designated representative or representatives thereon shall be final and conclusive upon the parties hereto. The Secretary of War may, in his discretion, designate an individual, or individuals, other than the Contracting Officer, or a board as his authorized representative to determine appeals under this Article. The Contractor shall be afforded an opportunity to be heard and offer evidence in support of his appeal. The president of the board, from time to time, may divide the board into divisions of one or more members and assign members thereto. A majority of the members of the board or of a division thereof shall constitute a quorum for the transaction of the business of the board or of a division, respectively, and the decision of a majority of the members of the board or of a division shall be deemed to be the decision of the board or of a division,

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as the case may be. If a majority of the members of a division are unable to agree on a decision or if within 30 days after a decision by a division, the board or the president thereof directs that the decision of the division be reviewed by the board, the decision will be so reviewed, otherwise the decision of a majority of the members of a division shall become the decision of the board. If a majority of the members of the board is unable to agree upon a decision, the president will promptly submit the appeal to the Under Secretary of War for his decision upon the record. A vacancy in the board or in any division thereof shall not impair the powers nor affect the duties of the board or division nor of the remaining members of the board or division, respectively. Any member of the board, or any examiner designated by the president of the board for that purpose, may hold hearings, examine witnesses, receive evidence and report the evidence to the board or to the appropriate division, if the case is pending before a division. Pending decision of a dispute hereunder the Contractor shall diligently proceed with the performance of this contract. Any sum or sums allowed to the Contractor under the provisions of this Article shall be paid by the United States as part of the cost of the articles or work herein contracted for and shall be deemed to be within the contemplation of this contract.

ARTICLE 13. **Domestic Articles.**—Unless the Secretary of War shall determine it to be inconsistent with the public interest, or the cost to be unreasonable, only such unmanufactured articles, materials, and supplies as have been mined or produced in the United States, and only such manufactured articles, materials, and supplies as have been manufactured in the United States substantially all from articles, materials, or supplies mined, produced, or manufactured, as the case may be, in the United States shall be delivered pursuant to this contract, except as noted in the specifications and/or other papers hereto attached. The provisions of this article shall not apply with respect to articles, materials, or supplies for use outside the United States, or if articles, materials, or supplies of the class or kind to be used, or the articles, materials, or supplies from which they are manufactured are not mined, produced, or manufactured, as the case may be, in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality.

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ARTICLE 15. -- Services and Supplies to be Furnished.-- (a) The Contractor shall furnish and deliver to the Government all of the following services and supplies at the time and place or places designated in Article 16, hereof, in the quantities and at the prices set forth below:

Item 1: Modification of XP-87 airplane, Serial No. 45-59600, including the services and supplies more specifically described, below, at a price of $520,316.15

(a) Contractor will receive, service , store and maintain said airplane during the period required for modification thereof in accordance with paragraph (h) of Article 38 and other applicable provisions of this contract;

(b) The engines and items of equipment peculiar thereto will be removed by the Contractor and disposed of in accordance with instructions by the Contracting Officer;

(c) The Contractor shall accomplish such other disassembly and modification of the fixed nacelles as may be necessary to accommodate the installation of two (2) Allison J-33-A-8 engines and related items of equipment;

(d) The Contractor shall fabricate and install the following items:

(1) Removable nacelles for the said J-33 engines

(2) New landing gear doors and landing gear strut doors

(3) New landing gear door actuation mechanism

(4) New engine access doors

(5) New nacelle tail cones

(6) Water injection system;

(e) The Contractor shall accomplish the necessary modification of the following items:

(1) Nacelle fixed equipment

(2) Engine Controls

(3) Cockpit installations

(4) Normal and flight test instruments;

(f) The Contractor shall reinstall all furnishings and equipment, reassemble all parts of the airplane including the installation of the said J-33 power plants;

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(g) The Contractor shall accomplish all ground testing determined by mutual agreement of the Contractor and the Contracting Officer to be necessary to insure satisfactory operation of the new power plants and associated systems and equipment;

(h) The Contractor shall completely service the airplane, put it in flyable condition and perform necessary functional ground checks and pre-flight inspections for fly-away by Government furnished crew;

(i) The Contractor will furnish applicable engineering data required by contract W33-038 ac-6266 as supplemented by additional data pertaining to the said J-33 power plant installation which shall include a calculation performance report, master index of drawings, weight report and appropriate Appendices or revisions to the Pilot's Handbook of Operating Instructions and the Erection and Maintenance Handbook together with any other pertinent reports applicable to the installation and modification called for under this contract.

Item 2: Such spare parts for the airplane called for under Item 1, above, as the Government may become obligated to take delivery of pursuant to the provisions of Appendix I, entitled "Spare Parts Provisioning Appendix for use in Connection with Contracts for Experimental Aircraft" attached hereto and hereby made a part hereof. Such spare parts shall be listed in a Spare Parts Exhibit, in accordance with the provisions of said Appendix I, and said Exhibit shall be attached to and made a part of this contract as Exhibit "A". If, as provided in said Appendix I, partial spare parts exhibits are compiled and approved from time to time, the first such partial exhibit shall, however, be attached hereto and made a part hereof as "Exhibit 'A', Part I", the second such list shall be attached hereto as "Exhibit 'A', Part II", and so on. The total amount to be paid for the spare parts delivered hereunder shall not exceed . . . $15,652.23

(b) All references in any Government specification incorporated herein to other Government specifications shall be deemed to include all specifications supplementary to or superseding the specifications so referred to, to the extent that such supplementary or superseding specifications are in effect at the date of Contractor's latest quotation, if the Contractor was furnished or otherwise notified of the existence of such supplementary or superseding specification at the time of said quotation.

(c) It is understood that the efficient use by the Government of the supplies called for hereunder requires that the data called for hereunder be delivered not later than the time or respective times herein specified. If such data is not delivered at said time or times, the Government may at its election, so long as such data remains undelivered, unless the delay in delivery thereof is an excusable delay as such term is defined in Article 5 (Delays-Damages), withhold payment to the Contractor for any of the supplies theretofore delivered to the Government, refuse approval of the Contractor's vouchers

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and refuse to accept further deliveries hereunder from the Contractor or take any other action authorized by law or regulations now or hereafter in effect including termination of this contract for default to the extent and in the manner authorized by Article 5 (Delays-Damages), and may take any or all of the foregoing actions separately or in combination.

(d) Except as may be made necessary by conditions hereafter arising, the Government will furnish no facilities to the Contractor in connection with the performance of this contract.

(e) The following specific items are conditions of this contract:

(1) No flight demonstration shall be deemed to be included as such demonstration has been omitted from the contract price.

(2) No static test is included in the contract price other than the very limited amount included in the Contractor's Specification No. 49-4-1.

(f) Inspection of the items called for under this contract will be accomplished by Resident USAF Inspectors in accordance with established procedures governing the inspection and approval of aircraft and aircraft components. Engineering Acceptance Inspection shall be conducted at the Contractor's plant by the Project Engineer and representatives from the Air Materiel Command Engineering Division Laboratories directly affected by the power plant change or modification. Recommendation for Final Inspection and Acceptance will be made through the USAF Dayton Procurement Field Office following the correction of Engineering Acceptance Inspection items of defect.

(g) The Government will furnish the required engines, instruments and other items listed in Appendix III of the approved XP-87-A Model Specification, as it may from time to time be modified by mutual agreement between the Contracting Officer and the Contractor.

(h) For the Government property furnished to the Contractor under this contract, the necessary property records in connection with this contract, as contemplated by War Department Memorandum 35-6520-1, "Supply and Accounting Procedures under War Department Research and Development Program", as amended, will be maintained by a Research Property Officer designated by the Commanding General, Air Materiel Command.

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ARTICLE 16.—Delivery.—(a) If any aircraft are required to be furnished to the Government under this contract, the following provisions of this paragraph shall be applicable to the delivery thereof. Unless otherwise provided in this Article or elsewhere in this contract, all said aircraft shall be delivered completely set up, serviced and ready for flight at the flying field where the same are to be finally inspected pursuant to the provisions of paragraph (a) of Article 17 hereof. All fuel, oil and/or cooling fluid necessary for engine tests and/or flight tests required to be made under the provisions of AAF Specification No. R-1800-E, shall be furnished and supplied at the expense of the Contractor. All fuel, oil and/or cooling fluid necessary for fly-away shall be furnished by the Contractor at its expense in an amount to be designated by the ferry pilot for each aircraft delivered. In the event it becomes necessary to ship any of the aircraft called for by rail or other carrier, same shall be packed as may be directed in writing by the Contracting Officer, such changes as may be necessary relating to packing and shipping to be made under the provisions of Article 2 hereof.

(b) If any spare parts or special hand tools and ground equipment are required to be furnished to the Government under this contract in accordance with the terms of any Appendix attached to or made a part of this contract, said spare parts and such special hand tools and ground equipment shall be delivered in accordance with the provisions of said Appendix.

(c) Except as otherwise provided in paragraph (b) of this Article or elsewhere herein, all other spare parts ordered hereunder shall be delivered in accordance with the delivery schedule set forth in each Item or Spare Parts Schedule of each Item or Spare Parts Schedule hereunder. Unless otherwise provided in the Item or Spare Parts Schedule, all spare parts ordered hereunder shall be delivered in approximately equal monthly quantities during the period of delivery of the aircraft to which such spare parts relate. Unless otherwise provided in the Item or Spare Parts Schedule, the number of spare parts to be delivered with each aircraft shall be in the ratio of the number of aircraft to the total number of such aircraft to be delivered hereunder. Unless otherwise provided in the Item or Spare Parts Schedule, all spare parts shall be packed for export shipment.

(d) Except as otherwise provided herein* and except as to aircraft to be flown away, all the supplies required to be furnished under this contract shall be delivered to the Government f. o. b. cars and/or freight station, at the city or cities, or shipping point or points, where is located the plant or plants at which such supplies are to be finally inspected pursuant to the provisions of Article 17 hereof and shall be packed in accordance with the requirements of Article 19 hereof. If the Contracting Officer directs in writing that any of the supplies to be furnished hereunder be shipped by air such supplies shall be delivered to the Government f.o.b. a flying field designated by the Contracting Officer for such purpose in the vicinity of the plant or plants at which such supplies are to be finally inspected pursuant to the provisions of Article 17 hereof. If the Contracting Officer directs in writing that any of the supplies to be furnished hereunder be shipped other than by rail or air, such supplies shall be delivered to the Government f.o.b. the plant or plants at which such supplies are to be finally inspected pursuant to the provisions of Article 17 hereof.

(e) For the purpose of determining the fulfillment of this contract so far as delivery dates are concerned, in the event the delivery point or points are not the same as the point or points of destination, the time of delivery of the supplies shall be calculated as the date of final Government inspection ready for shipment to destination as certified to by the Government representative or, in the event of acceptance of the articles without inspection, pursuant to the provisions of Article 17, as the date of delivery to the carrier ready for shipment to destination.

(f) All applications hereunder for Government Bills of Lading shall be made to the Officer in Charge, AMC Field Traffic Office, 39 South LaSalle Street, Chicago 3, Illinois.

* herein

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(g) The services and supplies called for by paragraph (a) of Article 15 shall be performed for and delivered to the Government as follows:

(1) The modification of the airplane, and all supplies and services, the delivery of which is not otherwise specifically provided for herein, shall be completed within nine (9) months after date of execution of this contract;

(2) The supplemental and/or revised data called for under Article 15 (a) shall be delivered to the Government by registered mail, postage prepaid, addressed to the U.S.A. Supply Officer, Wright Field, Dayton, Ohio, attention: MCREOA; said delivery to be progressive as said data is compiled and prepared and in any event within the period provided in subparagraph (1) above.

(h) After final inspection and acceptance by the Government of spare parts called for under this contract, the same shall be retained by the Contractor at Contractor's plant for the duration of this contract subject to the issuance of shipping instructions by the Contracting Officer. Upon the issuance of such shipping instructions, submitted in writing by the Contracting Officer, the Contractor shall deliver such parts to the Government f.o.b. Columbus, Ohio, or to such other f.o.b. point as may be designated by said shipping instructions. Said spare parts shall be packed for domestic shipment in accordance with Article 19, hereof;

(i) Except as otherwise herein provided, shipping instructions will be furnished upon the written request of the Contractor to the Commanding General, Air Materiel Command, Wright Field, Dayton, Ohio, attention: MCMSXB53. Such requests for shipping instructions will be made not later than fifteen (15) days prior to the date of which any of such articles to be shipped are ready for shipment.

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ARTICLE 17.—Place of Inspection.—(a) Unless otherwise provided herein, if any aircraft are required to be furnished to the Government hereunder and the same are to be flown away, such aircraft shall be finally inspected and accepted by the Government at a flying field or fields to be approved by the Government in the vicinity of the Contractor's plant or plants specified in paragraph (b) of this Article or in the vicinity of any other plant or plants of the Contractor approved for such purpose in writing by the Contracting Officer. Unless otherwise provided herein, such inspection and acceptance shall be accomplished in accordance with the provisions of AAF Specification No. R-1800-E.

(b) Except as otherwise herein provided, the ~~The~~ plant or plants of the Contractor at Columbus, Ohio

are designated as the point or respective points for final inspection and acceptance by the Government of all the supplies (other than aircraft to be flown away, if any) to be furnished under this contract.

(c) At the option of the Contracting Officer any of the supplies to be furnished hereunder may be accepted without Government inspection upon receipt of a certificate of the Contractor attached to an invoice for said supplies reading substantially as follows:

"I hereby certify that I did, on the ..... day of ....., 194....., ship via ....., in accordance with shipping instructions issued by the Contracting Officer, the supplies called for by Article 15 of Contract No. W33-038 ac-19837 : that such supplies were in the quantities and of the quality called for, and were in all respects in accord with the applicable specifications. This statement is furnished to support payment of the attached invoice."

(d) Notwithstanding any provisions of the certificate above referred to, the liability of the Contractor with respect to the supplies covered by this contract will, after inspection by the Government, or after the expiration of a reasonable time following delivery to the Government within which inspection may be made, whichever occurs first, be limited (except as to supplies rejected upon such inspection) to liability for latent defects, fraud or such gross mistakes as amount to fraud.

(e) The provision of paragraph (c) of Article 4 reading as follows:

"but failure to inspect and accept or reject materials or supplies shall not impose liability on the Government for such materials or supplies as are not in accordance with the specifications"

shall not be applicable to any supplies accepted without Government inspection pursuant to the foregoing provisions of this Article.

(f) The following provisions are not applicable to this contract: The respective points for final inspection and acceptance by the Government of all the supplies (other than aircraft to be flown away, if any) to be furnished under this contract shall be, in addition to the plant or plants of the Contractor specified in paragraph (b) of this Article, any other plant or plants of the Contractor or any plant or plants of a subcontractor or vendor of the Contractor hereunder, provided that such other plant or plants of the Contractor or such plant or plants of a subcontractor or vendor shall have been approved for such purpose in writing by the Contracting Officer. It is expressly understood by the Contractor that request by it for the approval referred to in the preceding sentence must be made as soon as practicable to permit the Government to make necessary arrangements for inspection and acceptance, and that the Government is not obligated to make such final inspection and acceptance at any point so approved until a reasonable period after the date of such approval.

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ARTICLE 20. - Inspection by Contractor and Report. - The Contractor shall provide an acceptable and complete system covering the inspection of all material, fabrication methods and finished parts. This system shall be approved by the Government representative who shall be assigned at the Contractor's plant. Records of all such inspection work shall be kept complete and shall be available to the Government representative at all times. The work of construction shall at all times be open to the duly authorized Government representative for the purpose of inspection, and every facility shall be afforded such inspectors for the prosecution of their work. The Government shall have the right to require replacement of parts not in accordance with applicable drawings and specifications or showing inferior workmanship or materials. The Government representative shall conduct sufficient spot checks on a surveillance basis to insure compliance of parts and assemblies with applicable contractual drawings or applicable specifications. The Contractor shall inform the inspector when materials or parts are ready for inspection. The Contractor shall, in the manufacture of the articles to be supplied under this contract, be required to use such jigs, fixtures, and/or other devices and appliances in all processes which are conducive to the proper modification of the airplane. Such jigs, fixtures and/or other services and appliances may be of temporary type construction but shall be adequate to maintain the dimensions of the airplane as called for in the applicable drawings. The passing as satisfactory of any particular part or pieces of material by the Government representative does not relieve the Contractor from any responsibility regarding faulty workmanship or material which may be subsequently discovered prior to final acceptance.

ARTICLE 21. - Furnishing of Materials and Supplies by the Government. - The Contracting Officer may at his option from time to time furnish the Contractor with materials and/or supplies not readily obtainable in the open market and which are required by the Contractor for the performance of this contract. In such event, an equitable adjustment in the contract price shall be made as provided in Article 2 hereof.

ARTICLE 22. - Government Property. - (a) - Furnishing Thereof. - If any material, articles or equipment be listed as Government-furnished in the specification or specifications, herein referred to, pursuant to which the supplies called for hereunder are to be furnished, or be elsewhere listed in this contract as being furnished by the Government (except such materials and/or supplies furnished under the terms of Article 21 hereof), the Government shall furnish to the Contractor, without cost therefor, for installation or incorporation in such supplies, all such material, articles and equipment so listed.

(b) Delay in Delivery Thereof. - In the event that any material, articles or equipment listed as Government-furnished as aforesaid are not delivered to the Contractor within the period required by the Contractor in order that the delivery dates specified in this contract may be met, and the Contractor notifies the Contracting Officer in writing of such delay, the Government agrees that the specified delivery dates shall be extended as to the supplies the delivery of which is delayed thereby. Such extension, however, shall not exceed the period of delay actually caused by the late delivery of the Government-furnished material, articles or equipment.

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(c) **Delivery and Disposition Thereof.**—In the event materials, supplies, equipment or other property are furnished by the Government to the Contractor under this contract, except such materials and/or supplies furnished under the terms of Article 21 hereof, for installation in the products and materials or other items called for hereunder, or for use in connection with the performance of this contract, said Government property shall be delivered to the Contractor, f. o. b. cars, and/or freight station of transportation company, at the city or shipping point where Contractor's plant is located, unless otherwise provided herein; and any of such materials, supplies, equipment or other property not permanently installed in the products and materials or other items called for hereunder, or properly expended by the Contractor in the performance of this contract, shall, unless otherwise provided herein, be delivered by the Contractor to the Government f. o. b. cars and/or freight station, at the city or shipping point where Contractor's plant is located, packed for domestic shipment.

(d) **Liability Therefor.**—See Article 38.

XXXX Property Accountability.—In the event Government property is furnished to the Contractor under this contract, the necessary property records in connection with this contract will be maintained by an Industrial Property Accountable Officer designated for this contract by the Chief, Procurement Service, Headquarters, Air Materiel Command. X

ARTICLE 23.—**Anti-Discrimination.**—(a) The Contractor, in performing the work required by this contract, shall not discriminate against any employee or applicant for employment because of race, creed, color, or national origin.

(b) The Contractor agrees that the provision of paragraph (a) above will also be inserted in all of its subcontracts. For the purpose of this Article, a subcontract is defined as any contract entered into by the Contractor with any individual, partnership, association, corporation, estate, or trust, or other business enterprise or other legal entity, for a specific part of the work to be performed in connection with the supplies or services furnished under this contract; **Provided, however,** that a contract for the furnishing of standard or commercial articles or raw material shall not be considered as a subcontract.

ARTICLE 24.—**Subcontracts.**—No contract shall be made by the Contractor with any other party for furnishing any of the completed or substantially completed articles, spare parts, or work, herein contracted for, without the written approval of the Contracting Officer as to sources.

ARTICLE 25.—**Reproduction Rights.**—It is understood and agreed that the Contractor does not convey to the Government any reproduction rights in or to the articles called for herein by virtue of the terms of this contract, except as may be herein otherwise provided.

ARTICLE 26.—**Inspection and Audit of Books.**—See Title XIII, Sec. 1301, "Second War Powers Act, 1942"; Sec. 10 (1), Act of July 2, 1926, as amended.

ARTICLE 27.—**Employment of Aliens.**—No aliens employed by the Contractor for furnishing or constructing aircraft, or aircraft parts, or aeronautical accessories for the United States shall be permitted to have access to the plans or specifications or the work under construction or to participate in the contract trials without the written consent beforehand of the Secretary of War.

ARTICLE 28.—**Discount.**—In the event payments made under the terms of this contract are subject to a discount for payment within a specified period or periods, as set forth in Article 15, time will be computed from date of the delivery of the supplies to carrier when final inspection and acceptance are at point of origin, or when such supplies are accepted without final inspection pursuant to the provisions of Article 17, or from date of delivery at destination or port of embarkation when final inspection and acceptance are at those points, or from date correct bill or voucher properly certified by the Contractor is received, if the latter date is later than the date of delivery.

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ARTICLE 30—**Termination at the Option of the Government.** (a) The performance of work under this contract may be terminated by the Government in accordance with this article in whole, or from time to time in part, whenever the contracting officer shall determine any such termination is for the best interests of the Government. Termination of work hereunder shall be effected by delivery to the contractor of a Notice of Termination specifying the extent to which performance of work under the contract shall be terminated, and the date upon which such termination shall become effective. If termination of work under this contract is simultaneous with, a part of, or in connection with, a general termination (1) of all or substantially all of a group or class of contracts made by the War Department for the same product or for closely related products, or (2) of war contracts at, about the time of, or following, the cessation of the present hostilities, or any major part thereof, such termination shall only be made in accordance with the provisions of this article, unless the contracting officer finds that the contractor is then in gross or willful default under this contract.

(b) After receipt of a Notice of Termination and except as otherwise directed by the contracting officer, the contractor shall (1) terminate work under the contract on the date and to the extent specified in the Notice of Termination; (2) place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portions of the work under the contract as may not be terminated; (3) terminate all orders and subcontracts to the extent that they relate to the performance of any work terminated by the Notice of Termination; (4) assign to the Government, in the manner and to the extent directed by the contracting officer, all of the right, title and interest of the contractor under the orders or subcontracts so terminated; (5) settle all claims arising out of such termination of orders and subcontracts with the approval or ratification of the contracting officer to the extent that he may require, which approval or ratification shall be final for all the purposes of this article; (6) transfer title and deliver to the Government in the manner, to the extent and at the times directed by the contracting officer (i) the fabricated or unfabricated parts, work in process, completed work, supplies and other material produced as a part of, or acquired in respect of the performance of, the work terminated in the Notice of Termination, and (ii) the plans, drawings, information and other property which, if the contract had been completed, would be required to be furnished to the Government; (7) use his best efforts to sell in the manner, to the extent, at the time, and at the price or prices directed or authorized by the contracting officer, any property of the types referred to in subdivision (6) of this paragraph, provided, however, that the contractors (i) shall not be required to extend credit to any purchaser and (ii) may retain any such property at a price or prices approved by the contracting officer; (8) complete performance of such part of the work as shall not have been terminated by the Notice of Termination; and (9) take such action as may be necessary or as the contracting officer may direct for protection and preservation of the property, which is in the possession of the contractor and in which the Government has or may acquire an interest.

(c) The contractor and the contracting officer may agree upon the whole or any part of the amount or amounts to be paid to the contractor by reason of the total or partial termination of work pursuant to this article, which amount or amounts may include a reasonable allowance for profit, and the Government shall pay the agreed amount or amounts. Nothing in paragraph (d) of this Article prescribing the amount to be paid to the contractor in the event of failure of the contractor and the contracting officer to agree upon the whole amount to be paid to the contractor by reason of the termination of work pursuant to this article shall be deemed to limit, restrict or otherwise determine or affect the amount or amounts which may be agreed upon to be paid to the contractor pursuant to this paragraph (c).

(d) In the event of the failure of the contractor and contracting officer to agree as provided in paragraph (c) upon the whole amount to be paid to the contractor by reason of the termination of work pursuant to this article, the Government, but without duplication of any amounts agreed upon in accordance with paragraph (c), shall pay to the contractor the following amounts:

(1). For completed articles delivered to and accepted by the Government (or sold or retained as provided in paragraph (b) (7) above) and not theretofore paid for, forthwith a sum equivalent to aggregate price for such articles computed in accordance with the price or prices specified in the contract;

(2). In respect of the contract work terminated as permitted by this article, the total (without duplication of any items) of (i) the cost of such work exclusive of any cost attributable to articles paid or to be paid for under paragraph (d) (1) hereof; (ii) the cost of settling and paying claims arising out of the termination of work under subcontracts or orders as provided in paragraph (b) (5) above, exclusive of the amounts paid or payable on account of supplies or materials delivered or services furnished by the subcontractor prior to the effective date of the notice of termination of work under this contract, which amounts shall be included in the cost on account of

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which payment is made under subdivision (i) above; and (iii) a sum equal to 2% of the part of the amount determined under subdivision (i) which represents the cost of articles or materials not processed by the contractor, plus a sum equal to 8% of the remainder of such amount, but the aggregate of such sums shall not exceed 6% of the whole of the amount determined under subdivision (i), which for the purpose of this subdivision (iii) shall exclude any charges for interest on borrowings;

(3). The reasonable cost of the preservation and protection of property incurred pursuant to paragraph (b) (9) hereof; and any other reasonable cost incidental to termination of work under this contract, including expense incidental to the determination of the amount due to the contractor as the result of the termination of work under this contract.

The total sum to be paid to the contractor under subdivisions (1) and (2) of this paragraph (d) shall not exceed the total contract price reduced by the amount of payments otherwise made and by the contract price of work not terminated. Except for normal spoilage and to the extent that the Government shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the contractor as provided in paragraph (d) (1) and paragraph (d) (2) (i), all amounts allocable to or payable in respect of property, which is destroyed, lost, stolen or damaged so as to become undeliverable prior to the transfer of title to the Government or to a buyer pursuant to paragraph (b) (7) or prior to the 60th day after delivery to the Government of an inventory covering such property, whichever shall first occur.

(e) The obligation of the Government to make any payments under this article: (1) shall be subject to deductions in respect of (i) all unliquidated partial or progress payments, payments on account theretofore made to the contractor and unliquidated advance payments, (ii) any claim which the Government may have against the contractor in connection with this contract, and (iii) the price agreed upon or the proceeds of sale of any materials, supplies or other things retained by the contractor or sold and not otherwise recovered by or credited to the Government, and (2) in the discretion of the contracting officer shall be subject to deduction in respect of the amount of any claim of any subcontractor or supplier whose subcontract or order shall have been terminated as provided in paragraph (b) (3) except to the extent that such claim covers (i) property or materials delivered to the contractor or (ii) services furnished to the contractor in connection with the production of completed articles under this contract.

(f) In the event that, prior to the determination of the final amount to be paid to the contractor as in this article provided, the contractor shall file with the contracting officer a request in writing that an equitable adjustment should be made in the price or prices specified in the contract for the work not terminated by the Notice of Termination, the appropriate fair and reasonable adjustment shall be made in such price or prices.

(g) The Government shall make partial payments and payments on account, from time to time, of the amounts to which the contractor shall be entitled under this article, whether determined by agreement or otherwise, whenever in the opinion of the contracting officer the aggregate of such payments shall be within the amount to which the contractor will be entitled hereunder.

(h) For the purposes of paragraphs (d) (2) and (d) (3) hereof, the amounts of the payments to be made by the Government to the contractor, shall be determined in accordance with the Statement of Principles for Determination of Costs upon Termination of Government Fixed Price Supply Contracts approved by the Joint Contract Termination Board, 31 December 1943, as amended by Regulation No. 5 of the Office of Contract Settlement dated 30 September 1944. The contractor for a period of three years after final settlement under the contract shall make available to the Government at all reasonable times at the office of the contractor all of its books, records, documents and other evidence bearing on the costs and expenses of the contractor under the contract and in respect of the termination of work thereunder.

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ARTICLE 38.—**Liability for Government-Owned Property.**

(a) Except as otherwise specifically provided, the Contractor shall not be liable for loss or destruction of or damage to property of the Government in the possession or control of the Contractor in connection with this contract (hereinafter called "Government property") (1) caused by any peril while the property is in transit off the Contractor's premises, or (2) caused by any of the following perils while the property is on the Contractor's or subcontractor's or other premises or by removal therefrom because of any of the following perils:

> Fire; lightning; windstorm, cyclone, tornado, hail; explosion; riot, riot attending a strike, civil commotion; vandalism and malicious mischief; aircraft or objects falling therefrom; vehicles running on land or tracks, excluding vehicles owned or operated by the Contractor or any agent or employee of the Contractor; smoke; sprinkler leakage; earthquake or volcanic eruption; flood, meaning thereby rising of rivers or streams; enemy attack or any action taken by the military, naval or air forces of the United States in resisting enemy attack.

The perils as set forth in (1) and (2) above are hereinafter called "excepted perils".

(b) The Contractor represents that it is not maintaining and agrees that it will not hereafter maintain insurance (including self-insurance funds or reserves) covering loss or destruction of or damage to Government property caused by any excepted peril, and represents that it is not including and agrees that it will not hereafter include in any price to the Government any charge or reserve for such insurance.

(c) Upon the happening of loss or destruction of or damage to Government property caused by an excepted peril, the Contractor shall communicate with the Contracting Officer and with the Loss and Salvage Organization now or hereafter designated by the Contracting Officer, and with the assistance of that organization employed by the Contractor to perform services in accordance with instructions or regulations of the Government (unless the Contracting Officer directs that no such organization be employed), shall take all reasonable steps to protect the Government property from further damage, separate the damaged and undamaged Government property, put all the Government property in the best possible order, and furnish to the Contracting Officer a statement of: (1) the lost, destroyed and damaged Government property, (2) the time and origin of the loss, destruction or damage, (3) all known interests in commingled property of which the Government property is a part, and (4) the insurance, if any, covering any part of or interest in such commingled property. The Contractor shall be reimbursed the expenditures made by it in performing its obligations under this paragraph (c) (including charges made to the Contractor by the Loss and Salvage Organization, except any of such charges the payment of which the Government has, at its option, assumed direct), as approved by the Contracting Officer and set forth in a Supplemental Agreement.

(d) With the approval of the Contracting Officer after loss or destruction of or damage to Government property, and subject to such conditions and limitations as may be imposed by the Contracting Officer, the Contractor may, in order to minimize the loss to the Government or in order to permit resumption of business or the like, sell for the account of the Government any item of Government property which has been damaged beyond practicable repair, or which is so commingled or combined with property of others, including the Contractor, that separation is impracticable.

(e) Except to the extent of any loss or destruction of or damage to Government property for which the Contractor is relieved of liability under the foregoing provisions of this Article, and except for reasonable wear and tear or depreciation, or the utilization of the Government property in accordance with the provisions of this contract, the Government property (other than property permitted to be sold) shall be returned to the Government in as good condition as when received by the Contractor in connection with this contract. In aid of its obligation so to return the Government property, the Contractor shall maintain a property control, accounting and maintenance system consistent with good business practice.

(f) In the event the Contractor is reimbursed or compensated for any loss or destruction of or damage to Government property, caused by an excepted peril, it shall equitably reimburse the Government. The Contractor shall do nothing to prejudice the Government's rights to recover against third parties for any such loss, destruction or damage and, upon the request of the Contracting Officer, shall at the Government's expense, furnish to the Government all reasonable assistance and cooperation (including the prosecution of suit and the execution of instruments of assignment in favor of the Government) in obtaining recovery.

(g) The Government shall at all times have access to the premises wherein any Government property is located.

~~(h) In the event any aircraft are to be furnished under this contract, any loss or destruction of or damage to Government property occurring during any operations of said aircraft will be governed by the Article of this contract captioned "Flight Risks", to the extent such Article is, by its terms, applicable.~~

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(h) It is anticipated that the Government will loan to the Contractor, under Blanket Bailment Contract W 33-038 ac-10363, the airplane described in Item 1, paragraph (a) of Article 15, for use in the performance of this contract pursuant to Paragraph 7-314 of War Department Procurement Regulation, and the obligation of the Contractor to perform this contract is contingent upon such loan. However, this contract shall not be construed as effecting the bailment of such property nor as a commitment that such loan will be made. The terms of such bailment agreement will govern the Contractor's liability for any loss or destruction of, or damage to the Government property covered by such bailment agreement.

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ARTICLE 41. -- Price Revision. -- (a) Because of the experimental and developmental nature of the work called for by this contract and the great uncertainty as to the cost of performance hereunder, the parties agree that the contract price fixed in Article 15 with respect to Item 1 of paragraph (a), hereof, may be increased or decreased in accordance with the provisions of this Article.

(b) Within sixty (60) days after the completion or termination of this contract, the Contractor will file with the Contracting Officer a statement showing, in such form and detail as the Contracting Officer may prescribe, the Contractor's cost of producing the supplies or furnishing the services called for hereunder, together with such other information as may be pertinent in the negotiations for a revised price pursuant to this Article. Such statement of cost shall fairly reflect the normal operation of the Contractor's cost system. The Contractor will establish and maintain such records of the costs of performing this contract as the Contracting Officer may require in writing. The Contracting Officer shall have the right at all reasonable times to make or cause to be made such examinations and audits of the Contractor's books, records and accounts as he may request.

(c) Upon the filing of the statement and other pertinent information required by paragraph (b) of this Article, the Contractor and the Contracting Officer will promptly negotiate in good faith to agree upon a reasonable revised price for the entire contract which, upon the basis of such statement and other pertinent information, will constitute fair and just compensation to the Contractor for the performance of this contract. In determining the extent of any estimated allowance for profit to be taken into account in fixing such revised price, consideration will be given to the extent to which the Contractor has performed the contract with efficiency, economy and ingenuity. In no event shall the revised price exceed $572,347.77. The revised price shall be evidenced by a supplemental agreement to this contract.

(d) If within sixty (60) days after the completion or termination of this contract, the parties shall fail to agree upon a revised price in accordance with the provisions of this Article, the failure to agree shall be deemed to be a disagreement as to a question of fact which shall be disposed of in accordance with Article 12 (Disputes).

(e) In the event of a price increase the Government will pay or credit to the Contractor the amount by which the revised price shall exceed the contract price aforesaid. In the event of a decrease in price the Contractor will repay or credit the amount of such decrease to the Government in such manner as the Contracting Officer may direct.

(f) For any of the purposes of Article 30 (Termination at the Option of the Government) of this contract (including without limitation, computation of "the total contract price" and "the contract price of work not terminated") the contract price shall be the revised contract price agreed upon under paragraph (c) of this Article or determined under paragraph (d) of this Article, as the case may be.

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ARTICLE 44. - Special Tooling. - (a) The Contractor recognizes that the price for the items listed in paragraph (a) of article 15 hereof includes an allowance to compensate the Contractor for the special tooling (such as jigs, dies, fixtures, special punches, special cutting tools, patterns, special gauges and other special manufacturing aids) to be provided by the Contractor to produce such items (but excluding any special tooling used for the manufacture of parts or assemblies which are not peculiar to military aeronautical materiel), all of said tooling being hereinafter called the "special tooling". If, within sixty (60) days after the Contractor has completed delivery of all such items, the Contracting Officer gives written notice (including appropriate shipping instructions) to the Contractor to deliver to the Government the special tooling or any specified partthereof, the Contractor shall as soon as practicable thereafter deliver to the Government such part of the special tooling specified in such notice as the Contractor has on hand at that time. The special tooling to be delivered to the Government under the foregoing provisions shall be delivered, in accordance with the Contracting Officer's shipping instructions, f.o.b. the plant or plants of the Contractor, or of any subcontractor or subcontractors at which the same may then be situated. Upon such delivery title to all the special tooling delivered shall vest in the Government, if not at that time already vested pursuant to the provisions of the article of this contract, if any, entitled "Partial Payments". The Contractor shall comply with the directions, if any, contained in such notice as to the preservation, protection and/or packaging of the special tooling, or any specified part thereof. In order to assist the Contracting Officer in determining the best interests of the Government with respect to the special tooling, the Contractor shall from time to time until the expiration of said sixty (60) day period, if requested by the Contracting Officer, furnish to the Contracting Officer such information as it may have in its possession with respect to the special tooling and, if so requested, shall permit the Contracting Officer to inspect the special tooling and whatever records it has thereon.

(b) It is recognized that during the performance of this contract a portion of the special tooling may become useless for the performance of this contract by reason of engineering changes made in the work called for hereunder. Whenever an engineering change is made, having the effect of making useless for the performance of this contract a portion of the special tooling, the Contractor shall determine as soon as practicable whether or not the parts or assemblies changed are interchangeable with the new parts or assemblies to be substituted therefor. If the Contractor determines that any such part or assembly is not so interchangeable it shall notify the Contracting Officer in writing to that effect, requesting instructions with respect to the portion of the special tooling made useless for the performance of this contract by the change in question. The Contracting Officer may within sixty (60) days after receipt of such notification, give written notice to the Contractor to deliver to the Government the special tooling, so made useless for the performance of this contract or any part thereof, whereupon all the provisions of paragraph (a) shall be applicable as in the case of the notice therein provided for.

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(c) Except to the extent, if any, that delivery of the special tooling or of a specified part thereof is required by a written notice of the Contracting Officer pursuant to paragraphs (a) or (b), the Contractor shall retain all rights to the special tooling as fully as if this Article were not contained in this contract, subject to the provisions of paragraphs (e) and (g). It is expressly recognized that the Contractor has the right to scrap or salvage any portion of the special tooling which (i) at any time during the performance of this contract the Contractor has determined to have become useless by reason of wear or tear or (ii) has been made useless for the performance of this contract by an engineering change, where the Contractor has determined that the parts or assemblies changed are interchangeable with the new parts or assemblies. Any of the special tooling being scrapped or salvaged by the Contractor pursuant to the foregoing provisions shall be subject to inspection by the Contracting Officer, and the Contractor shall at the request of the Contracting Officer, afford him all reasonable means for such inspection.

(d) Between the beginning of the respective sixty (60) day periods referred to in paragraphs (a) and (b) and, whichever is earlier, (i) delivery by the Contracting Officer of a written notice to deliver any special tooling as therein provided, (ii) delivery by the Contracting Officer to the Contractor of a written notice stating affirmatively that delivery of any or a specified portion of the special tooling will not be required, or (iii) the expiration of the sixty day period, the Contractor (1) shall take such steps as are reasonably necessary to preserve and protect the special tooling or portion thereof, delivery of which may be ordered, and (2) may initiate and proceed with reasonable measures for clearance of the special tooling or such portion thereof from its plants, including packaging the same for domestic shipment or preparation thereof for temporary storage on its premises. Any work performed pursuant to the foregoing sentence, and any work involved in complying with any written notice for delivery of the special tooling, or any portion thereof, shall be deemed a change made pursuant to Article 2 hereof and the Contractor shall be entitled to the equitable adjustment specified in said Article 2 with respect thereto.

(e) Unless it shall be stated at the conclusion of this Article that the price set forth in Article 15 hereof for the items called for hereunder makes allowance for the estimated scrap and salvage value of special tooling the Contractor shall account to the Government for the scrap value of any portion of the special tooling (i) scrapped or salvaged by it during the performance of this contract pursuant to the provisions of the second sentence of paragraph (c) and (ii) on hand at the date of completing delivery of all the items listed in paragraph (a) of Article 15 but not required to be delivered to the Government pursuant to the provisions of paragraph (a) of this Article. If the statement mentioned in the preceding sentence is set forth at the conclusion of this Article, the Contractor shall not be obligated to account to the Government for any portion of the special tooling scrapped or salvaged by it pursuant to said provisions.

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(f) In the event the Government terminates this contract in whole or in part under Article 30, or exercises its right of termination under Article 5, the right of the parties with respect to any part of the special tooling then on hand, produced or acquired in respect of the performance of the work terminated, shall be the same as if this Article was not contained in this contract.

(g) If on the receipt of the notice referred to in parag aphs (a) or (b) above, the Contractor does not have on hand for delivery to the Government any part of the special tooling referred to in said notice, or if the Contractor at any time scraps or salvages any item of special tooling otherwise than in accordance with the provisions of this Article, the Contractor shall not be liable to the Government for such thereof as is not on hand or for such thereof as has been so scrapped or salvaged, unless the absence thereof or such scrapping or salvaging thereof is found to be due to wilful misconduct or failure to exercise good faith on the part of the Contractor's corporate officers or other representatives having supervision or direction of the whole of the Contractor's business or of the whole of any plant operated by the Contractor in the performance of this contract; provided, however, that the Contractor shall account for the scrap value of any part of the special tooling so scrapped or salvaged, unless the statement mentioned in the first sentence of paragraph (e) is set forth at the conclusion of this Article. The Contractor shall, however, be liable to the Government whenever the absence of such special tooling or such scrapping or salvaging is found to be due to such wilful misconduct or failure to exercise good faith.

(h) The provisions of this Article shall not be deemed to be applicable to any special tooling acquired or produced by any subcontractors of the Contractor pursuant to any subcontract under this contract.

(i) In the event that upon the completion of this contract all or any part of the special tooling is needed by the Contractor for the performance of any then existing prime contract with the Government acting through the USAF or of any then existing subcontract under any such prime contract, the Contractor gives written notice to that effect to the Contracting Officer within five (5) days after completion of this contract or within such longer period as the Contracting Officer shall allow, the Contractor shall have the right to retain and use the special tooling or such part thereof for the performance of such contract or subcontract and for the performance of any subsequent similar contract or subcontract contemplating continuous production. All the provisions of this Article shall remain applicable according to their terms to the special tooling or part hereof so retained, except that (i) the date of completing delivery under each of the respective contracts and subcontracts for the performance of which any part of the special tooling has been so retained shall be substituted for the date of completing delivery of the items listed in paragraph (a) of Article 15 hereof, provided, however, that the sixty (60) day period referred to in paragraph (a) of this Article shall begin to run with respect to the part of the special tooling so retained

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for the performance of any particular contract or subcontract only when the Contractor has notified the Contracting Officer in writing of having completed delivery thereunder; and (ii) the words "the performance of this contract" shall be deemed to refer to the performance also of such respective contracts and subcontracts. In consideration of the right to retain and use such special tooling, the Contractor shall not include and hereby represents that it will not include in the price of any contract or subcontract on which the special tooling is used, any charge for depreciation or amortization that has previously been charged against this contract.

(j) The price of all the items called for under this contract makes allowance for the estimated scrap and salvage value of the special tooling required by the Contractor for the performance of this contract.

ARTICLE 45. - Special Provisions Reference Inspection. - The modification called for in this contract is designated as developmental services. The Contractor may, in order to facilitate the performance of this contract (a) substitute materials which are not in exact accordance with applicable drawings and specifications but which are adequate insofar as safety and strength of structure is concerned; (b) make changes in the drawings which come within the scope of "variations" as defined in ANC Regulation 123-1, 17 February 1946 without the approval of the Government, except that changes which amount to "deviations" from Contractor's Model Specification shall first be submitted to the Air Materiel Command for approval; (c) use drawings in the performance of this contract of such nature as are determined by the Contractor to be sufficient for expeditious fabrication and adequate inspection of parts produced, which drawings shall be prepared in accordance with current engineering practices but need not comply with requirements of Specification AN-D-12. Drawings and/or specifications shall indicate the proper material required by the design and whenever substitutions of material are made, as hereinabove permitted, the Contractor shall promptly inform the AAF Plant Representative and shall maintain complete and up-to-date records of all substitutions, which records shall show the weight differential resulting by reason of such material substitutions.

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ARTICLE . Approval This contract shall be subject to the written approval of

or such individual as he may designate and shall not be binding until so approved. The date of such approval shall be deemed to be the true date for the purpose of determining all times of performance.

In witness whereof, the parties hereto have executed this contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

Type or print under their respective signatures the names of the witnesses and Contractor's representative.

By .....

(Official title)

Two witnesses:

Ross R. Aikin

Adriene H. Fisher

CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION

By Edwin J. Ducayet
Representative
Title

Contractor.

4300 E. Fifth Avenue, Columbus 16, Ohio
(Business address)

I, G. M. Pryor , certify that I am the Assistant Secretary of the corporation named as contractor herein; that Edwin J. Ducayet who signed this contract on behalf of the contractor, was then Representative of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

G. M. Pryor [CORPORATE SEAL]

I hereby certify that, to the best of my knowledge and belief, based upon observation and inquiry,

, who signed this contract for

, had authority to execute the same, and is the individual who signs similar contracts on behalf of this corporation with the public generally.

Contracting Officer.

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APPENDIX 1
TO CONTRACT NO. W 33-038 AC-19837

SPARE PARTS PROVISIONING APPENDIX FOR USE IN
CONNECTION WITH CONTRACTS
FOR EXPERIMENTAL AIRCRAFT

Provisioning of Spares - (a) The selection, delivery and distribution of spare parts and the items and quantities thereof to be furnished under those items of the contract which provide that spare parts shall be furnished in accordance with this Appendix shall be made as hereinafter provided:

(b) In order to meet the needs of delivery of spare parts simultaneously with delivery of the first airplane called for under the contract, the Contractor, commencing as early as practicable after the approval of this contract, and continuing from time to time thereafter as rapidly as the progress of the design permits, shall select the spare parts and quantities thereof which in his judgment shall be furnished. Such selection will be made by the Contractor on the basis of his own best judgment and in the light of all information available to him in conjunction with and/or according to general principles laid down by the Engineering Division of the Air Materiel Command. At appropriate intervals, as items and quantities of spare parts are so selected, the Contractor shall prepare a list including the items and quantities so selected (hereinafter referred to as "Preliminary Spare Parts Lists").

(c) As each Preliminary Spare Parts List is prepared it will be submitted to the Chief, Engineering Division, Air Materiel Command for approval. Such approval shall, in turn, be transmitted to the Contractor through the Contracting Officer assigned by the AAF Procurement Field Office administering this contract, hereinafter referred to as the "local Contracting Officer". The approval of the local Contracting Officer will be endorsed on a cover sheet attached to such Preliminary Spare Parts list and, upon such approval, six (6) copies thereof (which need not be reproducible and need not include the copy bearing the endorsement of approval) will be forwarded to the Government by the Contractor.

(d) When the written approval of the local Contracting Officer is endorsed upon any Preliminary Spare Parts List, it shall become and be known as an Approved Production List, and the Contractor will be obligated to furnish the items and quantities of spare parts listed thereon; the Government will be obligated to take delivery of spare parts so furnished, and the Contractor will be entitled to fair and just compensation therefor; provided, that the obligations of both parties will be limited to an amount of work the total price of which will not exceed the total amount specified for spare parts in the contract.

(e) If, at any time, it appears to the Contractor that the total price of the total quantity of spare parts to be selected as hereinabove provided is likely to exceed the total amount specified for spare parts in the contract, the Contractor will promptly notify the Government, in writing,

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setting forth the estimated amount of the excess and such information as may be necessary to enable the Government to determine the amount, if any, by which such total amount is likely to be exceeded. Within thirty (30) days after receipt of such notice, the Government will either notify the Contractor that it elects to increase the total amount provided in the contract for spare parts (which will be accomplished by change order or supplemental agreement to the contract) or will notify the Contractor of the items and/or quantities to be deleted from the list in order to bring it within the total amount provided in the contract for spare parts. To the extent that the Government fails to effect such increase or to indicate the deletions to be made, the Contractor will select items and/or quantities to be deleted to effect the necessary reduction.

(f) At any time after the first Approved Production List has been established the Contractor may prepare a Proposed Spare Parts Exhibit consisting of a compilation of Approved Production Lists with the unit and total prices of each item of spare parts shown thereon. At any time prior to the selection, as herein provided, of all the spare parts, if the Contractor desires that the portion thereof which has, at such time, been selected and priced, become the Proposed Spare Parts Exhibit, such portion may be deemed to be the Proposed Spare Parts Exhibit and may consist of a compilation of only those Approved Production Lists that have been established at such time. In such event the Proposed Spare Parts Exhibit shall be so entitled as to identify it as a part of the Proposed Spare Parts Exhibit, and each succeeding compilation of Approved Production Lists, shall be similarly entitled and show its sequence as a part of the entire Proposed Spare Parts Exhibit.

(g) A vellum and at least ten (10) copies of each proposed Spare Parts Exhibit (or part thereof) will be prepared and delivered to the local Contracting Officer. Seven of said copies shall carry on each page thereof a notation that prices are preliminary and subject to approval. The seven (7) copies bearing the notation referred to above shall be forwarded by the Local Contracting Officer to the Chief, Engineering Division, Air Materiel Command.

(h) The Local Contracting Officer will review the unit and total prices specified in each proposed Spare Parts Exhibit (or part thereof) for the mathematical accuracy of extensions and additions. The approval of the Local Contracting Officer, if given, will be indorsed on the cover sheets which will be attached to the vellum, and the three copies not bearing the notation provided for in paragraph (g) of this Appendix. The Local Contracting Officer will then forward the vellum and two (2) such approved copies to the Aircraft Section, Procurement Division, Air Materiel Command, Wright Field, Dayton, Ohio, Attn: MCPPIA and one (1) such approved copy to the Contractor.

(i) Upon approval of each Proposed Spare Parts Exhibit (as revised, if revision is necessary) whether partial or complete, it will be identified and attached to and made a part of the contract as the Spare Parts Exhibit, or as a part thereof, to the contract.

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(j) If the total price set forth in a Spare Parts Exhibit or, in the case of a part of a Spare Parts Exhibit, if the total price set forth therein when added to the total price of all other parts of the Spare Parts Exhibit previously attached to the contract, is more than the dollar amount of the spare parts provided in the item of the contract calling for spare parts listed in the Spare Parts Exhibit, a change order or supplemental agreement will increase the dollar amount to such an extent as may be necessary, subject to the allotment of funds therefor. If the total price set forth in a complete Spare Parts Exhibit is less than the dollar amount of the spare parts provided in the item of the contract calling for the spare parts listed in the Spare Parts Exhibit, the change order or supplemental agreement will decrease such dollar amount to such an extent as may be necessary. In the case of a part of a Spare Parts Exhibit, if the total price set forth therein when added to the total price set forth in all other parts of the Spare Parts Exhibit previously attached to the contract, is less than the dollar amount of the spare parts provided for in the items of the contract calling for the spare parts listed in the Spare Parts Exhibit, no action shall be taken to reduce such dollar amount until such Spare Parts Exhibit is made complete. The Government may give notice to the Contractor that a part of a Spare Parts Exhibit completes its spare parts requirements under the item of the contract calling for spare parts to be listed in the Spare Parts Exhibit. In such event, if the total price of all the parts of the Spare Parts Exhibit theretofore attached to the contract, including the part as to which such notice is given, is less than the dollar amount provided in the item of the contract calling for the spare parts listed in the Spare Parts Exhibit; the change order or supplemental agreement will decrease such dollar amount to such an extent as may be necessary.

(k) If the local Contracting Officer takes exception to any of the unit and total prices specified in any Proposed Spare Parts Exhibit, and such exceptions cannot be resolved within a reasonable time through negotiation with the Contractor, the items as to which disagreement exists shall be referred to the Aircraft Section, Procurement Division, Air Materiel Command, Wright Field, Dayton, Ohio, Attention: MCPPXA, for further consideration and negotiation with the Contractor. No change order or supplemental agreement making any Spare Parts Exhibit, or part thereof, a part of this contract shall be prepared unless and until all negotiations in regard thereto have been concluded to the satisfaction of the parties.

(l) In the event this contract is terminated by the Government after the delivery to the Government of any spare parts, the prices of which have not been submitted to or approved by the local Contracting Officer, the parties will, nevertheless and as promptly as practicable, take the action prescribed herein to establish the prices of such items and quantities of spare parts as have been delivered to the Government prior to the effective date of such termination and in respect of which the Contractor may be entitled to payment pursuant to the Article of the contract regarding termination by, or for convenience of, the Government.

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18 Nov 47
Old AMC Form No 10-508

SECRET

MCPP

Procurement of F-12 Aircraft

Chief of Staff
United States Air Force
Washington 25, D. C.

1. The Air Force airplane procurement policy as practised in the past has been to satisfy military airplane requirements through the medium of competition in design. Implied under this policy has been the attainment of the five (5) following desired objectives:

a. Strategic georgraphical relocation of the aircraft industry.

b. A balanced distribution of business among aircraft manufacturers.

c. Maintenance of multiple sources for each of the several types of airplanes.

d. Elimination of factory conversions resulting from constant changes from one type to another in manufacturers' facilities.

e. Non-exclusion of new sources of supply.

In actual practice, awards have been made primarily as a result of technical excellence after first assuring that manufacturers' financial capabilities and manufacturing facilities were adequate to construct experimental articles. New sources have been permitted to enter the specialized aircraft manufacturing field and old sources of supply have been allowed to drop out. Only secondary consideration has been given to the attainment of the other objectives which have as important a bearing on the strength of the Air Force and the security of the country as does the technical excellence of the articles themselves.

2. No one, either in Government service, industry, or private life, has been able to suggest a practical method of obtaining the

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AMC Form No 10-7
(18 Nov 47)
(Old AMC Form No. 10-508)

IR INSPECTOR

Ltr from Hq, AMC to Chief of Staff, subject: "Procurement of F-12 Aircraft"

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first of these objectives, namely, the relocation and dispersion of elements of the aircraft industry, except through isolated voluntary acts by individual companies.

COMPTROLLER

Insufficient emphasis on the other objectives in the application of the existing Air Force policy has resulted in a current situation wherein over 70% of our business is allotted to three airframe companies. In addition, very attractive experimental designs appear to be in the possession of contractors who are not in a position to deliver the articles satisfactorily in production quantities.

PERSONNEL & ADM

Stated briefly below is the current situation with respect to the eleven major suppliers of airframes for the Air Force:

RESEARCH & DEV *

Boeing Aircraft Company

Undelivered
Backlog - $199,961,280

This contractor has extensive experience in the design and construction of 4-engine aircraft, including bombardment and transport types. At present, he has a near capacity load with every probability that adequate work will be available to him for the next five years. This production includes the B-50 bomber, C-97 transport, Model No. 377 commercial transport, and a substantial quantity of experimental work, including design studies on the XB-52 airplane and guided missiles research. The B-47 airplane, which at present is an experimental design, appears to be a definite possibility for future production. Boeing has been an outstanding engineering and research source in the large airplane field, and is considered to be a good production source with sound financial integrity.

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North American Aviation, Inc.

Undelivered
Backlog - $155,241,177

This contractor has an excellent record for design and particularly for the construction of Air Force aircraft, and is considered to have the best producti-

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North American (Cont'd)	bility record of all Air Force contractors. He is presently at near capacity in his facility, producing B-45 jet bombers, P-86 jet fighters, experimental missiles, together with Navy fighter and scout bomber aircraft. It is anticipated that the current production workload will continue for the next five years.
Northrop Aircraft, Inc. Undelivered Backlog - $16,689,150	The YB-35 and YB-49 flying wing bombers are currently being produced in a service test quantity at this facility, and procurement of a light utility transport is planned by the Air Force in the near future. This contractor has no additional planned production work for the future. Northrop is considered to be an outstanding engineering company, who has had little opportunity to build up or prove his production capabilities. The financial condition of this company is satisfactory at the present time.
Douglas Aircraft Company, Inc. Undelivered Backlog - $23,700,000	This contractor has a long and successful record for the design and construction of transport and attack aircraft. Post-war business has been concentrated in commercial transports, and at the present time, Douglas has no Air Force production contracts. However, it is planned to procure C-74 heavy transports in the future. The greatest difficulty in conducting business with the Douglas Company centers around exceedingly arbitrary contractor relationship.
Lockheed Aircraft Corporation Undelivered Backlog - $46,710,296	This contractor had extensive experiences during the war in the production of various types of aircraft. A large order of P-80 jet fighters and commercial transports are currently nearing completion at his facility, and no future production business is anticipated in the foreseeable future other

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Lockheed (Cont'd)	than a limited procurement of "Constellation" transports for the Air Force, together with a small number of P-80's. This organization possesses good design talent, but is extremely weak both financially and in production management. He is considered to be a desirable source for future supplies only if a reorganization of management is effected.
Consolidated-Vultee Aircraft Corporation Undelivered Backlog - $156,658,561	This contractor is starting delivery on a production quantity of B-36 heavy bombers, which will extend over the next two and one-half years, as presently planned. Further than this, there is no additional anticipated Air Force business other than the completion of a contract for small liaison type L-13 aircraft. This company has an unimpressive production record, and has never made an outstanding contribution in design or research development. The consensus is that this company should be utilized only under extenuating international circumstances.
Curtiss-Wright Corporation Undelivered Backlog - $7,389,132	This company is an old line manufacturer, who in recent years has contributed little in design, and less in production. His financial integrity is directly proportionate to the degree of support rendered by Curtiss-Wright Corporation, the parent holding company. This out-of-production facility at the present time appears to have the best available design of a vitally needed all-weather fighter (P-67). This company should be considered a future source of Air Force supply only if top management in the parent corporation can guarantee improvement in existing company policies.

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Bell Aircraft Corporation

Undelivered
Backlog - $12,666,956

This company contributed the P-39 and P-63 fighter aircraft designs during the war which were acceptable only because of the extenuating circumstances of that period. He further produced the B-29 airplane at Marietta, Georgia and compiled a fair production record in this venture. Since the war, he has had practically no Air Force business, outside of development work of a supersonic research airplane (XS-1), and limited production of helicopters. There is prospect for only a limited production of helicopters at that facility in the future and he is apparently in a difficult financial condition.

Fairchild Aircraft Division

Undelivered $38,984,633
Backlog -

This is a small company of limited engineering capabilities and questionable productible ability on other than training type aircraft. He is currently producing the C-82 cargo airplane at a nominal rate, and it is planned to use this limited facility in the continuing production of this model in the future.

The Glenn L. Martin Company

Undelivered
Backlog - $14,998,549

This is an old-line company who established a satisfactory record for production of medium and heavy bombardment aircraft during the war. Subsequent work at this facility has been directed to the production of commercial transports and Navy aircraft, together with one experimental jet bomber, for the Air Force. Martin is currently undergoing major personnel changes, particularly in the engineering department, and is an exceedingly questionable source for future Air Force business.

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PUBLIC INF OFFICE

Republic Aviation Corp.

Undelivered Backlog - $49,606,710

COMPTROLLER

This contractor established a satisfactory fighter production record during the war, and since that period has been engaged in the construction of F-84 jet fighters, a large number of which are currently on contract. He has also produced two XF-12 experimental long range reconnaissance airplanes, and has expended considerable effort to get into commercial transport, as well as commercial light plane production, which ventures have proven futile and costly. Republic is a relatively small new company, which at the moment is in extremely difficult financial condition as a result of manifestly poor business judgment in the handling of his war-earned resources. A fighter airplane designer and producer during the war, he is at the moment the designer of the best available strategic reconnaissance airplane (F-12).

PERSONNEL & ADM

RESEARCH & DEV

3. The unbalance evident from the foregoing may eventually be straightened out through more objective application of our design competition philosophy. However, rather drastic action is required now to prevent unavailability of needed articles and to preserve desired sources. Enforced sub-contracting may help to some extent but that alone will not be sufficient. In an effort to restore a more desirable situation in industry, consideration should be given to the placement of the pending production order for F-12 airplanes, and the purchase of the new development trainer and medium bomber.

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4. In the case of the F-12, as has been explained above, the Republic Company appears incapable of guaranteeing to the Air Force timely availability of this article. Of the other existing sources, North American and Boeing seem inappropriate because of their current workload. Northrop, Fairchild, Curtiss, and Bell can be eliminated due either to their financial, engineering, facilities, or production incapabilities. There remains then to be considered only Martin, Lockheed, Consolidated-Vultee, and Douglas. The unknown engineering situation and possible Navy participation are sufficient to eliminate Martin. The Air Force has effectively relocated Consolidated-Vultee's

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18 Nov 47)
(Old AMC Form No. 10-508)

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Ltr fr Hq, AMC to Chief of Staff, subject, "Procurement of F-12 Aircraft"

primary production effort through existing contracts at the Fort Worth plant, and has no desire at present to restore future manufacturing efforts to the San Diego plant. Lockheed appears to be a poor risk for the manufacture of this vitally needed strategic reconnaissance weapon because of its necessary financial and production rejuvenation. There remains then only Douglas who seems capable of undertaking production of the F-12. If possible, its manufacture should be accomplished in a Midwestern or Southwestern facility, but can be accomplished in the company's Santa Monica plant.

5. In summary, it is our recommendation (a) that the existing Air Force policy of design competition be continued but with greater emphasis being placed on producibility and distribution of business, (b) that, provided arrangements satisfactory to the Government can be made, the F-12 be produced by Douglas, and (c) that the award of the PT-37 trainer and the medium bomber be used to provide additional redistribution of business if an analysis now in process indicates that this is necessary to attain the desired balance.

JOSEPH T. McNARNEY
General, USAF
Commanding

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

Subject: Contract W[illegible]-[illegible], Model AT-[illegible] Airplanes
Repair [illegible] Airplane

To: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: MCPPAV-

Through: Air Officer In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Through: Chief, Dayton Procurement Field Office
Air Materiel Command
Wright Field, Dayton, Ohio

Attention: MCPPAV - Contracting Officer

References: (a) AMC Ltr PPAV-1/CL/VMC [illegible] December 1944
(b) AMC Message Serial MCPPAV-1/JW/VMC dated 5 February 1945

Enclosure: (A) Cost Estimate Breakdown

1. In response to the requests contained in Air Materiel Command letters references (a) and (b), and in compliance with Contract Change Notification No. [illegible] dated 3 January 1945, this Contractor submits herewith a quotation covering the costs involved in repairing AT-[illegible] Airplane No. [illegible]. Costs for these repairs, which were required as a result of the damage incurred while en route to Nurmo, are based directly on the total charges accumulated in accordance with the method outlined in CCN [illegible].

2. For the total estimated man hours necessary to repair the damage incurred [illegible] to Nurmo, this Contractor quotes herewith a total increase of $44,[illegible].14 in the fixed price of subject contract. Breakdown of this amount as applicable to the fin damage and the power unit nacelle damages are contained in Enclosure (A) attached hereto. Further breakdown of these costs as accumulated at Columbus and Nurmo through the end of the year 1944 and in January 1945 forwarded are contained in sheet [illegible] of Enclosure (A). Air Materiel Command attention is invited to the fact that overhead rates of [illegible]% for Columbus and 15% for Nurmo have been utilized in compiling these costs, in accordance with the Contractor's Nurmo Program quotations.

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The damage to the left-hand wing panel and nacelle was incurred near Joliet, California, on 18 November 1947. The fin damage for which costs are submitted herewith occurred 3 November 1947 near Springfield, Ohio. This Contractor regrets the delay which has been experienced in submitting this quotation for these repair costs. However, inasmuch as ECR No. 2 and all other Air Material Command requests concerning this quotation specifically instructed the Contractor to base the quotation on actual cost data, it was impossible to accumulate final complete cost data prior to this time. The Contractor has maintained detailed cost records for subject repairs and has such records available for the Air Material Command's review and approval.

Respectfully,

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

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ENCLOSURE (A)

XF-[illegible] AIRPLANE

Summary of Fin & Panel Repair Costs

	Fin	Panel & Nacelle	Total Repair
PRODUCTIVE			
Material	$ [illegible]	$ [illegible]	$ [illegible]
Labor	[illegible]	[illegible]	[illegible]
Overhead	[illegible]	[illegible]	[illegible]
Premium	[illegible]	[illegible]	[illegible]
Total Productive	$ [illegible]	$ [illegible]	$ [illegible]
Engineering			
Material	$ - - - -	$ - - - -	$ - - - -
Labor	[illegible]	[illegible]	[illegible]
Overhead	[illegible]	[illegible]	[illegible]
Premium	[illegible]	[illegible]	[illegible]
Total Engineering	$ [illegible]	$ [illegible]	$ [illegible]
TOTAL REPAIR COSTS	$ [illegible]	$ [illegible]	$ [illegible]
Profit @ [illegible]%			[illegible]
Price			$ [illegible]

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ENCLOSURE (A)

AP-67 Airplane

Repair of Damage En Route to Kwajalein
Breakdown of Actual Cost

	Columbus Costs thru Dec 1947	Kwajalein Costs thru Dec 1947	Kwajalein Costs thru Jan 1948	Total Repair Costs
REPAIR TO FIN				
Productive				
Material	$ 384.11	$ 2,353.49	$ 1,112.93	$ 3,500.13
Labor	6,432.80	652.45	241.90	7,327.15
Overhead	10,372.98	232.47	84.92	10,690.37
Premium	- - -	4.60	3.10	7.70
Total Productive	$17,289.89	$ 3,242.98	$ 1,443.73	$ 22,026.25
ENGINEERING				
Material	$ - - -	$ - - -	$ - - -	$ - - -
Labor	1,022.00	219.00	19.00	1,260.00
Overhead	1,022.00	70.57	20.80	1,113.37
Premium	- - -	46.50	1.70	48.20
Total Engineering	$ 2,044.00	$ 342.07	$ 41.50	$ 2,427.57
TOTAL FIN REPAIR	$19,333.89	$ 3,585.05	$ 1,485.23	$ 24,453.82
REPAIR TO PANEL & NACELLE				
Productive				
Material	$ 3,048.75	$ 401.10	$ 27.15	$ 3,477.00
Labor	2,537.10	2,109.63	452.00	5,098.73
Overhead	4,099.42	729.44	186.22	5,015.08
Premium	- - - -	707.22	49.80	757.02
Total Productive	$ 9,685.27	$4,997.09	$ 715.17	$ 14,347.53
ENGINEERING				
Material	$ - - - -	$ - - - -	$ - - - -	$ - - - -
Labor	304.47	474.70	- - - -	779.17
Overhead	304.47	108.17	- - - -	412.64
Premium	- - - -	109.12	- - - -	109.12
Total Engineering	$ 608.94	$ 691.99	$ - - - -	$ 1,300.93
TOTAL PANEL & NACELLE REPAIR	$ 10,294.21	$4,997.79	$ 715.17	$ 15,807.17

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MCPP Form No. 71-26A
(Rev 21 Jan 48)

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Execute in triplicate	CHANGE ORDER	Date 25 February 1948
C— 35379	UNITED STATES AIR FORCE Air Materiel Command ~~Wright Field, Dayton, Ohio~~ Wright-Patterson Air Force Base Dayton, Ohio	Change Order No. 1 to Contract No W33-038ac-19837 ~~xxxxxxxxxx~~
Class— 11-E		

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To: Curtiss-Wright Corporation, (Airplane Division), Columbus 16, Ohio

SUBJECT: New Item of Work

1. The following item is hereby added to paragraph (a), Article 15 of Contract W 33-038 ac-19837:

"Item 3 -- The contractor shall design, fabricate and install a simulated turret, in lieu of a government-furnished power turret, as specified in contractor's Model Specification No. 9566, Revision B, dated 1 November 1946, in XP-87 airplane, AAF Serial No. 45-59600, for the purpose of determining the aerodynamic feasibility of such a turret on a high speed airplane. This simulated turret shall be capable of rotation through the forward right hemisphere only and controllable by switches located in the radio operator's side of the cockpit. The simulated turret shall consist of four (4) 20mm aircraft cannons each with at least 100 rounds of ammunition and shall be capable of being stowed in the straight forward position for operation as fixed guns. The design of the simulated turret shall not be governed by applicable specifications for tactical weapons since it is intended only as a means of studying the aerodynamic problems which are expected to be encountered in an arrangement of this kind. Government-furnished equipment shall consist of 20mm cannons, gunchargers, and ammunition only. All other equipment and materials necessary for construction shall be contractor furnished.
Total Price . . . . . $88,508.87"

2. The following subparagraph is hereby added to paragraph (g), Article 16 of said contract W 33-038 ac-19837:

"(3) The modification of airplane, AAF Serial No. 45-59600, and all supplies and services called for under Item 3, paragraph (a), Article 15 hereof shall be completed on or before 30 December 1948."

3. Subparagraph (1) of paragraph (g), Article 16 of said contract is hereby amended to read as follows:

"(1) The modification of airplane, AAF Serial No. 45-59600, and all supplies and services called for under Item 1, paragraph (a), Article 15 hereof, the delivery of which is not otherwise specifically provided for herein, shall be completed within nine (9) months after date of execution of this contract;"

This change order has been (~~xxxxxxxxxx~~ negotiated pursuant to) Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941, and to JPR 4-111.2(2).

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4. Nothing herein contained shall be deemed to require the contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

5. This change order consists of Sheets 1, 1A and 2.

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MCPP Form No. 71-26B
(21 Jan 48)

Total increase in ~~decrease~~	fixed price	$88,508.87
	~~cost plus fixed fee~~	$
	~~fixed fee~~	$

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

THE UNITED STATES OF AMERICA

22 March 1948
(Date)

BY: /s/ Stephen Lovas
(Contracting Officer)
STEPHEN LOVAS

1ST INDORSEMENT

TO: CONTRACTING OFFICER:

Columbus 16, Ohio 15 March 1948
(Place) (Date)

1. Contractor hereby accepts the above Change Order.

CURTISS-WRIGHT CORPORATION
(Airplane Division) (SEAL)
(Contractor)

E.O. #430-256
TSEOA-4/O.B. Thornton (2-3124)

BY: /s/ Edwin J. Ducayet
(Signature of Official with Office held)
Edwin J. Ducayet, Representative

AFP No.: 450210

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Debit: 2180705, 802-7004 P611-09 S 33-038

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Enclosure (C) to
R.M.Park's Memo
for File MK:RMP:vws:5174
dated 3 March 1948

CURTISS-WRIGHT CORPORATION
Airplane Division
Muroc, California

MEMO FOR FILE

25 February 1948

Subject: Taxi Test and Lift-off

A total of four taxi runs were made, including one lift-off.

Weather:	Ceiling:	Clear
	Temperature:	75° F
	Wind:	0 to 5 m.p.h. from South-west.

Run number one was with landing flaps and stabilizer down in a South-west direction, a maximum airspeed of 100 m.p.h. indicated. Run was satisfactory to the pilot and very little brake was used.

Run number two was with landing flaps and stabilizer down in a North-east direction at a maximum airspeed of 130 m.p.h. indicated. The run was satisfactory except I was unable to make a lift-off at 130 m.p.h.; very little brake was used.

Run number three was with landing flaps up and stabilizer up in a South-west direction at a maximum airspeed of 150 m.p.h. indicated. This run was intended to be a lift-off, but due to the crash equipment not being located properly, the run was discontinued at 150 m.p.h. At the end of the above run, Curtiss Inspector Mr. George Pistner, inspected the tires and brakes for condition and temperature. Mr. Pistner, Inspector, revealed that the tires and brakes were satisfactory for additional taxiing. I requested that a station wagon be parked one and one-half miles from the South-west end of the lake. This was requested so that during the lift-off I could land at this point and have one and one-half miles available for rolling before coming to a stop. The airplane was then taxied to the North-east end of the lake, at a speed that the rudder was effective, so no brake was used (approximately 60 miles per hour).

Run number four was with landing flaps up and stabilizer up in a South-west direction. A lift-off was accomplished after a run of over one mile and an airspeed of 180 miles per hour, indicated, was obtained. Several attempts were made to lift the airplane at airspeeds below 180 miles per hour. The landing was made in fron of the Curtiss station wagon and following a short roll, there was considerable vibration in the airplane. The brakes were not applied until after the vibration ceased and normal braking was used in stopping the airplane, approximately one and one-half miles being used. At the end of the run the observer and I could see that there was no tread on the four main landing gear tires. Evidently the tread leaving the tires was the cause of the vibration. The number three fire warning light was on at the end of this run. The throttle for number three engine was placed in idle cutoff immediately and no smoke indicating a fire could be seen from the cockpit. The remaining three engines were then shut off due to the condition of the tires.

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The lift-off run was approximately four miles from start of run to the point where the airplane was stopped. The distance of the other three runs varied from two and a half to three and a half miles.

The flight characteristics during the lift-off were satisfactory and the writer is ready to make first flight if take-off is made in the clean condition.

The elevator trim tab was adjusted one-half of the nose down travel for zero force on the elevator at the take-off speed.

Inspection of the tire marks on the lake indicate that the main landing gear wheels touched first. The slide marks indicate they required twenty yards before the wheel accelerated to the required rotation speed. The nose wheel touched down one hundred and twenty yards beyond the point where the main wheels touched. The slide marks indicate it required twenty yards for the nose wheel to accelerate to proper rotation speed. The airplane rolled one hundred and fifty-five yards before the tread left the casings of the main wheels. The brakes were not used until after the tread left the casings and the braking required to stop the airplane was not excessive but was more than normal. Inspection of the nose wheel tires by Goodrich personnel revealed that they were satisfactory. However, I have requested that a new set of nose wheel tires be installed for a safety precaution, since we were at a much higher air speed than had been anticipated for the lift-off.

Crabs:

1. Engine idling speeds erratic.

2. Unable to get maximum power from No. 4 engine. (Tail-pipe temperature too high).

3. A maximum of 10,800 r.p.m. was obtained on No. 3 engine (Readjust governor)

4. Remote compass not operating.

B. L. Miller
B. I. Miller
Pilot

BIM:vws:5034

cc: Messrs. C. C. Pearson
E. J. Ducayet
R. C. Blaylock
N. Tydon
L. Parmely
C. E. Holt
R. Park
W. Herrigan
D. R. Collins
F. A. Maxam

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON

25 February 1948

SUBJECT: Future Performance of All-Weather Fighters.

TO: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Reference: Ltr fr this Hq to yr Comd, subj: "Engine Installation, P-87 Airplane", dtd 21 Aug 47 and 1st Ind thereto fr yr Comd dtd 2 Sep 47.

1. Referenced correspondence contained estimated performance figures for the Curtiss-Wright XP-87 with two (2) Allison C-6 engines installed in lieu of four (4) Westinghouse 24C engines. It is now informally understood that the C-6 engine development has been dropped. It is further understood that the performance characteristics of the Allison D-2 and D-4 engines will be substantially better than the C-6 engine. It is, accordingly, requested that your Command submit performance figures for the XP-87 with two (2) Allison D-2 or D-4 engines.

2. It is further requested that similar performance figures for the Northrop XP-89 with the TG-190 engine be forwarded to this Headquarters.

BY COMMAND OF THE CHIEF OF STAFF:

L. C. CRAIGIE
Major General, U. S. Air Force
Director of Research & Development
Office, Deputy Chief of Staff, Materiel

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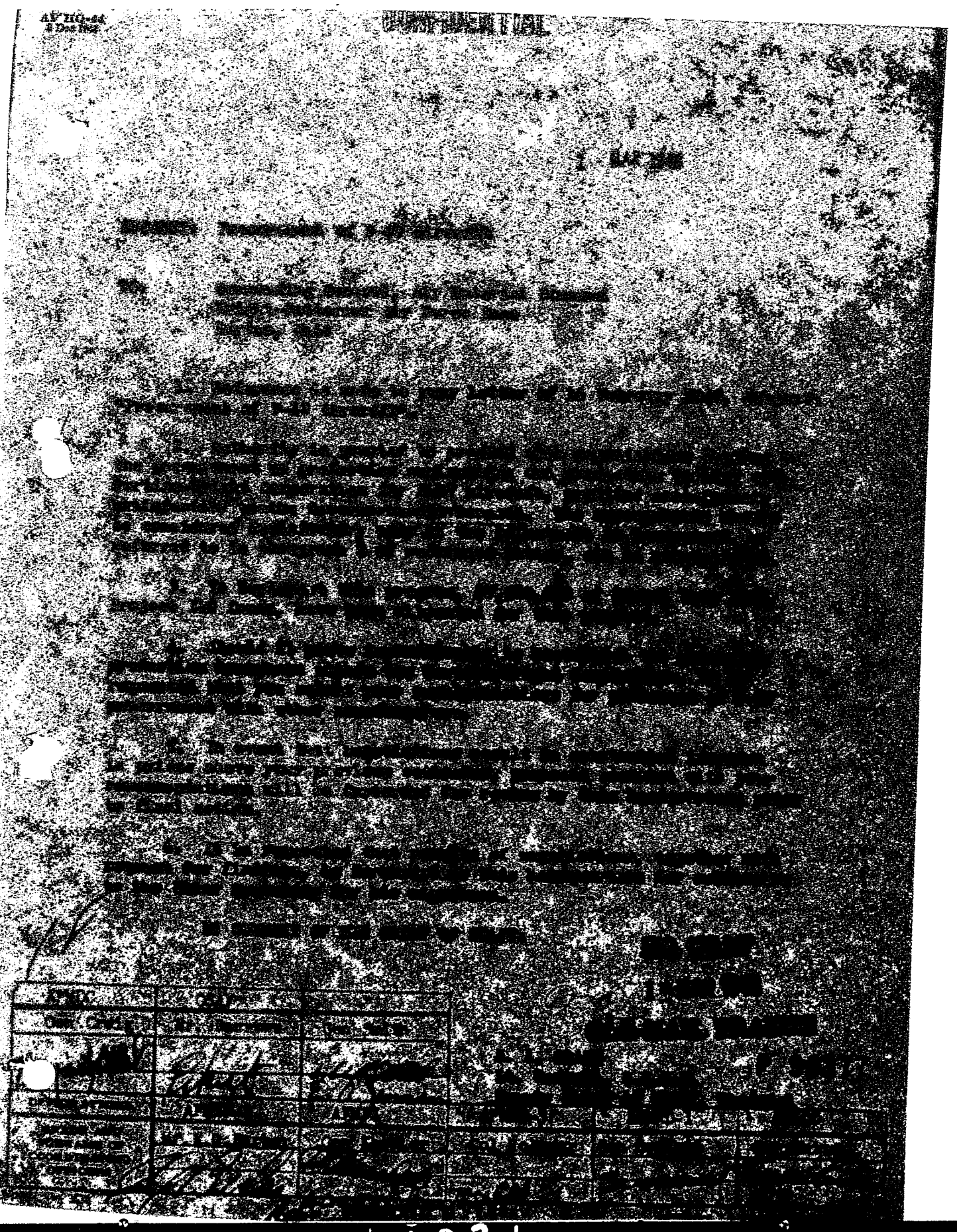

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RLY/et

MCFE 2 March 1948

SUBJECT: Recent Progress and First Flight of XF-87 Airplane
24 February 1948 - 1 March 1948

TO: Col. George F. Smith, USAF, CRECA
Lt. Col. F. A. Griffith, USAF, MCREOA4
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

1. The remainder of the engine depreservation runs and three taxi tests to a top speed of 140 m.p.h. were completed on 24 February. The following runs were completed on 25 February: two taxi tests with flaps full down (35°) to ground speeds of 100 and 130 m.p.h.; two taxi tests with flaps full up to ground speeds of 150 and 190 m.p.h. During the last taxi test the initial lift off was made at 190 mph (flaps up). During deceleration, following touchdown, the treads of all four main landing gear tires failed. The entire treads pulled free of the casings causing minor damage to the engine cowling, main landing gear doors, etc. The pilot reported that brakes were not used, during this run, until after tread failure occurred. No blowouts occurred during the braking process. Goodyear tires are used for the main landing gears and have been replaced by spares of the same make. Four additional spares are enroute from Wright Field. These tires have been restricted to 160 m.p.h. ground speed as a result of this failure; however, twenty Goodrich tires of an improved design have been ordered by Curtiss-Wright for use with this airplane. Apparently no restriction will be imposed on the Goodrich tires. Nose gear tires are of Goodrich manufacture and are apparently satisfactory.

2. Following tire replacement and repair of damage, the first flight of this airplane was made 1 March. Total flight time was 0:57. The following information regarding this flight is based on the pilot's comments:

a. Take-off was accomplished with a gross weight of 42,000 lbs and a c.g. of 20.1% MAC. Flaps were full down (35°) and the horizontal stabilizers were set at an incidence angle of -3°. Present range of stabilizer actuation is -1.5 to -4.5°. Acceleration was normal and a ground roll of approximately 6000 ft was required for take-off at 150 m.p.h. The landing gear retracted very well in a short interval and no noticeable trim changes were required upon retraction. Elevator and rudder forces appeared to be normal. After take-off, the flaps were raised and the airplane was stabilized at approximately 300 m.p.h. prior to climb.

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BASIC: Prog. Rpt and First Flt. of XP-87 Airplane, 24 Feb 48 - 1 Mar 48.

b. After climb was accomplished, to approximately 15,000 ft, the idling speeds of all engines were checked and found to be as follows: #1, 8,500 rpm; #2, 8,500 rpm; #3, 7,700 rpm; #4, 7,600 rpm.

c. Stalls were then performed. However, information is not conclusive because the main landing gear doors remained partially open during the entire flight. This was not the result of a malfunction; however, since the door uplocks were removed prior to the flight to insure opening of the doors when the gear was lowered. The following stalls were performed at 15,000 ft.

(1) Clean Configuration. Stall occurred straight ahead at approximately 160 m.p.h. IAS. Good stall warning occurred in the form of tail buffet at approximately 170 m.p.h. Very good recovery was made.

(2) Landing Configuration. Stall occurred with a drop of the left wing at approximately 130 m.p.h. IAS. Very little stall warning was detected. Recovery was effected satisfactorily with good response to control.

d. Because of the partially open gear doors the speed of the airplane was not allowed to exceed 350 m.p.h. IAS during this flight.

e. Motion pictures were taken during this flight from an accompanying P-80 airplane. This was in addition to motion pictures taken during take-off and landing.

f. The flight was terminated by a normal landing on the lake bed. Speed at touchdown was 140 m.p.h. (flaps down).

3. This flight, in general, was very successful as a first flight. No hydraulic or other difficulties were encountered and control forces appeared normal during the entire flight. The partial opening of the main landing gear doors cannot be considered as a malfunction since the door uplocks had been removed prior to flight. These uplocks are being re-installed and modifications are being made to the actuators. The next flight is tentatively scheduled for 4 March.

FOR THE COMMANDING OFFICER:

PREPARED BY: R. L. KING
Muroc Project Engineer

APPROVED BY: SYDNEY T. SMITH
Lt. Col., USAF
Chief Tech. Engineering Div.

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ARMY AIR [illegible]

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Wright [illegible]

[illegible]

3 March 1948

W-52-043
Plant Serial No.

CONTRACT CHANGE NOTIFICATION NO. R (135) 3
Rec. Loc. No. CCN No.

TO: Curtiss-Wright Corporation
Airplane Division
Columbus 13, Ohio

Purchase Order No.
Contract No. W 33-038 AC-6266

Pursuant to the Articles of the contract relating to changes, the above named Contractor is hereby authorized and directed to accomplish the changes listed below in respect to the articles called for under said contract as the same has heretofore and may hereafter be amended; subject, however, to the terms and provisions set forth on the reverse side hereof.

Description of Changes

The Contractor shall continue flight testing of the No. 1 XR-87 airplane at Kirtland Air Force Base until such time as all funds allocated to this portion of the flight test program are utilized.

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Page 1 of 1 Page(s)

Authority for Issuance
A.R.R. dtd 1 March 1948
CR 38-4

[illegible]
Contracting Officer

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AMC Form No. 70-18B
(20 Aug 47)

INSTRUCTION SHEET FOR CONTRACT CHANGE NOTIFICATION

1. In the event compliance with this Contract Change Notification will affect the delivery schedules contained in the contract or the performance characteristics of the articles to which the change hereby ordered applies and such change in delivery schedules or performance characteristics is not satisfactorily covered herein, the contractor shall notify the AF representative thereof as soon as practicable after receipt of this Contract Change Notification. Such notice shall be sent to the office and address designated on the face hereof, marked for the attention of the AF representative or contracting officer who signed this Contract Change Notification. The failure of the contractor to submit such notice to such AF representative or contracting officer within 30 days after receipt by the contractor of this Contract Change Notification (or within such additional period prior to the date of final settlement of the contract as the contracting officer, if he determines that the facts justify an extension of the above period, may approve) shall be taken as conclusively indicating that compliance with this Contract Change Notification will not affect delivery schedules or performance characteristics as aforesaid. Any notice given pursuant to the terms hereof will contain either (a) a detailed statement of the manner in which delivery schedules or performance characteristics will be affected, other than as provided herein, together with a proposal for amendment of the contract so as to avoid defaults by the contractor, or (b) a statement that the manner in which delivery schedules or performance characteristics will be affected cannot be ascertained within 30 days from the date of this Contract Change Notification, the reason therefor, and an estimate of the date upon which such information can be furnished. Any amendment to the delivery schedules or performance characteristics agreed upon by the parties as necessitated by this Contract Change Notification and not satisfactorily covered herein will be accomplished by further Contract Change Notification.

2. Within 60 days after receipt of the first Contract Change Notification under the contract and at intervals of approximately 60 days thereafter, the contractor shall submit to the AF representative an itemized list setting forth changes required by Contract Change Notifications received by the contractor in respect to the contract and not included in any such list previously furnished. The change ordered by this Contract Change Notification must be incorporated in either the first or second bi-monthly list submitted after receipt hereof, unless (a) the contractor, prior to the submission of such second bi-monthly list, submits a separate proposal for negotiating a change in price or in estimated cost and fixed fee occasioned by compliance with this Contract Change Notification, as provided in paragraph 4 below, or (b) the contracting officer approves an extention of time for the submission of a proposal for negotiating such a change. The provisions of this paragraph constitute an extension of the period for asserting claims for adjustment under the "Changes" article of the contract.

3. Each bi-monthly list submitted pursuant to the terms of paragraph 2 hereof shall indicate as to each change covered thereby the estimated increase or decrease in the contract price or estimated cost and fixed fee occasioned by such change, or shall state that no such change will result. Such list shall state the aggregate estimated net increase or decrease for all the changes shown thereon. Each such list will be accompanied by substantiating cost data for each change for which an adjustment is indicated, and the contractor shall, upon demand of the contracting officer, submit substantiating cost data even though no adjustment is indicated. Any aggregate n increase or decrease determined as a result of any negotiations will be incorporated in an appropriate change orde to the contract.

4. Notwithstanding the procedure set forth in paragraphs 2 and 3 hereof, the contractor may at any time within the period provided for presenting claims for adjustment under the "Changes" article of the contract, as the same may be extended by the contracting officer, submit a proposal for negotiation of a separate change order to give effect to any increase or decrease in the contract price or estimated cost and fixed fee occasioned by compliance with this Contract Change Notification or with a group of Contract Change Notifications which includes this Contract Change Notification.

5. Any disagreement in respect of any question of fact arising hereunder shall be determined in the manner provided in the article of the contract relating to "Disputes."

6. Pending completion of the negotiations mentioned above, the contractor will be paid at the unit prices or other consideration specified in said contract as amended from time to time for the articles affected by the change, subject to appropriate credit, refund, or further payment. of this Contract Change Notification by signing and de-

7. The contractor is requested to indicate receipt postal card immediately upon receipt hereof. livering to the AF representative the inclosed return postal card immediately upon receipt hereof.

WF-O-24 MAR 48 65M

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CONFIDENTIAL

Enclosure (B) to
W.A.Waxam's memo
to R.C.Blaylock,
FAM:vws:5264,
dated March 5,1948

CURTISS-WRIGHT CORPORATION
Airplane Division
Muroc, California

MEMO FOR FILE

3 March 1948

Subject: XP-87 #1 Tire and Nacelle Damage During High Speed Taxi Tests (25 February 1948)

Enclosures:
(A) Photograph of Tire Damage (Right Landing Gear)
(B) Photograph of Tire Damage (Left Landing Gear)
(C) B. L. Miller's Report, BLM:vws:503M, dated 25 Feb. 1948

During final taxi tests here at Muroc a lift off was executed and upon setting back down on the lake the tread peeled off of all four main landing gear tires. As the rubber was being thrown from the tires it flapped hard against the bottom of the nacelles, causing some damage to the skin and structure. Details of events leading up to and including the tire failures are summarized below.

On February 24, 1948, three taxi runs were made on the lake in a clean condition at speeds of approximately 100, 120 and 140 mph. Results were satisfactory. On February 25, 1948, four taxi runs were made, the first and second with flaps down at approximately 100 and 130 mph respectively, the third clean at approximately 150 mph, and the fourth, which included the lift off, clean at approximately 180 mph. The average length of the runs was approximately 3½ miles and just prior to the last run the tires were inspected for temperature and were found to be warm but not abnormally hot. It was during this last run that the tires came apart. They did not blow out and the plane was stopped satisfactorily without further damage. However, due to more than average use of the brakes, plus the heat already built up in them during the preceding runs, the brake linings caught fire and were still burning when the first station wagon reached the airplane, approximately one to two minutes after the airplane stopped. A hand extinguisher was used to put out the fire.

Damage to the tires can be easily seen in enclosures (A) and (B). Photographs of the nacelle damage were taken but prints are not available at this time. They will be forwarded later under separate cover.

The following repairs were made to put the airplane back in flight status:

(1) Replaced main wheels and tires. Wheels were not damaged but entire assembly was replaced to shorten repair time.

(2) Repaired hinges on accessory compartment access doors in both nacelles.

(3) Replaced one section of skin and portions of two aft bulkheads at the under surface of both fixed nacelles just aft of the landing gear.

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MEMO FOR FILE 3 March 1948
Subj: XP-87 #1 Tire and Nacelle Damage During High Speed Taxi Tests (25 February 1948)

(4) Salvaged the oleo door attachment rods by replacing the tubing, using the old end fittings. One rod had been broken and the others were bent.

(5) Repaired the oleo doors by replacing damaged channels and gussets and by hand straightening the doors themselves.

(6) Replaced flexible brake lines at the wheels.

The brakes were inspected by the Goodyear Service Representative, Mr. J. Gardiner, and according to him they were completely satisfactory for further use. The linings undergo a seasoning or burning in period during which all of the combustible materials in them eventually burn out due to actual use. In this case the burning in period was speeded up considerably due to the extreme heat but with no ill effects on the linings

Conclusions derived from the post-taxi discussions are as follows:

(1) The tire failures were probably due to the high centrifugal forces experienced at speeds of around 180 mph enhanced by the heat acquired during the preceding runs.

(2) The tires were not designed to withstand the combination of temperatures and forces to which they were subjected.

(3) The nose wheel tires apparently were not damaged. This could be attributed to one or both of the following reasons, (1) The temperature of these tires was probably considerably lower than that of the main tires because the nose wheel does not have brakes, and (2) the nose tires were made by Goodrich and were of different construction than the main tires (which were made by Goodyear).

Recommendations:

(1) All ground operations should be limited to a maximum speed of 160 mph. Full flap take-offs and landings can be made safely without exceeding this restriction.

(2) After each take-off or landing a cooling period should be allowed prior to further use of tires. The length of this cooling period will have to be determined by subsequent tests.

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MEMO FOR FILE 3 March 1948
Subj: XP-87 #1 Tire and Nacelle Damage During High Speed Taxi Tests (25 February 1948)

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(3) Goodrich tires for the main wheels should be procured and tested. Indications from the short experience with our nose tires, and from extensive experience of Douglas Aircraft using Goodrich tires vs Goodyear, warrant a trial with those tires. They are apparently better suited for the high speeds necessary with the XP-87 and similar aircraft than are the Goodyear tires.

R. M. Park
R. M. Park
Flight Test Engineering

MK:RMP:vws:517M

cc: C. C. Pearson
R. C. Blaylock
W. Tydon
L. Parmely
O. E. Holt
F. A. Maxas
W. Harrigan
R. Kibele
D. Collins
G. Pistner
B. L. Miller
M. Kuska

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Fighter Book file No. 1
Flight Test Data 7

Enclosure (A) to
F.A.Waxam's memo
to R.C.Blaylock,
FAM:vns:526M,
dated March 5,1948

CURTISS-WRIGHT CORPORATION
Airplane Division
Muroc, California

C C N F I D E N T I A L

3 March 1948

FLIGHT TEST REPORT XP-87 AIRPLANE #1
FLIGHT NO. 1

Date: 1 March 1948

Pilot: B. L. Miller Observer: R. Park

Duration: 57 minutes

Gross weight: 42,000 lbs.

C. G. wheels down 20.1% MAC.

PROCEDURE

General shakedown, control flutter investigation, flap, stabilizer, and landing gear check, clean and landing condition stall check.

Before starting the engines for the first flight I filed a flight plan with Army Flight Operations at the North Base. They notified the Main Base of the time of our intended take-off and closed the area for a radius of twenty-five miles to all aircraft. A P-80 was flown from the Main Base to fly as observing airplane on the first flight, also to take pictures of the XP-87 in flight. The P-80 was flown by Captain A. H. Worthington.

I spotted the Army photographer on the lake 1.4 miles from the point of the start of the take-off and inspected the lake area to be used for take-off and landing, using a Curtiss-Wright station wagon. A conference was held with the Fire Chief in relation to the direction of the intended take-off and the spotting of the fire equipment on the lake. The take-off was made in a West-South-West direction and the distance available was 4.4 miles. The fire equipment and Curtiss station wagons were stationed on the lake in the following order:

1. At the start of take-off run - 1 Curtiss station wagon with crew.
2. One mile down the lake in the direction of take-off - 1 Army fire truck.
3. 1.4 miles - 2 Army photographers and Curtiss photographer (Mr. Kuska).
4. 2 miles - Army fire truck
5. 2.5 miles - Army fire truck and Army ambulance
6. 1.5 miles from the far end of the lake - 1 Curtiss station wagon. (This wagon was located at this point so that the pilot would know exactly how much area was available for use after passing the wagon).

DESCRIPTION OF FLIGHT AND RESULTS

Army fire equipment stood by the airplane when the engines were started on the ramp. As soon as Robert Park (Observer) paralleled the four generators and bearing temperatures were checked, we taxied to the take-off position at the East-North-East side of the lake.

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The take-off was made with landing flaps full down and stabilizer set at 1-1/2° down from the full up position. The airplane accelerated very good considering the section of the lake used for take-off, which has been used a great deal by heavy airplanes and is rather spongy, which contributed to the length of run required for take-off (approximately 6,000 feet). The landing gear was retracted by the time 190 miles per hour was reached. The landing gear retracted evenly and within six seconds (estimated). A gentle climb was started after the landing gear was retracted and the landing flaps and stabilizer were "milked" up as airspeed increased. When the airspeed increased to 220 miles per hour a mild buffet was noticed throughout the entire airplane. The elevator column and rudder controls were moving constantly at speeds above 220 miles per hour. The buffet increased in amplitude with airspeed and was investigated up to 350 miles per hour. (Approximately 1" movement of control column and 3/4" rudder movement was noted at the higher speeds). Due to the excessive movement of the controls, no stability data was obtained above 225 m.p.h. At speeds below 225 m.p.h. movement of the controls was so small that it was considered safe to continue flight at this speed or lower. The airspeed was then reduced and the remainder of the flight was flown below 225 miles per hour. The observing pilot in the XA-80 airplane reported that the landing gear doors were not fully closed; the left doors were open six to eight inches and the right doors were open approximately four inches. The observing pilot also reported that the doors did not appear to be vibrating. The landing gear was cycled three times and the operation was satisfactory. Five to six seconds (estimated) were required for each extension or retraction. The only landing gear malfunctioning noticed during the entire flight was that the indicator indicated that the left wheel was down before the first extension of the gear in flight. The observing pilot reported that the left gear was not down at the time the indicator indicated the left wheel down.

The minimum idling speed of the engines at 15,000 ft. altitude with the present throttle stops (set at 5000 to 6000 r.p.m. on the ground).

No. 1 engine	8500 r.p.m.
No. 2 engine	8500 r.p.m.
No. 3 engine	7700 r.p.m.
No. 4 engine	7600 r.p.m.

A clean stall was made, power off, the stall warning beginning at 170 miles per hour by tail shake and increased in intensity until the airplane stalled at 158 miles per hour. The stall was mild and the recovery was normal.

A landing configuration stall was made with power off. The stalling speed was 130 miles per hour, with no stall warning. The left wing dropped at 130 miles per hour and a normal recovery was made. The dropping of the left wing was not violent.

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Flight Test Report XP-87 Airplane #1 3 March 1948
Flight No. 1

After completing the stalls, flight pictures of the XP-87 were taken by Captain Worthington, flying the P-80. A pass over the field at 600 feet altitude for the Army photographer on the lake to get flight pictures was made.

Landing gear was extended at 200 miles per hour, landing flaps were extended, stabilizer was adjusted to 1.5° down from the full up position and a landing was made in front of the Army photographer. Landing speed was approximately 140 miles per hour and landing roll was 2.5 miles before coming to a stop, very little brake being used. After retracting landing flaps, taxied the airplane to the hangar and placed all four throttles in idle cut-off position.

General Flight Characteristics

1. Control Forces:

Elevator - normal throughout the flight
Rudder - normal throughout the flight
Aileron - light, but very good "feel"

2. Control Effectiveness:

Elevator - good throughout the entire flight
Rudder - good throughout the entire flight
Aileron - good throughout the entire flight

3. General Stability:

A satisfactory check could not be made because of the buffet throughout the entire airplane at speeds above 220 m.p.h. indicated.

4. Trim setting at 200 m.p.h.

Aileron 0° Elevator 12° N.D. Rudder 4° L

Crabs:

1. Attitude gyro indicated right wing down approximately 10° for the entire flight.
2. Landing gear doors open in flight.
3. Buffet present in clean condition above 220 m.p.h.
4. Landing gear indicator showed left gear down in flight before the first extension of the gear.
5. No. 2 engine - No. 3 bearing temperature 40° higher than other three engines.
6. No. 2 engine - oil pressure fluctuations.

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Pilot Comments:

The flight instruments listed below are difficult for the pilot to observe in flight because of being located behind the control wheel:

1. Altimeter
2. Turn and bank rate gyro
3. Vertical gyro
4. Airspeed (production system)
5. Trim tab indicators.

The forward left visibility is restricted by the wide frame structure in the windshield. At Muroc, due to the light traffic and large landing areas, it is not as bad as it will be when operating in heavier traffic and normal airports.

The landing gear control should be redesigned because the force required to operate is too great. Control required the use of two hands by the observer to extend the gear.

Preliminary investigation indicates that it will be necessary to have the stabilizer and flaps synchronized together because of the pitching moment set up by lowering the flaps without changing the setting of the stabilizer.

VHF radio transmitting and reception was very good.

Throttle controls can be improved and an idle detent should be installed at the engine governor, so the idle r.p.m. will be consistent.

B. L. Miller
B. L. Miller
Pilot

BLM:vws:520M

cc: Messrs. C. C. Pearson
E. J. Ducayet
R. C. Blaylock
W. Tydon
L. Parmely
O. E. Holt
E. Park
W. Harrigan
D. R. Collins
F. A. Maxam
E. Kuska

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TSB Form No. 71-26A
(Rev 23 Oct 47)

SIL

Execute in triplicate	
C—	34881
Class—	01

CHANGE ORDER

UNITED STATES AIR FORCE
Air Materiel Command
Wright Field, Dayton, Ohio

Date 28 November 1947
Change Order No. 3 to
Contract No. W 33-038 ac-6266
as amended

To: Curtiss-Wright Corporation (Airplane Division) Columbus 16, Ohio

SUBJECT: Specification Changes

1. In the design, development and construction of two (2) Airplanes, Model XP-87, Serially numbered 45-59600 and 46-522 being procured under the terms of Items 5 and c respectively of Paragraph (a) of Article 15 of Contract W 33-038 ac-6266, as amended, the Contractor shall comply with certain requirements as more particularly set forth below:

(a) Comply with Revision B dated 1 November 1946 to Model Specification No. 9566, hereby made a part hereof by reference, in lieu of Revision A, dated 1 January 1946, effective on both of said airplanes at a total increase in contract price of - $56,719.19

(b) Design, fabricate and install dummy nose on airplane, Serial No. 45-59600 in lieu of installing Government-furnished power turret, at a total increase in contract price of - - - $10,161.73

(c) Design, fabricate and install all special intake ducts, access doors, oil system, and forward transverse bulkheads necessary to facilitate the installation of two (2) Westinghouse X24C-4A engines in lieu of two (2) X24C-4B engines presently specified for airplane, Serial No. 45-59600, at a total increase in contract price of - - - - - - - - - $ 5,655.45

(d) Design, fabricate and install a tachometer generator adapter capable of raising tachometer generator speed to 4200 RPM at 12,000 engine RPM for two Airplanes, Serial Nos. 45-59600 and 46-522 at a total increase in contract price of - $ 4,463.27

(e) Construct necessary jigs and conduct a series of drop tests in accordance with the current issue of AAF Specification No. 40228, hereby made a part hereof by reference, on the nose wheel and main landing gear for the purpose of determining correct metering pin size and to insure structural integrity at landing loads, effective on airplane, Serial No. 45-59600, at a total increase in contract price of - $ 9,106.11

This change order has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

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CURTISS-WRIGHT CORPORATION
(Airplane Division)
Columbus 16, Ohio

Change Order No. 3 to
Contract W 33-038 ac-6266

APPROVED 9 March 1948
By Direction of the Secretary of the Air Force under the provisions of Public Law 703, 76th Congress, (as amended by Section 13 of Public Law 580, 77th Congress); Title II of the First War Powers Act, 1941 and Executive Order No. 9001 dated 27 December 1941.

/s/ H. A. Shepard
H. A. SHEPARD
Brigadier General, USAF
Chief, Procurement Division

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(f) Construct simulated fuselage section containing the rear fuselage fuel tank and the bombay tank and conduct accelerated tests on the test rig in accordance with Army-Navy Specification No. AN-V-7 dated 21 July 1942 and Amendment No. 2 thereto dated 8 August 1944, hereby made a part hereof by reference, effective on Airplane, Serial No. 45-59600. Upon completion of said tests the simulated fuselage section containing the two fuel tanks shall be delivered to Air Materiel Command, Wright Field, Dayton, Ohio, for further test. Contractor shall follow up these tests conducted by Air Materiel Command and record any changes that may be necessary on future airplanes, at a total increase in contract price of - - - - - - - - - - - - - - - - - - - $ 9,496.45

(g) Fabricate one (1) oil tank and one (1) hydraulic tank and conduct vibration, slosh and acceleration test at Contractor's plant, in accordance with the current issue of Army-Navy Specification No. AN-T-49, hereby made a part hereof by reference, effective on Airplane, Serial No. 45-59600, at a total increase in contract price of - $10,281.52

2. This Change Order supersedes Amendment No. 22 dated 13 June 1947 to Letter Contract W 33-038 ac-6266, dated 22 May 1945, thereby reducing the work called for under said Letter Contract to that set forth in Amendment No. 18 and reducing the amount the Contractor is authorized to expend or obligate under said Letter Contract to $125,000.00. In the event of conflict between said Amendment No. 22 and this Change Order No. 3 this Change Order shall govern.

3. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

4. All references in any Government specification incorporated herein to other Government specifications shall be deemed to include all specifications supplementary to or superseding the specification so referred to, to the extent that such supplementary or superseding specifications are in effect at the date of Contractor's latest quotation, if the Contractor was furnished or otherwise notified of the existence of such supplementary or superseding specification at the time of said quotation.

5. This Change Order consists of Sheets 1, 1-A and 2.

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	fixed price	$ 105,883.72
Total	increase in	$
		$

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

This Change Order shall be subject to the written approval of the Secretary of the Air Force or such individual as said Secretary shall designate and shall not be binding until so approved. The date of such approval shall be deemed to be the true date for the purpose of determining all times of performance.

UNITED STATES OF AMERICA

BY: /s/ Stephen Lovas
Contracting Officer

STEPHEN LOVAS

1st Indorsement

TO: CONTRACTING OFFICER:

1. Contractor hereby accepts the above Change Order. Columbus, Ohio (Place) 14 January 1948 (Date)

CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION) (SEAL)
(Contractor)

BY: /s/ Edwin J Ducayet + Representative
(Signature of Official with Office held)

AFP No.: 450208

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Acct. 2170705, 702-7004 P 611-09 S 33-038

Approved: .....1946.
By Direction of the Secretary of War under the Provisions of Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order 9001, 27 December, 1941.

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COORDINATION

CG OR DEP CG

ASSISTANT GENERAL

CHIEF OF ADMIN.

AIR INSPECTOR

PUBLIC RELATIONS

JUDGE ADVOCATE

PERSONNEL (T-1)

INTELLIGENCE (T-2)

OPERATIONS (T-3)

PLANS (T-4)

SUPPLY (T-5)

MAINTENANCE

ENGINEERING

BASE C. O.

OTHER

AMC Form No. 19-20B (Rev 2 Apr 47)

(PRINT SYMBOL, DATE AND INITIALS IN APPROPRIATE BLOCK)

SECRET

MCXRD A-4/JHH/hw

12 March 1948

Future Performance of All-Weather Fighters

Chief of Staff
United States Air Force
Washington 25, D. C.
ATTN: Deputy Chief of Staff, Material

1. Reference is made to your letter dated 25 February 1948, subject as above.

2. As requested in the reference letter, performance figures for the Curtiss-Wright XP-87 using two Allison D2 or D4 engines and for the Northrop XP-89 using two YJ-190 engines, are as follows:

	XP-87		XP-89
	J-33-27 I-40-D-4	J-33-29 I-40-D-2	J-35[illegible]-1 YJ-190-1
V max at S.L.	521 knots (600 mph)	543 knots (625 mph)	542 knots (624 mph)
V max at 35,000'	453 knots (522 mph)	484 knots (557 mph)	495 knots (570 mph)
Time to 35,000'	13.35 min.	6.3 min.	11.2 min.
T.O. over 50' obs.	* 6156 ft.	* 5800 ft.	** 4440 ft.
Combat Ceiling	38,200'	45,000'	41,300'
Combat Radius	* 856 N.M. (1000 S.M.)	* 695 N.M. (800 S.M.)	** 807 N.M. (929 S.M.)

* With full external fuel and water injection for take-off.

** With full external fuel.

SECRET

T-11103

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Ref #3 cf MX-745 3/3 5

SECRET

12 March 1948

Subject: Future Performance of All-Weather Fighters

3. Northrop is at present preparing additional performance figures on the basis of two TG-190-3 engines which will be available within a month and should show considerably improved all-around performance for the XP-89 airplane.

FOR THE COMMANDING GENERAL:

Alden R. Crawford

ALDEN R. CRAWFORD
Major General, USAF
Chief, Engineering Division

SECRET

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AF-11103

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MCPP Form No. 71-26A
(Rev 21 Jan 48)

flp

Execute in triplicate	CHANGE ORDER	Date 18 March 1948
C— 35779	UNITED STATES AIR FORCE Air Material Command ~~Wright Field, Dayton, Ohio~~ Wright-Patterson Air Force Base Dayton, Ohio	Change Order No. 7 to Contract No. W33-038ac-6266 as amended
Class— 01-A		

To: Curtiss-Wright Corporation, (Airplane Division), Columbus 16, Ohio

SUBJECT: Miscellaneous Engineering Changes and Revision 1 to Exhibit "A" Part I

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1. Exhibit "A" Part I to Contract W 33-038 ac-6266, as amended, is hereby amended as follows:

   (a) Certain items indicated and listed in said Exhibit "A" Part I, being a part of the exhibit contemplated by Item 10, paragraph (a), Article 15 of said contract, as amended, are hereby changed as more particularly set forth in Exhibit "1" (Revision 1 to Exhibit "A" Part I) attached to and made a part hereof.

   (b) Exhibit "A" Part I attached to and made a part of said contract, as amended, by Change Order No. 4 is hereby cancelled; and "Revised Exhibit 'A' Part I," attached hereto, is the exhibit now contemplated by the aforesaid Item 10 and is identified, attached to and made a part of said contract by this change order.

   (c) The total price of Item 10 shall be adjusted in accordance with the provisions of said item at the time of incorporating the final part of or final revision to Exhibit "A". The price breakdown for said Item 10 is as follows:

Item 10	$75,000.00
Exhibit "A" Part I (C.O. #4)	$70,441.36
Revision 1 (C.O. #7) - Increase	1,400.62
Revised Exhibit "A", Part I (REVISION #1)	71,841.98
Unadjusted Balance	$ 3,158.02

2. The Contractor shall comply with the following requirements on the two (2) XP-87 airplanes, AAF Serial Nos. 45-59600 and 46-522, called for under Items 5 and 6, respectively, of paragraph (a), Article 15 of Contract W33-038 ac-6266, as amended, at a total increase in contract price of $1,425.28

   (a) Install 1000 VA 3-phase G.F.E. inverters in lieu of 500 VA 3-phase inverters as specified in Contractor's Report No. 9566 revised 1 November 1946, entitled "Model Specification, XP-87 Airplane." Mounting provisions for 500 VA 3-phase inverters shall be maintained in order that these inverters may be quickly and easily installed when available. Increase in the unit price of each airplane $74.80, Total Increase $149.60

This change order has been (~~xxxxxxxxxx~~ negotiated pursuant to) Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

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(b) Furnish one hundred (100) Wilcolator Aircraft Fire Detectors as CFE for installation in said airplanes, at an increase in unit price of each airplane of $239.25; Total Increase $478.50

(c) Install Type AN3091 rudder position lights in accordance with ANA specification AN-L-12A dated 8 September 1943 and Amendment #2 dated 28 December 1945, in lieu of Grimes white and yellow lights as specified in Contractor's Report No. 9566, at an increase in unit price of each of said airplanes of $179.80; Total Increase $358.60

(d) Install Type GT-13 batteries in lieu of GT-17 batteries as specified by Contractor's Report No. 9566 on said airplanes, maintaining mounting provisions for the la ger size battery in order that installation may be made when this battery becomes available, at an increase in unit price of each airplane of $118.80; Total Increase $237.60

(e) Redesign the left-hand cockpit console of XP-87 airplane, AAF Serial No. 46-522, in order to accommodate a radio compass control panel within easy reach of the pilot. The control panel presently located on the right side of the instrument panel is unsatisfactory and shall be deleted. Total increase in price for Item 6 . . . . . $4,654.35

(f) Design, fabricate, calibrate, and install in said airplanes, a CFE in lieu of GFE canopy sense antenna for radio compass AN/ARN-6, at an increase in unit price of each airplane of $2,083.19; Total Increase $4,166.38

(g) Delete the induction air shut-off valve as originally specified in Contractor's Report No. 9566 on said airplanes, since it has been determined that the design complications encountered in the installation of such a valve out-weigh the advantages derived therefrom; and make appropriate changes to the Model Specification for the XP-87 airplane to reflect the weight and balance and performance changes due to the deletion of the induction air shut-off valve, at a decrease in unit price of each airplane of $4,465.78 for said deletion of induction air shut-off valve; Total Decrease $8,931.56

(h) Make appropriate changes to Contractor's Report No. 9566 to reflect the weight and balance and performance changes resulting from the substitution of Thompson B-17 fuel pumps in lieu of Thompson B-18A fuel pumps, at no change in contract price.

(i) Install thermocouples for the horizontal thrust bearings on X24C-4A engines installed on said airplane, AAF Serial No. 45-59600, in accordance with Westinghouse Engine Notice No. 22 dated 18 July 1947, at a total increase in price of Item 5 of . . $ 311.81

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3. Paragraph (a) of Article 47, added to this contract by Change Order No. 6, is hereby amended to read as follows:

"(a) Because of the experimental and developmental nature of the work called for by this contract and the great uncertainty as to the cost of performance hereunder, the parties agree that the contract price fixed in Items 11, 12, and 13 of Article 15(a) hereof and in paragraph 2 of Change Order No. 7 hereto may be increased or decreased in accordance with the provisions of this Article."

4. No further adjustment of the contract price shall be made for cancellation charges, if any, resulting from the changes provided herein.

5. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

6. This change order consists of Sheets 1, 1A, 1B and 2, and Exhibit "A" Part I, Revised, of 22 pages, and Exhibit "1" (Revision 1 to Exhibit "A" Part I) of 10 pages.

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MCPP Form No. 71-268
(21 Jan 48)

Total	increase	fixed price	$ 1,425.28
	~~decrease~~ in	~~estimated cost~~	$
		~~fixed fee~~	$

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

THE UNITED STATES OF AMERICA

30 June 1948 (Date)

BY: /s/ Stephen Lovas (Contracting Officer)
STEPHEN LOVAS

1ST INDORSEMENT

TO: CONTRACTING OFFICER:

Columbus 16, Ohio (Place) 27 April 1948 (Date)

1. Contractor hereby accepts the above Change Order.

CURTISS-WRIGHT CORPORATION (Contractor) (SEAL)

BY: /s/ Edwin J. Ducayet
(Signature of Official with Office held)
Edwin J. Ducayet, Representative

~~AAF~~PR No.: 425289

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Debit: 2180705, 802-7004 P 611-09 S 33-038

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MCPP Form No. 71-26A
(Rev 21 Jan 48)

Execute in triplicate

C— 35801

Class— 01-C

CHANGE ORDER

UNITED STATES AIR FORCE
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

flp/ral

Date 18 March 1948
Change Order No. 8 to
Contract No. W33-038ac-6266
as amended

To: Curtiss-Wright Corporation, (Airplane Division), Columbus 16, Ohio

SUBJECT: Continuation of Flight Testing Program

1. The following new items are hereby added to Article 15(a) of Contract W33-038ac-6266, as heretofore amended:

"Item 12 - The Contractor shall conduct a further program of Flight Testing on the first XP-87 airplane, AAF Serial No. 45-59600, at Muroc Air Force Base, Muroc, California, substantially in accordance with the provisions of Exhibit "B" to Item 12, Article 15(a) to Contract W 33-038 ac-6266, attached to and made a part hereof by Change Order No. 8. The additional flight testing to be conducted pursuant to this Item 12 shall be designated as Phase IA and shall be conducted for a period of nine (9) consecutive work-weeks of fifty-two (52) hours each, beginning with the date of expiration of the program conducted pursuant to Item 11 above. The Contractor shall use every effort to complete twenty (20) hours of Phase IA flight testing on such airplane during such period of nine (9) work-weeks. However, the Phase IA Flight Testing Program shall be deemed to have been fully completed at the expiration of such period of nine (9) work-weeks or at the completion of the additional twenty (20) hours of such Phase IA Flight Testing, whichever is earlier. Total price . . $79,787.39

"Item 13 - The Contractor shall upon completion of Phase IA Flight Testing, conducted under Item 12 above, provide for a two-week period of maintenance and servicing of said Airplane, AAF Serial No. 45-59600, instrumentation, and equipment during which time the Army Phase II Flight Testing shall be conducted. Total price . . . . . $ 7,774.21"

2. The provisions of paragraphs (a), (b), (c), (d), and (e) of Item 11 and paragraph 4 of Change Order No. 6 to this contract, as amended, shall be applicable to the work called for under Items 12 and 13 above.

3. (a) The provisions of Article 47 - Price Revision - for retroactive pricing with limited upward revision, as added to this contract by Change Order No. 6 and as amended by subparagraph (b) below, shall be applicable to the work called for under Items 11, 12, and 13 and to those Items only.

This change order has been (~~authorized by~~ negotiated pursuant to) Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

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CURTISS-WRIGHT CORPORATION
(Airplane Division)
Columbus, Ohio

Change Order No. 1 to
Contract W 33-038 ac-6266

APPROVED: 23 July 1942
By Direction of the Secretary of the Air Force under the provisions of Public Law 703, 77th Congress, as amended by Section 15 of Public Law 880, 77th Congress; Title II of the First War Powers Act, 1941 and Executive Order No. 9001 dated 27 December 1941.

/s/ F. A. Shepard
F. A. Shepard
Brigadier General, USAF
Chief, Procurement Division

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MCPP Form No. 71-26C
(Rev 5 Feb 48)

		fixed price	$ 105,073.92
Total	increase in	~~estimated cost~~	$
	~~decrease~~	~~fixed fee~~	$

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

This Change Order shall be subject to the written approval of the Secretary of the Air Force or such individual as said Secretary shall designate and shall not be binding until so approved. The date of such approval shall be deemed to be the true date for the purpose of determining all times of performance.

UNITED STATES OF AMERICA

BY: /s/ W. A. Davis, Lt. Colonel, USAF
Contracting Officer
~~STEPHEN LOVAS~~
W. A. DAVIS, LT. COLONEL, USAF

1st Indorsement

TO: CONTRACTING OFFICER:

1. Contractor hereby accepts the above Change Order. Columbus 16, Ohio (Place) 7 April 1948 (Date)

CURTISS-WRIGHT CORPORATION
(Airplane Division) (Seal)
(Contractor)

BY: /s/ Edwin J. Ducayet
(Signature of Official with Office held)

Edwin J. Ducayet, Representative

E.O.S. #430-256
MCREOA-4/O.B. Thornton, Capt., USAF

PR No.: 19390

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Debit: 2180705, 802-7004 P 611-09 S 33-038

Approved: .....1948.
By Direction of the Secretary of War under the Provisions of Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order 9001, 27 December, 1941.

Change Order No. 8 to Contract No. W 33-038 ac-6266

3-b Sheet 2

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(b) The ceiling price set forth in paragraph (c) of said Article 47, is hereby amended to read $274,595.92.

4. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

5. This change order consists of Sheets 1, 1A and 2, and Exhibit "B" of 5 pages.

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EXHIBIT "B" to Item 12, Article 15(a), to
Contract W33 038 ac-6266, attached to
and made a part thereof by Change Order No. 8 thereto.

XP-87 Phase IA Flight Test Program

Phase IA Flight Tests will be accomplished on the XP-87 Airplane as outlined herein. The flight tests will be divided into the following categories for presentation:

I. Functional Tests
II. Investigation of Aerodynamic Characteristics
III. Preliminary Buffet Boundary Determination
IV. Preliminary High Speed Investigation
V. Maximum Gross Weight Investigation

The actual flight testing may not be accomplished in the order of presentation hereafter; each flight may incorporate items from one or all of the above listed categories. These tests are primarily designed to determine the high speed of the subject airplane; the performance and stability at higher speeds; the relationship of the high speed points to the buffet boundary; and critical stability, take-off and landing characteristics at maximum load.

I. Functional Tests:

A. At an approximate pressure altitude of 25,000 ft. start one engine by windmilling and accelerate to 11,000 rpm while the other engines are at NRT. (Reduce power on other engines if necessary so as not to exceed placard speed).

B. At an approximate pressure altitude of 25,000 ft. and an equivalent airspeed of 325 mph check the operation of:

(1) Standby compass
(2) Gyrosyn Compass
(3) Automatic pilot
(4) Trim tabs
(5) Oxygen system
(6) Pressurization
(7) Trim tab indicators
(8) Radio (pilot's opinion)

II. Investigation of Aerodynamic Characteristics:

A. Investigation of stick force gradient will be made at approximately 10,000 ft. pressure altitude (approximate design gross weight and C.G.) by trimming in level flight for equivalent airspeeds of 250, 325 and 400 and then executing tight spirals maintaining each speed to 2g and 3g accelerations at which points the airplane will be stabilized and records taken. These tests will be conducted with gear and flaps up.

B. Further investigation of directional and lateral stability will be made approximately at 10,000 ft. pressure altitude (approximate design gross weight and C.G.) by trimming the airplane in

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level flight with one outboard engine inoperative and the others at MRT. Also (with four engines) perform steady straight sideslips at various increments (1/4, 1/2, and 3/4) up to full rudder throw or maximum permissible pedal force (180 lbs.) at equivalent airspeeds of 200 and 275 mph with gear and flaps up and power to fly level. Tests will also be made at 375 mph up to 3/4 rudder throw. Similar tests will be made at 200 mph E.A.S. with gear and flaps down.

C. Further investigation of aileron control power will be made approximately at 10,000 ft. pressure altitude (approximate design gross weight and C.G.) by trimming the airplane at equivalent airspeeds of 250 and 400 mph, (gear and flaps up), locking the rudder in its trim position, and applying abrupt aileron deflection in increments (1/4, 1/2, 3/4) up to full deflection (or maximum wheel force). A similar test will also be made at 475 mph E.A.S. up to 3/4 aileron throw. Recover will be executed after 60° of bank is obtained. Rolls will be made both to the left and right. All tests will be repeated with aileron boost inoperative up to a point where excessive control forces prohibit further testing unless tests in Change Order No. 6 to ac-6266 show this to be unnecessary. The clean tests at 250 and 400 mph and a landing test at 150 mph will be repeated (with aileron boost) using the rudder to overcome the adverse aileron yaw encountered. Rudder movement will be limited to 3/4 deflection in the 400 mph test.

III. Preliminary Buffet Boundary Determination:

A. Determination of the buffet boundary with the airplane in the clean configuration at approximately design gross weight will be made by performing dives and/or pullouts under the conditions of Table I. A check of the engine compressor inlet conditions will be made during the last three dives.

Table X

Pullout Conditions

Item	Pressure Altitude	E.A.S.	L.F. (g)	Notes
1	30,000	300	1.5	
2	30,000	300	2.0	
3	30,000	305	2.5	
4	30,000	315	Buffet	Buffet at approx. 2.5 g
5	20,000	350	2.5	
6	20,000	405	Buffet	Buffet at approx. 2.7 g
7	20,000	370	4.0	
8	20,000	370	Buffet	Buffet at approx. 4.5 g

Exhibit "B" to [illegible], Article [illegible] to Contract W 33-038 ac-6266
attached thereto by Change Order No. 8

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*Table I (Cont'd)

Item	Pullout Conditions			Notes
	**Pressure Altitude	E.A.S.	L.F. (g)	
9	10,000	460	1.5	
10	10,000	480	2.0	
11	10,000	500	Buffet	Buffet at approx 2.0 g

*These points are shown on Figure I as a Mach Number vs. Lift Coefficient plot and on Figure II as a Load Factor vs Equivalent airspeed plot.

**Pullout should be started to give maximum load factor at these altitudes.

IV. Preliminary High Speed Demonstration:

A. High Speed Investigation

1. Tests will be made by trimming in level flight for 500 mph E.A.S. at 5,000 ft. and then increasing airspeed to V_{max} at the lowest possible altitude. Each test will progressively increase the speed by 10 mph increments. Flight characteristics (aileron buzz, control, etc.) will be noted. (The above tests are based on the assumption the engine compressor blades are considered satisfactory up to 600 mph E.A.S.)

B. Airspeed Calibration

1. An airspeed calibration from 150 mph I.A.S. to V_{max} will be made at the lowest practicable altitude with the airplane in configuration CR with power for level flight.

C. High Speed Determination

1. Tests will be conducted approximately at design gross weight and normal C.G. position.

2. Tests will be made in a clean configuration as near to the contract drag as possible.

3. Stabilized runs will be made as shown in Table II.

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TABLE II

Item	Standard Temperature Altitude	RPM
a.	14,000	12,000
b.	10,000	12,000
c.	6,000	12,000, 11,000 & 10,000
d.	4,000	12,000, 11,000 & 10,000
e.	2,000	12,000, 11,000 & 10,000

The 12,000 rpm points are shown on Figure I as a Mach Number versus Lift Coefficient plot and on Figure II as a Load Factor versus Equivalent Airspeed plot.

V. Maximum Gross Weight Investigation:

A. At approximately 15,000 Ft. pressure altitude stalls will be investigated in the following configurations:

	Flaps	Gear	Power
1	Up	Up	Level flight at 300 mph I.A.S.
2	Up	Up	Off
3	Down	Down	Off
4	Down	Down	Level flight at 190 mph I.A.S.
5	Down	Down	Take-off
6	Down	Up	Take-off

B. Investigation of trim changes will be made by trimming under the conditions shown below, making the changes listed, and then stabilizing the airplane at the same speed without changing trim.

Trim				Change
Speed	Flap	Gear	Power	
2(a)	Up	Up	Off	Gear - down
2(c)	Up	Down	Off	Flap - down
1.d. V_{B_1}	Down	Down	Off	Take-off power
1.d. V_{B_1}	Down	Down	Take-off	Gear - up
1.d. V_{B_1}	Down	Up	Take-off	Flap - up

C. Longitudinal static stick-fixed and stick-free stability and control will be investigated at approximately 10,000

Exhibit "B" to Item 1., [illegible]

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ft. pressure altitude to obtain [illegible] level flight at the trim speeds listed below and then stabilizing in configurations shown at all listed speeds without retrimming.

Gear	Flaps	Trim Speed	Fuel Pump	Test Speeds
Up	Up	260	NRT	190, 210, 240, 280, 320, 350
Down	Down	150	50% NRT	105, 125, 135, 200

D. Investigation of directional and lateral stability will be made at 10,000 ft. pressure altitude by performing steady straight sideslips to both the left and right progressively increasing the [illegible] up to full rudder or maximum permissible pedal [illegible] at an equivalent airspeed of 175 mph with the [illegible] and maximal rated power.

E. Investigation of aileron control power and lateral stability will be made at [illegible],000 ft. pressure altitude by trimming the airplane at an equivalent airspeed of 140 mph (gear and flaps down), locking the rudder in the zero position, and applying abrupt aileron deflection to 1/3 of full deflection (or maximum wheel force). Recoveries will be executed after 60° of bank is obtained and rolls will be made both to the left and right.

F. Tests will be [illegible] to determine the minimum take-off and landing distances over a 50 foot obstacle at two flap settings (full up and full down).

Exhibit "B" to Item 12, Article [illegible] to be [illegible] 6265 attached thereto by [illegible]

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WSD-1 Pertinent, NVE, Contract

APGIP-2/Mr.E.G.Barbur/ntz/4369 - 3/19/48
Reprint: AFMIC/Col. Bogart/rw/3153 - 3/20/48

CONFIDENTIAL

MAR 20 1948

SUBJECT: Procurement of B-47 Aircraft

TO: Commanding General, Air Material Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attn: Major General K. B. Wolfe
Director, Procurement & Industrial
Mobilization Planning - ADP

1. Confirming verbal instructions this headquarters to Major General K. B. Wolfe, the Air Material Command is authorized to proceed with the basic directive of 1 March 1948 covering the procurement of B-47 aircraft.

2. This matter has been coordinated with the staff of the Bureau of Aeronautics, United States Navy Department. We have established direct negotiation with the Martin-Wright Corporation.

3. In addition to the provisions of the basic directive, it is desired that a close check be made of the estimated plant maintenance cost as furnished by the contractor. These costs should be held to the minimum dictated by sound plant maintenance practices.

4. The Under Secretary feels that the lease negotiated by the contractor with the Department of the Navy for the use of these facilities should be based on the actual enlargement costs incurred rather than a flat yearly rate.

5. The results of negotiations, together with request for funding, should be forwarded to this headquarters for submission to the Under Secretary for his signature.

BY COMMAND OF THE CHIEF OF STAFF:

HQ USAF
99961 dd 22 MAR 1948
CAD-MAIL BRANCH

Signed:

H. A. CRAIG
Lieutenant General, USAF
Deputy Chief of Staff, Material

CONFIDENTIAL

OFFICE SYMBOL	1.	2.	3. AFMIC	4.	5.
GRADE AND SURNAME OF COORDINATING OFFICERS			Bogart		

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AAMC Form No. 10-514 (Rev 10 Sep 46)

WF-L-7 JAN 47 300M

SAFE

HEADQUARTERS

AIR MATERIEL COMMAND

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL, AIR MATERIEL COMMAND, ATTENTION FOLLOWING OFFICE SYMBOL:

MCREKA(MCRECA-4)

MCREDA-4/ORT/h.w
WRIGHT FIELD, DAYTON, OHIO
March 1948

SUBJECT: Contract W33-038-AC-[illegible], XFF-37 Airplane

TO: Chief of Staff
United States Air Force
Washington 25, D. C.
ATTN: Deputy Chief of Staff, Materiel

1. In a recent conference between personnel of Curtiss-Wright Corporation and the AMC held at Wright-Patterson Air Force Base for the purpose of discussing detail requirements for the above airplane, it was brought to light that no suitable piece of radar equipment is presently available that could be physically installed in this airplane to meet the requirements for precision navigation for use in conjunction with the infra red night lighting system. It is also apparent at this time that the installation of the best available radar set (the APS-10) would require a separate nose section to be interchangeable with the normal camera nose, inasmuch as the scanning equipment for this radar set could not be interchanged with the cameras of the standard camera nose.

2. The ground position indicator, which is believed to have an accuracy of within ½ to 1 miles at 1000 miles range, is presently contemplated to fulfill the requirement for precision navigation in connection with the XFF-37 airplane, and inasmuch as radar equipment with sufficient definition and sufficiently small size, to be installed in this airplane, is not available now or in the foreseeable future, the contractor has been instructed to proceed with the design of the XFF-37 airplane based on the use of no radar equipment for precision navigation making use of the ground position indicator and any other means to pilot's disposal in order to accurately navigate from base to target and return.

3. Approval of the above action by your Headquarters is requested.

FOR THE COMMANDING GENERAL:

GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

MA-745

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[illegible] Air Force Materiel Command
([illegible])

[illegible] Air Force Materiel Area
Wright Patterson AF [illegible]
Dayton, Ohio

TO: [illegible]
[illegible]

24 March 19[illegible]
(N-58106)
Master Serial No.

CONTRACT CHANGE NOTIFICATION NO. R (133) 8
Rec. Loc. No. / CCN No.

TO: Curtiss-Wright Corporation
Airplane Division
Columbus 16, Ohio

Purchase Order No.
Contract No. W 33-038 AC-6266

Pursuant to the Articles of the contract relating to changes, the above named Contractor is hereby authorized and directed to accomplish the changes listed below in respect to the articles called for under said contract as the same has heretofore and may hereafter be amended, subject, however, to the terms and provisions set forth on the reverse side hereof.

Description of Changes:

"1. The Contractor shall continue flight testing XP-87 airplane, Serial No. 45-59600, at Muroc, California in accordance with the schedule previously agreed to between the Contractor and the AMC until an additional 20 flying hours are accomplished.

2. The Contractor shall, upon completion of the above 20 additional hours of flight testing time, provide for a two weeks period of maintenance and servicing to the airplane, instrumentation and equipment during which time USAF Phase II flight testing will be conducted."

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Page 1 of 1 Page(s)

Authority for Issuance
R & R dtd 22 March - 48
MCRDOA-4

H. W. T. COLLINS
Contracting Officer

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AMC Form No. 70-18B
(20 Aug 47)

INSTRUCTION SHEET FOR CONTRACT CHANGE NOTIFICATION

1. In the event compliance with this Contract Change Notification will affect the delivery schedules contained in the contract or the performance characteristics of the articles to which the change hereby ordered applies and such change in delivery schedules or performance characteristics is not satisfactorily covered herein, the contractor shall notify the AF representative thereof as soon as practicable after receipt of this Contract Change Notification. Such notice shall be sent to the office and address designated on the face hereof, marked for the attention of the AF representative or contracting officer who signed this Contract Change Notification. The failure of the contractor to submit such notice to such AF representative or contracting officer within 30 days after receipt by the contractor of this Contract Change Notification (or within such additional period prior to the date of final settlement of the contract as the contracting officer, if he determines that the facts justify an extension of the above period, may approve) shall be taken as conclusively indicating that compliance with this Contract Change Notification will not affect delivery schedules or performance characteristics as aforesaid. Any notice given pursuant to the terms hereof will contain either (a) a detailed statement of the manner in which delivery schedules or performance characteristics will be affected, other than as provided herein, together with a proposal for amendment of the contract so as to avoid defaults by the contractor, or (b) a statement that the manner in which delivery schedules or performance characteristics will be affected cannot be ascertained within 30 days from the date of this Contract Change Notification, the reason therefor, and an estimate of the date upon which such information can be furnished. Any amendment to the delivery schedules or performance characteristics agreed upon by the parties as necessitated by this Contract Change Notification and not satisfactorily covered herein will be accomplished by further Contract Change Notification.

2. Within 60 days after receipt of the first Contract Change Notification under the contract and at intervals of approximately 60 days thereafter, the contractor shall submit to the AF representative an itemized list setting forth changes required by Contract Change Notifications received by the contractor in respect to the contract and not included in any such list previously furnished. The change ordered by this Contract Change Notification must be incorporated in either the first or second bi-monthly list submitted after receipt hereof, unless (a) the contractor, prior to the submission of such second bi-monthly list, submits a separate proposal for negotiating a change in price or in estimated cost and fixed fee occasioned by compliance with this Contract Change Notification, as provided in paragraph 4 below, or (b) the contracting officer approves an extention of time for the submission of a proposal for negotiating such a change. The provisions of this paragraph constitute an extension of the period for asserting claims for adjustment under the "Changes" article of the contract.

3. Each bi-monthly list submitted pursuant to the terms of paragraph 2 hereof shall indicate as to each change covered thereby the estimated increase or decrease in the contract price or estimated cost and fixed fee occasioned by such change, or shall state that no such change will result. Such list shall state the aggregate estimated net increase or decrease for all the changes shown thereon. Each such list will be accompanied by substantiating cost data for each change for which an adjustment is indicated, and the contractor shall, upon demand of the contracting officer, submit substantiating cost data even though no adjustment is indicated. Any aggregate net increase or decrease determined as a result of any negotiations will be incorporated in an appropriate change order to the contract.

4. Notwithstanding the procedure set forth in paragraphs 2 and 3 hereof, the contractor may at any time within the period provided for presenting claims for adjustment under the "Changes" article of the contract, as the same may be extended by the contracting officer, submit a proposal for negotiation of a separate change order to give effect to any increase or decrease in the contract price or estimated cost and fixed fee occasioned by compliance with this Contract Change Notification or with a group of Contract Change Notifications which includes this Contract Change Notification.

5. Any disagreement in respect of any question of fact arising hereunder shall be determined in the manner provided in the article of the contract relating to "Disputes."

6. Pending completion of the negotiations mentioned above, the contractor will be paid at the unit prices or other consideration specified in said contract as amended from time to time for the articles affected by the change, subject to appropriate credit, refund, or further payment. of this Contract Change Notification by signing and de

7. The contractor is requested to indicate receipt postal card immediately upon receipt hereof. livering to the AF representative the inclosed return postal card immediately upon receipt hereof.

WF-O-24 MAR 48 65M

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HEADQUARTERS
AIR MATERIEL COMMAND

MCPTA15/ESS/ob
Contract No. W 33-038 ac-20450
(19810)
Wright-Patterson Air Force Base,
Dayton, Ohio
29 March 1948

NAME: CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION)
ADDRESS: Columbus 16, Ohio

Dear Sirs:

1. An order is hereby placed with you for the furnishing to the Government of the following supplies or services:

See Exhibit "A" attached hereto and hereby made a part hereof.

CONFIDENTIAL

Project No.

NOTICE: This document contains information affecting the national defense of the United States within the meaning of the Espionage Act (50 U.S.C., Sts 31 and 32). The transmission of this document or the revelation of its contents in any manner to any unauthorized person is prohibited.

Copy Received; Sufficient Funds Have Been Obligated To Cover The Maximum Amount of Monies Which The Government is Obligated To Pay Under This Instrument.
BUDGET AND FISCAL DIVISION
29 MAR 1948
By

2. Except as otherwise expressly provided to the contrary herein, you are directed, upon your acceptance of this order (or upon its approval if required by paragraph 9) to proceed immediately to procure the necessary materials, and to commence the manufacture of the supplies or performance of the services called for in paragraph 1, and to pursue such work with all diligence to the end that the supplies may be delivered or services performed at the earliest practicable date.

3. All applicable articles (other than the article "Termination at the option of the Government" now required by Federal Law, Executive Order, or War Department Procurement Regulations to be inserted in contracts for supplies or services of the kind herein described are incorporated herein by reference. There is also incorporated herein by reference the article prescribed by Paragraph 2[illegible] of War Department Procurement Regulations in effect at the date of this Letter Contract.

4. By your acceptance hereof, you undertake without delay to enter into negotiations with the Government or its representatives looking to the execution of a definitive contract which will include all the provisions required by Federal Law, Executive Order and War Department Procurement Regulations to be inserted in contracts for supplies or services of the kind herein described. You agree to submit [illegible] delivery schedule and prices, terms and conditions as agreed to by you in your negotiations, or which may be at variance with the provisions of this order. It is contemplated that such definitive contract will be executed with you prior to 1 May 1948.

5. You are authorized to incur obligations and to make expenditures or obligate, in furtherance of your performance hereunder, not in excess of the aggregate. Pending the execution of a

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itive contract, each expenditure, order, subcontract or commitment made by you in furtherance of your performance hereunder, if for an amount that shall exceed either five per cent (5%) of the amount last above stated or $25,000.00, whichever is less, for tools, dies, jigs, fixtures, materials, supplies, parts, equipment, engineering assistance or reproduction or other license rights will be subject to written approval by the Contracting Officer. No contract, regardless of the amount thereof, shall be made by you with any other party for furnishing any of the completed or substantially completed articles, spare parts or work herein called for, without the written approval of the Contracting Officer as to sources.

6. **Termination**—(a) In case a definitive contract is not executed by the date specified in paragraph 4 hereof, (or any subsequent date at any time mutually agreed upon) because of the inability of the parties to agree upon a definitive contract, this order will terminate on the stated date or such subsequent date, as the case may be.

(b) The Government may at any time terminate this order in whole or in part for its convenience by giving you written notice of such termination.

(c) In the event of any termination pursuant to either paragraph 6 (a) or paragraph 6 (b) of this order, you and the Contracting Officer will attempt to agree by negotiation upon a settlement estimated by the parties to be the aggregate amount (less payments previously made to you) of the costs incurred by you in the performance of this order and the amounts paid or to be paid by you or for your account in settling with the approval of the Contracting Officer your obligations for commitments made in the performance of this order. In case of termination pursuant to paragraph 6 (b), such negotiated settlement may include a reasonable allowance for profit. Any such negotiated settlement shall be embodied in a Supplemental Agreement.

(d) If you and the Contracting Officer are not able to agree upon such a negotiated settlement within 90 days after the effective date of the termination (or within such longer period as at any time may be mutually agreed upon), the Government binds itself (without duplication of any of the following payments or of payments previously made) to reimburse you (1) for the costs incurred by you in the performance of this order, (2) for any amounts paid by you or for your account in settling with the approval of the Contracting Officer your obligations for commitments made in the performance of this order, and (3) for expenditures made and costs incurred by you with the approval of the Contracting Officer after the date of the termination for the protection of Government property and for other necessary purposes in connection with the settlement of this order. In lieu of reimbursing you for expenditures made by you in settling any of your obligations for commitments, the Government, in the discretion of the Contracting Officer, may assume such obligations or any of them. The total of such reimbursement (and of all payments previously made), together with the amount of any obligations assumed, shall not exceed the amount specified in the first sentence of paragraph 5. If such termination shall take place pursuant to paragraph 6 (a) of this order no allowance of profit will be made to you. If termination shall take place for the convenience of the Government pursuant to paragraph 6 (b) of this order, such allowance of profit will be made to you with respect to the work done by you prior to the effective date of the termination as the Contracting Officer may find to be reasonable under all the circumstances.

(e) The Government may permit you to sell or retain at prices or on terms agreed to by the Government any equipment, completed supplies, materials or work in process and the proceeds of any such sale, or such agreed prices, shall be paid or credited to the Government in such manner as the Contracting Officer may direct.

(f) Upon payment or reimbursement to you pursuant to paragraph 6 (c) or 6 (d) of this order, title to all equipment, completed supplies, work in process, materials, plans, information, and other things, for which you are so paid or reimbursed (except such property as may be sold or retained by you as above provided) will vest in the Government (if title thereto has not already become vested in the Government). The Government will also become entitled to any rights under any commitment which it may assume, or for the settlement of which it shall have reimbursed you.

(g) Any dispute which arises under this paragraph 6 regarding a matter of fact (including any dispute (1) as to whether termination has in fact taken place for the convenience of the Government or because of the inability of the parties to agree upon a definitive contract, or (2) as to the extent of any allowance of a profit in the event of a termination for the convenience of the Government) will be treated and resolved as a dispute under the "Disputes" article incorporated in this order by reference.

(h) Partial payments on account of any amount admittedly due to you pursuant to this paragraph 6 may be made by the Government at any time in the discretion of the Contracting Officer.

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AF Form No. 71-62
(26 Mar 46)

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7. [redacted]

8. Any claim arising under this order may be assigned subject to the terms of the Assignment of Claims Act of 1940 unless the subject matter of this order has been classified as secret, confidential or restricted, and any claims arising under this order shall not be subject to reduction or set off for any indebtedness of the assignor to the United States arising independently of this order.

9. Your acceptance of this order will be indicated by affixing your signature to this letter and two copies thereof and returning the executed original and two executed copies to the Contracting Officer not later than 15 April, 1948. Such acceptance will constitute this order a contract on the terms set forth herein, [redacted]

10. This instrument has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941, and APR 4-115.

11, 12., 13., 14. & 15. Paragraph 11 entitled "Patent Rights" PARO Form No. 8-4, paragraphs 12 and 13 entitled "Notice and Assistance" and "Royalties" PARO Form No. 8-8, paragraph 14 entitled "Filing of Patent Applications" PARO Form No. 8-9, and paragraph 15 entitled "Authorization and Consent" PARO Form No. 8-10C, added to this Letter Contract prior to the execution hereof.

16. Inspection. - See Page 9.
17. Partial Payments. - See Page 10.
18. Copyrights. - See Page 12.
19. See Page 13.

THE UNITED STATES OF AMERICA

By W. A. Davis

W. A. DAVIS, Lt. Colonel, USAF
Contracting Officer

ACCEPTED 31 March, 1948.

CURTISS-WRIGHT CORPORATION (Contractor) Affix Corporate Seal

By Edwin J. Lucas

Edwin J. Lucas (Name; Official Title) Representative

NOTE: Type or Print Names under all signatures

The Finance Officer, U. S. Army, Bldg. 287, Wright-Patterson AF Base, Dayton, Ohio is designated as the officer to make payments in accordance with this contract.

The sums to be expended by the Government hereunder are chargeable to the following allotments, the available balances of which are sufficient to cover the same:

2180705, 802-7004 P 110-09 S 55-058

Point of Inspection and Acceptance and F. O. B. Point	Columbus, Ohio
Type Contract Contemplated	Fixed Price
[redacted]	PR 51784
Priority Rating	None
Equipment Class	None
Classification	Confidential
Program	None

The USAF Procurement Field Office, Wright-Patterson AF Base, Dayton, Ohio, Attn: MCPPIB, is hereby designated as the office having overall administrative responsibility for this contract.

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Letter Contract (F-c) 3 W 55-058 ac-20450

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EXHIBIT "A" TO
LETTER CONTRACT DATED 29 MARCH 1948 DESIGNATED W 33-038 ac-20450

Item 1 - The Contractor shall, in anticipation of a production contract for F-87A and RF-87A airplanes and spare parts, based on Contractor's Tentative Model Specifications 29-Z-8, dated 15 January 1948, Revised 10 February 1948, and 29-Z-9, dated 29 January 1948, Revised 10 February 1948, conduct a series of engineering design, tooling and planning studies for said airplanes and spare parts. The Contractor shall also proceed with the production engineering, planning and special tool designing and the procurement of critical and strategical materials and such other preparation as is necessary for the production of said airplanes and spare parts so as to meet the following anticipated production schedule of twenty-eight (28) F-87A and fifteen (15) RF-87A airplanes:

Month	Quantity of Airplanes
October 1949	1
November 1949	0
December 1949	1
January 1950	1
February 1950	2
March 1950	4
April 1950	6
May 1950	7
June 1950	7
July 1950	7
August 1950	7

Item 2 - The Contractor shall fabricate and assemble special tools, detail parts, subassemblies and assemblies as necessary to meet the schedule set forth in Item 1 above.

Item 3 - The Contractor shall submit informal monthly progress reports, in quintuplicate, on the progress of the work to be performed under this contract, including the amounts expended or obligated for this contract. Such reports shall be addressed to the Commanding General, Air Material Command, Wright-Patterson Air Force Base, Dayton, Ohio, Attention: MCPPIA4l.

4. In conducting the studies called for in Item 1, the Contractor shall include the studies as set forth in Exhibit "B" attached hereto and hereby made a part hereof and such other studies as may be directed in writing by the Contracting Officer.

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1B. In conducting the production engineering, planning and special tool designing under Item 1, the Contractor shall so accomplish the work as to be prepared for the ultimate production of approximately five hundred (500) airplanes at a maximum monthly rate of nineteen (19) airplanes.

1C. It is anticipated that the Government will lend to the Contractor certain Government-owned property for use in the performance of this contract pursuant to Paragraph 7-514 of War Department Procurement Regulations. However, this contract shall not be construed as effecting the bailment of such property nor as a commitment that such loan will be made.

1D. The Contractor's Tentative Model Specifications set forth in Item 1 may be changed by mutual agreement between the Contractor and the Contracting Officer and such agreement shall be evidenced by an amendment to this contract.

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EXHIBIT "B"

SECTION I

Study Items to Reduce Weight of Airplanes

1. Airplane General

Conduct a study to remove the normal paint from the exterior of the airplane. Past experience indicates that existing surface preparations are unsatisfactory on high speed airplanes and, therefore, it is desirous to, if possible, eliminate all paint from the airplane. Since the exterior must be black in color, it has been proposed that the use of a black anodic surface be used. This will necessitate considerable study to provide sufficient smoothness without removing the protective coating. Its success will represent a saving of approximately 140# on the airplane.

2. Wing

Preliminary investigations indicate that a weight saving of at least 350 pounds may be realized on a production wing over the present experimental one. A study should be made of the design changes which are listed herein in order to verify the preliminary investigations. The study should include design layouts, structural analysis and weight analysis, culminating in a limited amount of testing of structural specimens as well as a static test article during the production stages.

a. Use machine tapered skin.
b. Use tapered wing beam cap strips in lieu of step machined.
c. Use tapered sheets for beam webs.
d. Use lighter skins between beams 5 and 6 to secure a better distribution of bending material.
e. Simplify ribs by using integral flanges where construction requirements will permit.
f. Reduce weight of anti-icing provisions in the nose section by eliminating dural spacers.
g. Revise wing - fuselage attachment to remove excess material and effect a more efficient connection.

3. Fuselage

An estimated 185 pound weight saving may be made on the fuselage, windshield and canopy by further analysis and refinement. The major portion of this saving is in the windshield and canopy which are now extremely heavy because of their size and shape and the low strength of the plastic material at high temperatures. The completion of this investigation will require a limited amount of flight testing of the experimental airplane to determine the actual pressure and temperatures imposed upon the enclosure during high speed flight. The balance of the saving on the fuselage will be accomplished by further refinement of structural components for lightest weight.

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4. Control Surfaces

A weight saving of 130 pounds is anticipated on the ailerons, elevator and rudder. This would be accomplished in the following manner: First, a design program based upon a complete static test of the surfaces would permit the use of lower margins of safety and, therefore, a general paring down of structure throughout. Second, a complete flutter analysis would provide for the use of minimum mass balance in the surfaces and their tabs.

5. Power Plant

A study program of the power plant and its associated systems should yield a considerable savings in weight. Part of this saving will be incorporated in the prototype installation of the Allison J-33 type engine but some of it can only apply to future production. It is estimated that the total saving which may be realized through design improvements alone would be approximately 600 pounds. The proposed changes are as follows:

a. The wing and tail anti-icing system should be redesigned to eliminate the use of the present heat exchanger and as much ducting as possible. There are several proposed ways of doing this, each of which should be studied carefully to arrive at the most efficient arrangement. One method is to mix exhaust gas and rammed cold air in a suitable mixing chamber and to distribute it to the surfaces in a manner similar to the present installation. The second suggestion is to utilize the turbine cooling air from the engine and distribute it through the system by means of blowers. This method will depend upon a complete investigation of the heat available but possesses several very attractive features. First, it utilizes air which would otherwise be dumped into the slip stream, it provides a means of anti-icing on the ground, and it should provide better ground cooling of the engines. The third means of anti-icing which should be considered is the use of combustion heaters. This may prove best for the entire airplane or it is possible that a combination of one of the two other methods and combustion heaters would be best. In this arrangement, engine heat would be utilized to anti-ice the wing while combustion heaters would be used for the tail. This would greatly simplify the extensive ducting system now used.

b. An extensive design study should be made to produce a lighter fuel tank arrangement. The tank installations now used in the experimental airplane utilize an internally braced tank supported by straps in the fuselage. However, because of high deflections, it has been necessary to add considerable external structure around the tanks to protect critical points. It is felt, that a lighter

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installation will result from eliminating the internal bracing and using the airplane structure itself to provide as much support as possible.

c. The deletion of self-sealing fuel and oil lines will result in an appreciable saving in weight. However, certain portions of the present system depended upon the flexibility of the lines to permit installation. An investigation must, therefore, be made to determine how metal lines may be used in these locations.

d. The proposed new jet engine fuel per AAF Specification #X-3611, dated 8 October 1947, will produce a weight saving if the expected specific gravity of 6.5 pounds per gallon is attained. This will result from a reduction of fuel tank size.

e. In addition to the above, it is expected that a reduction in fuel system weight may be realized as a result of the change to two engines. This will be accomplished by a simplification of the fuel selector system, a possible reduction in the number of booster pumps from six to four and in fewer lines required.

6. Dorsal Fin

Wind tunnel tests on the experimental model indicates that more than adequate directional stability is provided by the dorsal fin and the vertical tail. Preliminary investigations indicate that it may be possible to delete the dorsal fin entirely. The purpose of this study would be to carry this investigation to a final conclusion. 32# would be saved by the deletion of the dorsal fin.

7. Landing Gear & Hydraulics

At least 150# may be saved in the landing gear and hydraulic systems. This will be accomplished by detail design studies including the following: The combining of various assemblies on the landing gear which are now built up into single forgings, the changing of certain steel parts in the landing gear and hydraulic systems to 75ST aluminum alloy, the reduction in member sizes of landing gear as a result of drop tests and the simplification of the landing gear door operating mechanisms.

8. Equipment and Controls

The following studies should be made on fixed equipment and controls for an estimated saving of 50#.

a. Redesign the pilot's and co-pilot's seats to the latest specification and requirements.

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b. Refine the design of the air controls system to reduce weight by changing steel parts to aluminum, reducing the number of idlers and push-pull rods used and taking advantage of a reduced booster ratio as indicated by wind tunnel tests.

9. Electrical System

An accurate estimate of possible weight saving in the electrical system is impossible at this time because it depends so much upon the outcome of the engineering studies indicated herein. However, it is felt that at least 100 lbs. may be saved by a thorough study of the following:

a. All wire sizes should be reduced to a minimum commensurate with anticipated load requirements. Here again information relative to the flexible turret is of extreme importance. Electrical load requirements for the turret are essential to the design of the basic power system and wiring of the airplane.

b. The batteries should be relocated to a point near the generators.

c. A simplified fuel system made possible by the engine change should save weight.

d. Remote circuit breakers should be used where possible.

e. An investigation should be made of the possible application of a 120V, AC or DC system to the airplane.

10. Summary

The study items listed above represent a total possible weight saving of 1737 pounds. This is a saving which is independent of the weight reduction which will be realized from the change in power plants from the 24C to the J-33 type engine. It is expected that the change in power plants will provide an additional saving of 1010 pounds. This gives a total of 2747 pounds reduction in gross weight over the actual gross weight of the experimental airplane.

SECTION II

Changes Requested by the Air Material Command

1. Airplane General

A study should be made of the complete winterization of the P-87 airplane. This will include an investigation of the availability and use of equipment carrying yellow dot approval. The requirements of Specification AN-

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M-10-a must be studied thoroughly with respect to all motors and actuators. This study is requested to meet the requirements of Air Materiel Command letter TSEOA-4/PBS/ns, dated 10 September 1946.

2. Electrical System

a. A study should be made of a new instrument board in accordance with the recommendations of the Air Materiel Command, in letter TSEOA-4/OBT/hw, dated 7 August 1947, and requests contained in Appendix B to the Engineering Division Memo Report No. TSEOA-4-1387, Engineering Acceptance Inspection.

b. Study relocation of the external power receptacle as requested by AMC letter, TSEOA-4/CBT/hw, dated 25 August 1947.

c. Study a revised lighting system for the instrument board and the cockpit, as requested by Item c-2, of Appendix B, of the Engineering Acceptance Report.

d. Make a comprehensive layout of all instruments and electrical control systems in the cockpit to incorporate the changes requested by Appendix B of the Engineering Acceptance Report.

3. Equipment

a. Completely redesign seat and supporting structure in accordance with the latest specifications and with applicable comments in Appendix B of Engineering Acceptance Report.

b. Make a complete analysis of wing and tail anti-icing in accordance with the requirements set forth in Items D-4 and D-6 of Appendix B, of the Engineering Acceptance Report, and make the necessary design changes in the system to conform with this analysis.

c. Prepare a new design layout and inboard profile of the cockpit area to incorporate all of the changes requested in Appendix B of the Engineering Acceptance Report.

4. Fuselage

An investigation should be made of the steps necessary to improve the optical qualities of the canopy as requested in Section H-3, of Appendix B, of the Engineering Acceptance Report. This will involve considerable contact with manufacturing sources and should include the possibility of using a single large piece of plastic for the canopy. A sizable weight saving would result from using a tapered sheet of plastic as was suggested in Curtiss Wright letter to the AMC, WT:bsp/2350-E, dated 19 March 1947.

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5. Landing Gear

a. Study the means of reducing the brake pressure to zero during flight, as requested by AMC letter TSEOA-4/OET/hw, dated 15 May 1947.

6. Power Plant

a. As a result of AMC Item G2, of Appendix B to the Engineering Acceptance Report, a complete study should be made of a means to completely seal the fuel cell compartments from the balance of the airplane.

b. Design layouts should be made of a revised tip tank completely in accordance with AF Specification 28495, as requested by AMC letter TSEOA-4/OET/hw.

c. A design layout should be made to simplify the fuel system in the fuselage area just above the wing, as requested by Item G3 of Appendix B to the Engineering Acceptance Report.

7. Armament

As requested in AMC letter TSEPA-4/PEB/irz dated 15 December 1947, a study should be made to provide for the installation of a minimum of two (2) bombs in all standard sizes up to 1,000 lbs. This installation must be made in such a manner that the tip tanks may be carried on the airplane at the same time. To properly evaluate this study and to arrive at the best configuration for the airplane, it is suggested that a comparison should be made with a bomb bay installation using pre-loaded bomb racks as was originally proposed for the airplane.

In addition to these studies, this Contractor suggests that, in view of the difficulties which may be expected in any bomb installation on a high speed airplane, such as the P-87, that consideration be given to an experimental development program on the prototype airplane. This should include investigation of the drag of an external installation, dropping at high speeds, and possible ejection from a bomb bay.

SECTION III

Items to Improve Production of the Airplane

1. Airplane General

A comprehensive study should be made of all the major components of the airplane to secure the most satisfactory production breakdown. This should include an investigation of interchangeability and the preparation of an interchangeability list. The breakdown of each component into sub-assemblies suitable for quantity production should also be considered. In connection with these breakdowns, it is essential that information

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be made available as to the desired ultimate rate of production for the airplane to use as a guide in planning the extent of sub-assembly breakdown required.

2. Wing

In conjunction with the previously listed studies relative to the wing, the following should be investigated to make it more suitable for quantity production.

a. The use of a span-wise hinge to attach the aileron closure skin to the wing should be studied in lieu of the present multiple screw attachment.

b. An investigation should be made to eliminate the anti-icing air return duct in the wing. The purpose of this duct was to reduce pressure loss in exhausting the anti-icing air but it is now felt that this may be accomplished without the duct.

c. The present double skin arrangement for anti-icing the nose section of the wing is somewhat complicated. A study should be made to simplify this area.

3. Fuselage

In the program to improve the production breakdown of the fuselage, it is felt that a staggered splice should be used at the wing attachment. This would be accomplished by breaking the lower section of the fuselage under the front wing beam and the upper section above the rear beam. The assembly of the wing and fuselage will thereby be much simplified and ready transportation of the fuselage in two sections will be afforded.

4. Tail Surfaces

The following additional studies are recommended for the tail surfaces.

a. Investigate the use of a stabilizer adjustable in flight. It is expected that this will result in improved flight characteristics for the airplane at high speed and may permit the deletion of the trim tab with a resultant saving in weight.

b. Simplify the tail surface anti-icing provisions by removing the exhaust ducting and simplifying the nose section construction.

5. Equipment and Controls

In order to properly coordinate all the changes to the cockpit which have been previously listed and to secure the earliest approval, a complete mockup of the cockpit will be necessary to provide the means for a physical evaluation of all changes and assure a satisfactory production cockpit.

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In addition to all changes now listed, it is desired to make improvements for production in the side consoles, the pedestal, the column and wheel arrangment, and the rudder pedal installation. The mockup will also include the pilot's and navigator's seats completely revised to specification, as this will permit a check of the emergency escape procedure. Consideration shall be given to a readily removable pedestal on the nonpilot's side of the cockpit, for alternate installations of fixed guns, photo reconnaissance installation, or turret installation.

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452.1 Pursuit, 1948, Vol. I

AF HQ-33 (30 MAY 44) CONFIDENTIAL 42

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

TALLY NO	
FILE NO.	

SUBJECT: Future Performance of All Weather Fighters

TO: Requirements Div., Director of Trng & Req., DCS/O DATE 29 March 1948

COMMENT No 1

FROM: Director of Research & Development, DCS/Materiel Major L. B. Smith/bkw/62110

1. Your attention is invited to the following present and future estimated performance figures for the Curtiss-Wright XF-87 and the Northrop XF-89:

Aircraft:	XF-87-1	XF-87-2	XF-87-3	***XF-89-1	XF-89-2
Engine	4 - 24C	2 - J33-27	2 - J33-29	2 TG-180	2 TG-190A
V Max (Knots) Sea level	520	521	543	465	542
V Max. (Knots) @ 35,000 ft.	438	453	484	475	495
Time to Climb to 35,000 ft (Min.)	13.35	13.35	6.3	16.5	11.2
Take Off over 50' Obstacle (Feet)	6060	*6156	* 5880	7150	** 4660
Combat Ceiling (Feet)		38,200	45,000		41,300
Combat Radius (Naut. Mi.)	868	* 868	* 695	860	807

* With full external fuel and water injection for take-off.

** With full external fuel.

*** Northrop is currently preparing additional performance figures on the basis of two (2) TG-190H engines.

2. It is estimated that the advanced engine models utilized in the above proposals will be available for production in accordance with the following schedule:

J33-27	July 1949
J33-29	December 1949
TG-190A	April 1948
TG-190H	Late 1949 (contingent upon satisfactory completion of type tests).

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AF HQ-33 (30 MAY 44)

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AF-HQ-33 (20 MAY 44)

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HEADQUARTERS ARMY AIR FORCES

CONFIDENTIAL

ROUTING AND RECORD SHEET

TALLY NO	
FILE NO	

SUBJECT: Future Performance of All Weather Fighters

TO: Requirements Div., DCS/O

DATE: 29 March 1948

FROM: Dir. of Research & Dev., DCS/M

COMMENT No. 1 (Contd)
Major Smith/bkw/6210

3. The above information is submitted to give an indication to your office of the effect utilization of advanced engine models will have on the performance of the F-87 and F-89.

4. Your comments are requested.

R S Harman, Col USAF
for J. S. HOLTONER
Colonel, U. S. Air Force
Chief, Aircraft Branch

AFDRD-3F May RBS

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

[illegible]
REPLY-140

Subject: [illegible]
Model AT-9J Airplanes
Engine Changes in No. 1 Airplane

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCREAV-

Through: Air Officer in Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Through: Chief, Dayton Air Procurement Field Office
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCRPAV - Contracting Officer

Reference: (a) AMC Field Ltr TBECA-4/CEI/cw dated 31 Dec 1942
(b) AMC Engineering Div (MCREGA-1) Teletype dated 7 January 1943
(c) AMC Eng Div (MCREGA-1) Teletype dated 1 Jan 43
(d) AMC Eng Div (MCREGA-1) Teletype dated 9 Feb 43
(e) AMC Ltr (MCREGA-1/WSH/mjm) dated 18 Feb 1943

Enclosure: (A) Cost estimate breakdown

1. As a result of repeated instances of failure during [illegible] of the Wright-R and our engines installed in the N. A. [illegible], it has been necessary for this Contractor to make numerous engine changes to insure satisfactory engine installations for flight test purposes. Upon development of the possibility of making the substitution of production type R-[illegible] engines in the engine positions was contained in reference (a), and approval for each substitution was contained therein. At the time reference (a) was issued, the experimental "B" type engine (Serial Wa-[illegible]) had already been replaced by a production "B" type (Serial Wa-[illegible]) in the No. 2 position. This change was accomplished prior to shipment of the airplane to Muroc.

2. During engine test operations at Muroc it was revealed that production "B" type engines (Serial Numbers Wa-[illegible], Wa-[illegible], Wa-[illegible], Wa-[illegible], Wa-[illegible], and Wa-[illegible]) were unsatisfactory for operation until further inspection and tests on such engines had been accomplished at the

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Westinghouse plant. This necessitated removal of the "E" engine (Serial WE-[illegible]) from the No. 4 position and reinstallation of the experimental "B" type engine (Serial WE-002046). As a result of the above change and test requirements, this Contractor by references (b) and (c) was authorized to ship the above six pre-production "B" engines for return to Westinghouse, and to ship two "A" type engines (Serials WE-20007 and WE-20008) to Muroc for use as spares. Subsequently, because of a faulty ignition system, it became necessary again to remove the experimental "B" type engine (Serial WE-002046) from the No. 4 position and return that engine to Westinghouse. The authority for this change was contained in reference (c). As acknowledged in AMC letter, reference (e), it later became necessary to remove the experimental "B" type engine (Serial WE-[illegible]) from the No. 3 position because of failure of the accessory gear box bearing. Instruction "E" type engine, Serial WE-20009, was substituted in No. 3 position. Further, this Contractor, acting on the authority contained in reference (a), substituted a "B" type engine (Serial WE-20007) in lieu of the experimental "A" type (Serial WE-[illegible]) in the No. 1 position.

5. Although reference (a) indicated that the change from experimental engine types to production "B" engines would be accomplished at no additional cost to the Government, neither the Air Materiel Command nor the Contractor was aware of the several changes which would be required subsequently. Therefore, the Contractor submits herewith a quotation for a total price of $[illegible] for accomplishing all engine changes on the A-[illegible]-C, Airplane, and for crating and handling the engines which were sent from this plant to Muroc and from Muroc to the Westinghouse plant. A breakdown of this amount, subdivided into Columbus and Muroc costs, is contained in enclosure (A) attached hereto. The Air Materiel Command's attention is invited to the fact that the costs shown in Enclosure (A, are based on actual charges collected for these engine changes.

6. On the assumption that it will be necessary, at the earliest possible date, to make the final change to a production "B" engine in the No. 2 position (experimental "A" type, Serial WE-[illegible]), the estimate of costs involved in such change is contained in Enclosure (A). This estimate is based, however, on actual charges incurred for a similar change at Muroc.

7. Included [illegible] in the [illegible] of [illegible] Enclosure (A) are those charges involved in installing and packing the [illegible] engines for shipment from Columbus to Muroc. Costs for fabricating and packing the intermediate shipment from "E" engines. Costs for fabricating and packing the intermediate shipment from two experimental "A" type engines to two production "B" type engines, have already been covered by Change No. [illegible] to subject contract.

8. The Air Materiel Command's early consideration of this quotation for the entire engine change program will be appreciated.

Respectfully,

Curtiss-Wright Corporation
Airplane Division

Edwin J. Lampert
Contracts Manager

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ENCLOSURE (A)

AF-37 ENGINE CHANGES

SUMMARY

	Columbus Costs	Marco Costs	Total Costs
PRODUCTIVE			
Material	$ 650.00	$ 4,1,2.00	$ 4,507.00
Labor @ 1.57/hr	1,190.00	3,412.00	6,202.00
Overhead (100% & 75%)	2,5[illegible].00	2,244.00	5,1[illegible].00
Overtime Premium		454.00	454.00
Total Prod. Costs	$ [illegible],50[illegible].00	42[illegible].2[illegible].00	42[illegible],571.00
TOOLING			
Material	$ [illegible]5.00		$ [illegible]5.00
Labor @ 1.57/hr	7[illegible].00		7[illegible].00
Overhead (100% & 75%)	1[illegible]5.00		1[illegible]5.00
Total Tooling Costs	$ 2[illegible]1.00		$ 277.00
ENGINEERING			
Material			
Labor @ [illegible].00/hr	2[illegible]7[illegible].00	$ 1,[illegible]97.00	$ 1,[illegible]97.00
Overhead (100% & 75%)	5[illegible]0.00	[illegible],5[illegible].00	[illegible],[illegible]0.00
Overtime Premium		838.00	1,414.00
Total Eng. Costs	$ 1,[illegible].00	$ 4,[illegible]8.00	$ 5,[illegible].00
TOTAL COST	$ 1,7[illegible].00	$ 17,7[illegible]3.00	$ 24,[illegible]2.00
Profit @ 10%	[illegible]5.00	1,11[illegible].00	[illegible],4[illegible]3.00
TOTAL PRICE	$ 7,42[illegible].00	$19,509.00	$26,[illegible]1.00

PK [illegible]7[illegible]

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AIR FORCE BASE
[illegible] MUROC [illegible]
[illegible], CALIFORNIA

RLK/et

15 April 1948

[illegible]

Subject: Tail Buffet Investigation and General Progress
XP-87 #1 Airplane
Flights #11, 12 and 13
27 March to 12 April 1948

[illegible]: Col. George F. Britt, USAF, [illegible]
Lt. Col. H. A. Griffin, USAF, [illegible]
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

1. The newly modified and strengthened main landing gear doors and retracting mechanism for the [illegible] during the subject period. After installing the doors, the landing gear and door systems were ground cycled. During cycling the main gear doors were overloaded in the down position. Loads applied to the nacelle stiffeners and inboard of the forward hinge [illegible] to the nacelle stiffeners [illegible] to facilitate locations. The doors were removed for minor rework and to facilitate strengthening of the nacelles at the forward hinge locations. As a result, all of the subject flights were made with the main landing gear doors removed. In addition, all flights were made with the [illegible] removed from the bottom tips of the elevators and with the [illegible] tested tail [illegible].

2. Prior to flight #11, on 1 April, the electrical circuits for the landing flaps and horizontal stabilizer were connected together for synchronous operation with [illegible] and previously [illegible] were made for these controls separate. During this flight, stabilizer [illegible] were taken of the elevator and rudder forces, [illegible] etc. The data obtained during the [illegible] examination of these records [illegible] on tail buffet observations. The following tests were made during this flight:

a. Elevator Buffet.

(1) The airplane was trimmed to zero control force, i.e., the [illegible], at various speeds from 200 [illegible]. The leading edge of the horizontal stabilizer was at zero degrees. The [illegible] was rotated with the stabilizer set at -1.0 degrees. The elevator control was then displaced rapidly, however, with the stabilizer set [illegible] degrees, the elevator [illegible] at an IAS of 300 knots, the maximum limitation [illegible]. The response recorded [illegible] which point [illegible] the natural [illegible] of the [illegible]. [illegible] reported that, however, [illegible] air was encountered

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Tail Buffet Investigation and General Progress, XP-87 #1 AF, Flts #11 12 and 13, 27 Mar to 12 Apr 48.

a. Flaps and Stabilizer Actuation with Single Control - The airplane was trimmed to zero stick force at 200 m.p.h. IAS in the clean configuration with the stabilizer set at zero degrees. The flap-stabilizer control was then operated. With both surfaces full down the airplane nosed up approximately 8 degrees; however, the control force required to return the airplane to a level flight attitude was not excessive. When retracting to the clean configuration and zero stabilizer setting the required control force was negligible because movement of the flaps and stabilizer is more nearly synchronized for this condition.

e. Free Fall of Landing Gear - The landing gear "free fall" characteristics were checked at 200 m.p.h. IAS. Gear indicator lights showed all gear down and locked within 5 seconds or less.

f. Aileron Control System - Aileron control forces were checked for the landing configuration at [illegible] m.p.h. IAS with boost off. Aileron forces were high but the pilot felt that the airplane could be landed safely in the event of failure of the boost system. Aileron forces were then checked without boost in the clean configuration from [illegible]300 m.p.h. IAS. Aileron forces were high at 350 m.p.h. but the airplane could be controlled.

3. Prior to flight #12, performed 9 April, the elevators were overbalanced approximately 10% in lbs by distributing weight along the hinge axis. The purpose of this change was to eliminate the possibility of resonant response of the elevator system by reducing its natural frequency to approximately zero. Tests were conducted from 200-400 m.p.h. IAS in the same manner and at the same speeds as in the preceding flight. Rough air or intentional excitation of the control column resulted in very limited vibration of the elevator system. Some vibration was detected but the amplitude was small since it was of a forced nature. Fuselage vibration was similarly affected by the use of the elevator overbalance weights. Apparently these weights eliminated resonant response of the elevators which in turn reduced the vibratory loads imparted to the fuselage by the elevators. Rudder vibration was apparently unaffected by the use of the overbalance weights.

4. Flight #13 was performed 9 April for the purpose of obtaining take-off data and photographs, the airplane in accordance with CAL 3 request. Take-off was accomplished from the Main Base runway with a gross weight of 41,1[illegible] lb. and a c.g. of 20.[illegible] M.A.C., gear down. Flaps were full down (35°) and the stabilizer was set at -3 degrees. A 30 m.p.h. headwind was utilized and take-off was made at 140 m.p.h. IAS after a ground roll of 4[illegible]0 ft. Nose wheel action has been very good during take-off and landing rolls; however, the pilot recommends the inclusion of nose wheel steering to provide directional control during taxi runs at speeds below 60-65 m.p.h. IAS where extensive use of brakes is now necessary.

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Tail Buffet Investigation and General Progress, X- 7 .1 AF, Hts ell ls and L, 27 Mar to 13 Apr 46.

b. The modified main landing gear doors and actuating mechanisms are being installed prior to the next flight, scheduled 15 April, and approximately 75% of the elevator overbalance will be removed. The Contractor considers the present overbalance to be more than required. Buffet will be investigated, with the present tail stinger installed, at speeds above 400 m.p.h. IAS. Tests will be conducted at a later date with a larger fixed stinger extending aft from the 50% chord point of the horizontal tail where tuft movies indicate that tail turbulence begins, see paragraph 3 of NACA report on this airplane, dated 13 March 1946. The present tail stinger extends aft from the [illegible] chord point.

c. At present the total number of Curtiss-Wright employees at Troc, including technical personnel, is twenty-three (23). These employees have been assigned for the duration of the project and their number is expected to remain constant, except as affected by limited assignment of employees to temporary duty as [illegible] demands.

FOR THE COMMANDING OFFICER:

PREPARED BY:

[illegible]
Troc Project Engineer

APPROVED BY:

WILLIAM D. SMITH
Lt. Col., USAF
Chief, Technical Engineering Division

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Priority

[illegible] April 1944

MED

USAF OFFICER IN CHARGE
[illegible]
[illegible]
[illegible]

[illegible], Colonel, USAF
[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

21 April 1946
[illegible]

Subject: Contract W33-038 ac-14357
Model AP-3? airplane (modified)
Installation of Photographic View Finder

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPLA

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Through: Chief, Dayton AF Procurement Field Office
Wright-Patterson Air Force Base
Dayton, Ohio

Through: Air Inspector in Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) CW Ltr [illegible] dated 13 January 1946

1. This Contractor's letter reference (a) submitted a proposal for making the necessary modifications on A-C[illegible] airplane No. [illegible] airplane to the reference aircraft type. The reference (a) proposal was specifically based on the understanding that a separate proposal would be submitted to cover the procurement of a photographic viewfinder for use in connection with the photo reconnaissance modifications. It was pointed out that the Contractor's continued efforts to obtain a firm quotation for such a viewfinder had been unsuccessful.

2. Although subsequent investigations concerning a source for the procurement of such a viewfinder have not produced firm price commitments, the Contractor believes that the vendor's preliminary price quotation is a reasonably accurate estimate of the costs involved in procuring this item. Therefore, the Contractor hereby amends paragraph 1 of reference (a) to reflect a total price of $[illegible] for the photo-reconnaissance modification, which revised price is derived as follows:

P.R. 5776

WRIGHT "A" [illegible] 5776

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To: Contracting General

From: [illegible]

Total cost (per reference (e))	$[illegible]
Profit, awarded (_____ percent)	[illegible]
Total Revised Cost	$[illegible]
Profit - 1)	[illegible]
Total Price	$[illegible]

2. In view of the possibility exists that the Contractor's attempts to obtain a firm price for subject modification, it will be necessary that the modification be issued subject to a cost reimbursement basis, which is to be negotiated as soon as possible (*). Thus, the modification must contain a ceiling of $[illegible] for the total revised price ([illegible]), which may not be exceeded by the Government without prior approval.

3. It is requested that the Contractor (*) letter to the extent necessary to incorporate the above cost and profit include revised prices.

Respectfully

[illegible]
Principal Assistant

Edwin [illegible]
Contracting Officer

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F168 - 46 (1/1)

TSENG Form No. 23
(Rev 19 Sep 44)

RECORD OF OFFICIAL CONTACTS

ENGINEERING DIVISION

FILE: XP-87 Airplane	PROJECT: MX-745	DATE: 23 April 1948

SUBJECT: Damage to XP-87 Airplane, Serial No. 45-59600, as result of wheels up landing at Muroc Lake, 20 April 1948

PERSON(S) CONTACTED: Mr. Walter Tydon

REPORT ON:

- ☒ Long Distance Telephone Call
- ☐ Govt. Paid
- ☒ Contractor Paid
- ☐ Personal Visit of Representative
- ☐ Conference
- ☐ Incoming
- ☐ Outgoing

FACTUAL DATA (If additional space required, use reverse side):

Mr. Walter Tydon of Curtiss-Wright Corporation contacted Capt. O. B. Thornton, Fighter Branch, Airc. Proj. Sect., on 23 April 1948 to report the extent of damage incurred to the XP-87 after raising the airplane and conducting a general inspection of damaged areas.

a. The bomb bay section of the underside of the fuselage was severely damaged since this section was not stressed to take ditching loads due to the deletion of the bomb bay doors and substitution of light skin structure therefor.

b. The bottom fuselage skin from Station 150 to the aft bomb bay section will have to be replaced, however, with the exception of the bomb bay area, no damage to bulkheads or stringers is apparent.

c. Only superficial damage in the form of paint scratching was incurred by the engine nacelles.

Mr. Tydon stated that the bomb bay structure from the No. 2 airplane is being sent to Muroc and that that portion of the fuselage skin having double curvature will be manufactured at the plant in Columbus and flown to Muroc. The remainder of the damage can be repaired at Muroc and it is estimated three weeks will be required to complete the repairs.

The Project Officer requested Mr. Tydon to expedite a cost estimate in order that funds for the repairs may be obligated and a CCN to cover the repair work issued.

ACTION REQUIRED:

—

OBT
PBL
CLH
PBK
fww

SIGNATURE OF INITIATOR:	Symbol	COORDINATION:
O.B. Thornton Capt USAF	MCREOA-4	PBL

WF-(A)-0-30 SEP 47 5M

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AIR INSPECTOR

MCPPX4A1

PUBLIC INF. OFFICE

COMPTROLLER

PERSONNEL & ADM.

RESEARCH & DEV.

SUPPLY AND MAINT.

PROC. & DIST. MOS. PLNR.

OTHER

AMC Form No. 10-7
(18 Nov 47)
(Old AMC Form No. 10-806)

MCPPX4A1

Wright-Patterson Air Force Base

26 April 1948

SUBJECT: F-87 Series Airplanes Production Designations.

TO: Curtiss-Wright Corporation
Airplane Division, Plant No. 3
4300 East Fifth Ave
Columbus 16, Ohio

ATTN: MCAF Inspector in Charge

1. The mechanics of changing the current "F" designation denoting Fighter, and "YF" denoting Photo version of Fighter, to "XF" and "XF" respectively have not been fully coordinated to date.

2. It is expected there will be quite some elapsed time before adoption of the new designations and accordingly directives, the present designations, as indicated below, will be adhered to for now.

(a) P-87A (5928) Fighter with six gun flush nose. (This configuration is not anticipated for production.)

(b) P-87B (5986) Fighter with Tail Fire Control, or components thereof forming the armament for the airplane.

(c) YF-87A (5929) Photo-Reconnaissance version of P-87 Production Fighter.

FOR THE COMMANDING GENERAL:

Chas. F. Fletcher, Jr.
C. E. U. S. A. F.

for GEORGE E. SCHAFFEL
Colonel, USAF
Chief, Aircraft & Missiles Sec.
Procurement Division

cc: Dayton USAFPPO
C-W, Dayton

Ehf.

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452.1-Curtiss-Wright Corporation, Airplane Division, Propeller Division

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AIR FORCE BASE
XXXXXXXX XXXXX

RLK/et

MCREOA31

28 April 1948

SUBJECT: Buffet Investigation
XP-87 #1 Airplane
Flights #14 and 15
17-20 April 1948

TO: Col. George F. Smith, USAF, MCREOA
Lt. Col. H. A. Griffith, USAF, MCREOA4
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

1. The main landing gear doors were reinstalled following the performance of minor rework on the doors and strengthening of the nacelles at the forward hinge points for the doors. As a result, both of the subject flights were made with the main gear doors installed. In addition, these flights were made with the horn balances removed from the outboard tips of the elevators and with the recently tested tail stinger installed.

2. Flight #14, 17 April 1948 - The preceding flights, #12 and 13, were made with an overbalancing moment of 150 in. lbs. distributed along the elevator hinge axis. Use of the overbalance resulted in considerable reduction of elevator and fuselage vibration, see MBEPP report dated 15 April 1948. The Contractor considered this amount of overbalance to be more than required and, prior to flight #14, it was reduced to 37.5 in. lbs. Oscillograph records were taken of the elevator and rudder forces, fuselage bending, etc. under all test conditions. The comments contained herein are based on an examination of these records as well as on pilot observations. The following items were accomplished:

a. The airplane was trimmed to zero control force, in the clean configuration, at various speeds from 200-400 m.p.h. IAS at an altitude of 10,000 ft. Vibration of the fuselage and rudder system was small at all speeds. Elevator vibration was also small but increased somewhat with air speed. Apparently resonant response of the elevator system was eliminated with the 37.5 in. lbs. of overbalance which reduced the natural frequency of the system. At each speed, the pilot also moved the control column forward and backward at a frequency of approximately 8 c.p.s., the natural frequency of the elevator system before the addition of overbalance weights, and then released the control. Upon releasing the control column the pilot induced elevator movement dampened out immediately; however, a slight movement of the control column persisted. This movement was probably the same as that experienced before the control was hand excited. The fuselage continued to vibrate at its natural frequency of 8 c.p.s., when the control column was released, and several cycles were required to dampen out its movement.

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b. A check climb was started from 14,000 ft. at rated engine speed, 11,000 r.p.m., and 275 m.p.h. IAS. The climb was made to an altitude of 26,500 ft. The IAS at the end of the climb was 225 m.p.h. and approximately 22 minutes time was required to complete the climb. No explanation for the apparently low rate of climb has been obtained. During a recent level flight check a maximum speed of approximately 325 m.p.h. IAS was reached at 10,000 ft. and an engine speed of 11,000 r.p.m.

c. Following the climb to 26,500 ft., the engines were throttled back and a descent was started. At 20,000 ft., after the indicated air speed had increased to 365 m.p.h., a violent buffet of the airplane was experienced. This buffet excited considerable response in the elevator and rudder controls. The angle of attack was increased but the buffet remained undiminished until the IAS reduced to 300 m.p.h. An examination of the oscillograph records showed that considerable vibration of the fuselage occurred at its natural frequency of 8 c.p.s. and persisted from 365 to 300 m.p.h. IAS. Apparently the fuselage vibration forced the controls to vibrate. Since this violent buffet occurred at 20,000 ft., the decision was made to investigate Mach number effect during the succeeding flight.

3. Flight #15, 20 April 1948 - The configuration used for this flight was the same as for flight #14, except that the elevator overbalance was increased to the initial test value of 1[illegible] in. lbs.

a. The effect of Mach number was investigated at altitudes from 7300 to 20,400 ft. and at various airspeeds from 250 to 400 m.p.h. IAS. As in preceding flights, the airplane was first trimmed to zero control force and the control column was then hand excited and released. The pilot reported that buffet was very similar to, but somewhat less than that encountered with the 3765 in. lbs. of elevator overbalance. No violent buffet, such as described in par. 2. a., was encountered during this flight; however, it is the consensus of opinion that such buffet remains a possible hazard at speeds in excess of 300 m.p.h. IAS. Apparently this buffet excites the fuselage at its tending natural frequency of 8 c.p.s. Resulting vibration of the elevators becomes very severe unless elevator overbalance is provided. A detailed analysis is now being made of the oscillograph records obtained during this flight to determine if Mach number appreciably effects buffet. The results of this analysis will be forwarded as soon as they become available.

b. The landing gear was cycled successfully four times during this flight. While attempting the fifth extension, it was found that the left main gear would not extend although the right main and nose gear extended and locked satisfactorily. Unsuccessful attempts were made to extend the left gear by use of both the normal and free fall systems and with accelerations of 3 "g's" applied. It was then decided to make a crash landing on the lake with all gear up. The right main and nose gear were retracted and the resulting landing was made at approximately 140 m.p.h. IAS. Inspection

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revealed that the tripping mechanism for the left main gear door uplocks had contacted the roller on the landing gear and had become wedged in the door operating arm during retraction. This prevented unlocking of the doors and lowering of the gear. Damage was sustained by several fuselage bulkheads, the nose gear door and the fairing skin directly forward and aft of the bomb bay. Engine nacelles and the complete electrical, hydraulic and fuel systems were undamaged. The engines are apparently undamaged but have been removed for a thorough check by Muroc Power Plant personnel. The Contractor will incorporate several items of rework and modification during the present shut down period. Twelve (12) Curtiss-Wright employees will be utilized during this period in addition to the twenty-three (23) presently stationed at Muroc. The Contractor estimates that the airplane will be ready for a resumption of the flight test program approximately 17 May.

FOR THE COMMANDING OFFICER:

PREPARED BY: P. L. KING
Muroc Project Engineer

APPROVED BY: SYDNEY L. SMITH
Lt. Col., USAF
Chief, Technical Engineering Division

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MCPP Form No. 71-26A
(Rev 21 Jan 48)

Execute in triplicate

C— 36140

Class— 02-A

CHANGE ORDER

UNITED STATES AIR FORCE
Air Materiel Command
~~Wright Field, Dayton, Ohio~~
Wright-Patterson Air Force Base, Dayton, Ohio

TFL/jba

Date 28 April 1948
Change Order No. 4 to
Contract No. W 33-038 ac-19837
as amended

To: CURTISS-WRIGHT CORPORATION (AIRPLANE DIVISION) 4300 E. 5th Ave., Columbus, 16 Ohio

SUBJECT: Cancellation and Incorporation of Contract Change Notifications

1. Changes set forth in Contract Change Notification 1 (N-52850) to Contract No. W 33-038 ac-19837, as amended, are hereby canceled at no increase in contract price.

2. The changes directed by Contract Change Notification No. 3 (N-52997) to Contract No. W 33-038 ac-19837, as amended, are hereby made a part hereof by reference and shall be accomplished at no increase in contract price.

3. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

This change order has been (~~negotiated pursuant to~~) Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

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MCPP Form No. 71-26B
(21 Jan 48)

Total	increase / decrease	in	fixed price	$.....
			estimated cost	$.....
			fixed fee	$.....

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

THE UNITED STATES OF AMERICA

20 May 1948
(Date)

BY: /s/ Stephen Lovas
(Contracting Officer)

STEPHEN LOVAS

1st Indorsement

TO: CONTRACTING OFFICER:

Columbus, Ohio (Place) 12 May 1948 (Date)

1. Contractor hereby accepts the above Change Order.

CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION)
(Contractor) (SEAL)

BY: /s/ Edwin J. Ducayet
(Signature of Official with Office held)

Edwin J. Ducayet, Representative

AFP No: None.

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

See pars. 1 & 2.

Change Order No. 4 to Contract No. W 33-038 ac-19637

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Distribution 3

ATSC Form No. 70-12A (2 Dec. 41) ARMY AIR FORCES, AIR MATERIAL COMMAND

MCREXV-2a-DTair

Dayton AF Procurement Field Office
Wright Field, Dayton, Ohio

16 February 1948
(N-52850)
Master Serial No.

CONTRACT CHANGE NOTIFICATION NO. R (133) 1
Rec. Loc. No. CCN No.

TO: Curtiss-Wright Corporation
Airplane Division
Columbus 16, Ohio

Purchase Order No.
Contract No. W 33-038 AC-19837

Pursuant to the Articles of the contract relating to changes, the above named Contractor is hereby authorized and directed to accomplish the changes listed below in respect to the articles called for under said contract as the same has heretofore and may hereafter be amended; subject, however, to the terms and provisions set forth on the reverse side hereof.

Description of Change:

"In lieu of the Government-furnished power turret as specified in Curtiss-Wright Report No. 9566, Revision B dated 1 November 1946, "Model Specification", the Contractor shall design, fabricate, and install a simulated turret for the purpose of determining the aerodynamic feasibility of such a turret on a high speed airplane. This simulated turret shall be capable of rotation through the forward right or left hand hemisphere, being changeable from one-half hemisphere to the other on the ground and controlled by switches located in the radar operator's side of the cockpit. The simulated turret shall consist of 4 - 20mm aircraft cannons each with at least 100 rounds of ammunition and shall be capable of being stowed in the straight forward position for operation as a fixed gun. The design of simulated turret shall not be governed by applicable specifications for tactical weapons inasmuch as the simulated turret is intended only as a means of studying the aerodynamic problems which are expected to be encountered in an arrangement of this kind. GFP shall consist of 20mm cannons, gun charges, and ammunition only. All other equipment and materials necessary for construction and installation shall be CFP."

PROPERTY CLASS

Page 1 of 1 Page(s)

Authority for Issuance
MCR70A-4 - 5 Feb-48

H. W. T. COLLINS
Contracting Officer

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AMC Form No. 70-13A (2 Dec. 44) ARMY AIR FORCES, AIR MATERIEL COMMAND

ECHE V-2:GDT:jr

Dayton AF Procurement Field Office
Wright-Patterson AF Base

4 March 1948
1-52997
Master Serial No.

CONTRACT CHANGE NOTIFICATION NO. R (135) 3
Rec. Loc. No. CCN No.

TO: Curtiss-Wright Corporation
Airplane Division
Columbus 16, Ohio

Purchase Order No.
Contract No. W 33-038 ac-19837

Pursuant to the Articles of the contract relating to changes, the above named Contractor is hereby authorized and directed to accomplish the changes listed below in respect to the articles called for under said contract as the same has heretofore and may hereafter be amended; subject, however, to the terms and provisions set forth on the reverse side hereof.

Description of Change:

The Contractor shall receive the wooden mock-up of the XP-87 airplane to be used in the development of the J33 engine installation. Drawings, data, and AMC engineering inspection of the mock-up as modified for the new engine installation will constitute ample consideration for the property which shall be retained by the Contractor and disposed of as he sees fit.

PROPERTY CLASS

Pages 1 of 2 Page(s)

Authority for Issuance
W33038-ac-19837

Lawrence H. Smith
LAWRENCE H. SMITH, Lt. Col., USAF

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MCPP Form No. 71-26A
(Rev 21 Jan 48)

Execute in triplicate

C— 36130

Class— 01-A

CHANGE ORDER

UNITED STATES AIR FORCE
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

TFL/jba

Date 29 April 1948
Change Order No. 10 to
Contract No. W 33-038 ac-6266
as amended

To: Curtiss-Wright Corporation (Airplane Division) Columbus 16, Ohio

SUBJECT: Incorporation of Contract Change Notifications

1. The changes directed by Contract Change Notification No. 7 (N-53023) 10 March 1948, to Contract No. W 33-038 ac-6266, as amended, are hereby made a part hereof by reference at no further change in contract price.

2. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

This change order has been (~~authorized by~~ negotiated pursuant to) Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

1-b

Sheet 1

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MCPP Form No. 71-26B
(21 Jan 48)

Total	increase / decrease	in	fixed price	$.....
			estimated cost	$.....
			fixed fee	$.....

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

THE UNITED STATES OF AMERICA

1 June 1948 (Date)

BY: /s/ Stephen Lovas (Contracting Officer)
STEPHEN LOVAS

1ST INDORSEMENT

TO: CONTRACTING OFFICER:

Columbus 7, Ohio (Place) 18 May 1948 (Date)

1. Contractor hereby accepts the above Change Order.

CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION) (SEAL)
(Contractor)

BY: /s/ Edwin J. Ducayet
(Signature of Official with Office held)
Edwin J. Ducayet, Representative

AFP No.: None.

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

See par. 1.

Change Order No. 10 to Contract No. # W33-038 ac-6266

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AMC Form No. 70-18A (2 Dec. 43) ARMY AIR FORCES, AIR MATERIEL COMMAND

Dayton AF Procurement Field Office
Wright-Patterson AF Base

10 March 1948
(N-58023)

CONTRACT CHANGE NOTIFICATION NO. R (188) 7
Bur. Loc. No. Mod. No.

TO: Curtiss-Wright Corporation
Airplane Division
Columbus 16, Ohio

Purchase Order No.
Contract No. W 33-038 AC-6266

Pursuant to the Articles of the contract relating to changes, the above named Contractor is hereby authorized and directed to accomplish the changes listed below in respect to the articles called for under said contract as the same has heretofore and may hereafter be amended; subject, however, to the terms and provisions set forth on the reverse side hereof.

Description of Change:

The Contractor is authorized to make appropriate changes to Curtiss-Wright Report No. 9560, Rev. B dated 1 November 1946, "Model Specification - XP-87 Airplane", to reflect the following weight and performance changes due to oil system re-design:

(1)	Weight Empty Guarantee	+ 126.9	lbs.
(2)	Design Useful Load	+ 150.0	lbs.
(3)	Design Gross Weight Change	276.9	lbs.
(4)	V Max at Sea Level	- .04	MPH
(5)	Time to Climb to 35,000 ft.	+ .15	Min.
(6)	Take-Off Dist. over 50' Obs.	78	Ft.

PROPERTY CLASS

Page 1 of 1 Page(s)

Authority for Issuance
R & R dtd 8 March 1948
MCREOA-4

H. W. T. COLLINS
Contracting Officer

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

CONFIDENTIAL

30 April 1948

Subject: Letter Contract W 33-038 ac-20450
Quotation for Proposed Procurement

To: Commanding General
Air Material Command
Wright-Patterson Air Force Base
Dayton, Ohio
Attention: MCPPXA-15

Reference: (a) AMC Restricted Telegram MCPPXA41-4-5 dated 11 April 1948
(b) AMC Secret Messageform MCPPXA41-4-4 dated 2 April 1948
(c) Curtiss Letter NRA:hw-156 dated 12 April 1948

Enclosure: (A) Detailed Price Breakdown
(B) Price Derivation Data
(C) GFP Schedule
(D) Plancor
(E) Detail Specifications 29Z-8 and 29Z-9
(F) Requirements Report 29Z-7

ORIG FILE CONTROL:
RECEIVED FOR Contract
EXPEDITE MCPPXA41
COPY RETAINED
VALUE OF PAPER-CHECK ONE
PERMANENT TRANSITORY

1. GENERAL: Subject letter contract was entered into on 31 March 1948 to provide the Contractor with a preliminary release in order to prepare for production to meet the desired delivery schedule of the Air Force for the P-87A and FP-87A type aircraft. Work was started immediately and has been proceeding on schedule. By references (a) and (b) Contractor was requested to submit a formal proposal in order to negotiate and enter into a definitive contract. Accordingly, the Contractor submits herewith its proposal, including price, delivery and other terms and conditions.

2. DESCRIPTION AND PRICE: Tabulated below are the items to be procured with unit and total prices.

	Quantity	Description	Unit Price	Total Price
Item 1(a):	26	P-87A Type Airplanes in accordance with Contractor's Specification 29Z-8 dated 15 January 1948, including Revision "B" dated 15 April 1948	$ 718,487	$18,680,662
Item 1(b):	32	P-87A Type Airplanes in accordance with Contractor's Specification 29Z-8 dated 15 January 1948, including Revision "B" dated 15 April 1948	334,180	10,693,760
Item 1(c):	9	FP-87A Type Airplanes in accordance with Contractor's Specification 29Z-9 dated 20 January 1948, including Revision "B" dated 15 April 1948	899,193	

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Air Materiel Command — CONFIDENTIAL — Page 2

Item 1(d):	Quantity 21	Description	Unit Price	Total Price
		XF-87A Type Airplanes in accordance with Contractor's Specification 29Z-9 dated 20 January 1948, including Revision "B" dated 15 April 1948	$ 381,920	$ 8,020,320
Item 2:		Spare Parts for Items 1(a), 1(b), 1(c) and 1(d) in a total amount of approximately 17% of the total value of Item 1		1,395,171
Item 3:	1	Static Test Article in accordance with Paragraph F-1 of Curtiss Requirements Report 29Z-7 dated 15 April 1948		388,992
Item 4:	1	Mockup in accordance with Section K of Curtiss Requirements Report 29Z-7		123,061
Item 5:		All Drawings, Handbooks, Reports, Data, Tests, and other miscellaneous items as specified in Curtiss Requirements Report 29Z-7	Included in the Price of Item 1	
Item 6:		Installation of Wasp Engines in one of the airplanes to be furnished under Item 1 above in accordance with Section I-2 of Curtiss Requirements Report 29Z-7		115,656
Item 7:		Engineering Development Study of Single-Point Refueling in accordance with Section I-3 of Curtiss Requirements Report 29Z-7		19,573
Item 8:		Installation of Afterburners in one of the airplanes to be furnished under Item 1 above in accordance with Section I-1 of Curtiss Requirements Report 29Z-7		49,944
Item 9:		Phase III Flight Test on #1 XP-87 substantially in accordance with reference (c)		341,441
Item 10:		Additional Tools required to increase schedule from 12 airplanes per month to 19 airplanes per month		1,170,538
TOTAL				[illegible]

Classification Cancelled
(or Changed to Restricted)
AUTH: CG AMC
By R A Kimbel Capt AGC
Date 6 May

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3. DELIVERY: Delivery of all items shall be as noted below.

Items 1(a), 1(b), 1(c), and 1(d) Airplanes shall be delivered, set up, serviced and ready for flight at Port Columbus, Ohio, in accordance with the following schedule:

Date	P-87A - Items 1(a) and 1(b)	FP-87A - Items 1(c) and 1(d)
1950		
January	1	
February	2	
March	2	
April	3	
May	4	1
June	4	1
July	5	3
August	5	3
September	6	4
October	6	4
November	6	4
December	7	5
1951		
January	7	5
	58	30

Item 2: All Spare Parts shall be delivered f.o.b. Columbus, Ohio, in accordance with the provisions of "5 Air."

Item 3: The Static Test Article shall be delivered in November 1949, f.o.b. Columbus, Ohio, disassembled and loaded on trucks suitable for transportation to Wright-Patterson Air Force Base on Government Bill of Lading.

Item 4: The Mockup shall be delivered to the Government at Columbus, Ohio, 90 days prior to delivery of the first airplane.

Item 5: All Drawings, Data, etc. shall be delivered f.o.b. Wright-Patterson Air Force Base in accordance with the dates specified in Curtiss Requirements Report 29X-7.

Items 6, 7 and 8: Delivery shall be determined at a later date by mutual agreement between Contractor and the Government and after selection of the particular airplanes in which the installations will be made.

Item 9: Phase III Flight Test shall be completed in accordance with reference (c).

Classification Canceled (or Changed to Restricted)
AUTH: CG, AMC
By
Date

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3. PRICE BREAKDOWN: The prices quoted in Paragraph 2 above are on the basis of a fixed price contract, including price redeterminations. Detailed breakdowns of each of the various prices are included as Enclosure (A) hereto. Additional supporting data or explanation showing the derivation of the various increments of price are included herewith as Enclosure (B). It is understood that all quotations are on the basis of a five-day week and a one-shift operation. It should be noted that the additional tooling required to increase the monthly schedule from 12 airplanes per month to 19 airplanes per month has been included as Item 10. If this tooling is procured under the initial procurement, it is believed that the cost should be prorated over the 88 airplanes covered by Item 1, the same as is the practice with the original tooling. The prices for Item 1 have been divided into individual unit prices for each of the two types of airplanes and each type has also been divided into two groups; the first group, Items 1(a) and 1(c), covering the airplanes to be delivered up to the period of price redetermination and the other group, Item 1(b) and Item 1(d), covering the airplanes to be delivered after price redetermination. It is believed that this method of pricing is desirable, since the cost data on which redetermination will be accomplished will more nearly match the actual prices as included in the contract and, furthermore, the Contractor will receive reimbursements for the early airplanes more nearly in line with actual costs and expenditures for said airplanes. Although no subcontracting has been indicated as such in the price breakdown, it is anticipated that in actual practice, there will be some subcontracting, but it will not exceed 1 percent of the labor hours.

4. TERMS AND CONDITIONS: This proposal is submitted on the basis of the following terms and conditions:

(a) It is understood that this is the definitive contract contemplated by subject letter contract. The contract shall be of a standard fixed price type in accordance with AFSC Form 32 except as modified herein.

(b) The contract shall contain provisions for partial payments in an amount of seventy-five percent of the costs incurred. Any partial payments made under the letter contract shall automatically become partial payments under the definitive contract.

(c) All risk of loss or damage during flight shall be borne by the Government.

(d) The contract shall contain a Form II B Price Redetermination Article providing for redetermination of the entire contract price, both retroactively and prospectively, at not to exceed the delivery of forty percent of the articles under Item 1. The redetermination article shall also provide for an increase in price in the event of labor rate increases at any time during the life of the contract. Since it is impossible to furnish the data required for redetermination within the time stipulated in the standard clause (5 days), it is requested that this time increment be increased to 90 days.

(e) Articles covering patent rights, notice and assistance, royalties, filing of patent applications, and authorization and consent shall be identical to those in the letter contract.

(f) A standard tooling article substantially in accordance with Article 45 of Contract W 33-038 ac-6266 shall be included.

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By Authority of
By

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(g) It is understood that all Government-owned tooling and equipment currently in the possession of the Contractor as a result of the provisions of Contract W 33-038 ac-6266 and Contract W 33-038 ac-19837 shall remain in the possession of the Contractor and shall be utilized under this proposed contract at no cost to the Contractor.

6. SPARES: This proposal is made on the basis of spares provisioning and procurement substantially in accordance with "5 Air." Although there has been some discussion of the so-called "Barrows Plan" covering a proposed revised method of spares handling, it is not believed that this plan is sufficiently crystallized or clarified at the present time to allow its inclusion in the contract. The Contractor is reviewing the latest "5 Air" provisions and will discuss at a later date certain minor clarifications and revisions that it deems necessary.

7. GOVERNMENT FURNISHED PROPERTY: In order to allow adequate time for test and acceptance of the airplanes and some leeway for unforeseen difficulties, the Contractor has scheduled the airplanes off the production line at dates appreciably in advance of those specified in the delivery schedule in Paragraph 3 above. In order to prevent any possible misunderstanding, the Contractor has included herewith as Enclosure (C) a complete list of Government Furnished Property with a schedule for each item.

8. FACILITIES AND EQUIPMENT: In order to meet the ultimate delivery requirements as specified in the letter contract and references (a) and (b), Contractor requires additional facilities and equipment as specified in detail in Enclosure (D) hereto. This proposal is submitted on the basis that all of the facilities and equipment in the Planoer will be furnished by the Government at no cost to the Contractor. The remaining facilities and equipment required are the property of the Navy and a lease is currently being negotiated.

9. This Contractor is prepared to discuss any of the items of this proposal upon request and would appreciate as much advance notice as possible. It is hoped that the proposal as submitted will meet with the approval of the Air Materiel Command and that a definitive contract can be promptly negotiated and approved.

Respectfully,

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J. Dubayet
Contracts Manager

cc: AF OIC CC
MCPPIV-2

Canceled
(Resubmitted to Rebundled)
AMC
By
Date

CONFIDENTIAL

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ENCLOSURE (A)
To EJD:af-165 dated 30 April 1948
Detail Price Breakdown

P-87A & FP-87A Production Estimate
(58) P-87A (30) FP-87A - Total (88) Airplanes @
Schedule Rate of 12/mo plus Tool Costs for 19/mo.

ITEMS	(a) Unit Cost 26 P-87A	(b) Unit Cost 32 P-87A	(c) Unit Cost 9 FP-87A	(d) Unit Cost 21 FP-87A	(e) Total Cost 88 Airplanes	Total Cost Static Test Article	Total Cost Mockup	Total Cost "Nene" Eng. Instal
PRODUCTIVE								
Material	$ 70,623	$71,062	$79,503	$79,210	$6,489,119	$45,635	$8,760	$1,726
Labor Hours	(101,745)	(58,196)	(121,101)	(68,659)	(7,039,428)	(60,159)	(20,428)	(13,391)
Labor @ $1.38 per hour	140,410	80,310	167,120	94,750	9,714,410	83,020	28,190	18,480
Overhead 120%	168,492	96,372	200,544	113,700	11,657,292	99,624	33,828	22,176
Total Productive Cost	379,525	247,744	447,167	287,660	27,860,821	231,279	70,778	42,382
TOOLING								
Material	11,628	2,560	11,628	2,560	542,660	-	250	200
Labor Hours	(30,762)	(6,829)	(30,762)	(6,829)	(1,438,628)	-	(799)	(780)
Labor @ $1.64 per hour	50,450	11,200	50,450	11,200	2,359,350	-	1,310	1,280
Overhead 120%	60,540	13,440	60,540	13,440	2,831,220	-	1,572	1,536
Total Tooling Cost	122,618	27,200	122,618	27,200	5,733,230	-	3,132	3,016
TEMPLATE								
Material	380	16	385	16	14,193	-	-	350
Labor Hours	(2,317)	(91)	(2,317)	(91)	(85,945)	-	-	(2,061)
Labor @ $1.64 per hour	3,800	150	3,800	150	140,950	-	-	3,380
Overhead 120%	4,560	180	4,560	180	169,140	-	-	4,056
Total Template Cost	8,740	346	8,745	346	324,283	-	-	7,786
ENGINEERING								
Material	-	-	-	-	-	-	-	-
Labor Hours	(21,500)	(888)	(24,000)	(908)	(822,484)	(2,634)	(7,122)	(12,707)
Labor @ $2.05 per hour	41,075	1,820	49,200	1,862	1,686,092	5,400	14,600	26,050
Overhead 100%	44,075	1,820	49,200	1,862	1,686,092	5,400	14,600	26,050
Total Engineering Cost	88,150	3,640	98,400	3,724	3,372,184	10,800	29,200	52,100
FLIGHT TEST	2,967	1,070	1,070	1,070	143,482	-	-	-
TOTAL COST LESS G. & A.	602,000	280,000	678,000	320,000	37,434,000	242,079	103,110	105,284
G. & A. Overhead 8½%	51,170	23,800	57,630	27,200	3,181,890	20,577	8,764	8,949
TOTAL COST	653,170	303,800	735,630	347,200	40,615,890	262,656	111,874	114,233
Profit 10%	65,317	30,380	73,563	34,720	4,061,589	26,266	11,187	11,423
TOTAL PRICE	$718,457	$334,180	$809,193	$381,920	$44,677,479	$288,922	$123,061	$125,656
Approximate Average Unit Cost	-	-	-	-	$507,699	-	-	-

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ENCLOSURE (A)
To BJD:af-165 dated 30 April 1948
Detail Price Breakdown

CONFIDENTIAL

P-87A & FP-87A Production Estimate
(55) P-87A (30) FP-87A - Total (55) Airplanes @
Scheduled Rate of 12/mo plus Tool Costs for 19/mo.

(d) Cost 21 -87A	(e) Total Cost 55 Airplanes	3 Total Cost Static Test Article	4 Total Cost Mockup	6 Total Cost "Nene" Eng. Instal	7 Total Cost Refueling Development	8 Total Cost After Burner Test Install.	9 Total Cost Phase IIIA Flight Test	10 Total Cost Added Tools for 19/mo Prod
9,210	$6,489,119	$45,635	$8,760	$1,726	$ -	$ 745	$112,251	$ -
8,659)	(7,039,428)	(60,159)	(20,428)	(13,391)	-	(10,246)	(28,519)	-
4,750	9,714,410	83,020	28,190	18,480	-	14,140	39,356	-
3,700	11,657,292	99,624	33,828	22,176	-	16,968	21,363	-
7,660	27,860,821	231,279	70,778	42,382	-	31,853	172,970	-
2,560	542,660	-	250	200	-	100	-	136,352
(6,829)	(1,438,628)	-	(799)	(780)	-	(183)	-	(377,951)
11,200	2,359,350	-	1,310	1,280	-	300	-	619,840
13,440	2,831,220	-	1,572	1,536	-	360	-	743,808
27,200	5,733,230	-	3,132	3,016	-	760	-	1,500,000
16	14,193	-	-	350	-	50	-	-
(91)	(85,945)	-	-	(2,061)	-	(317)	-	-
150	140,950	-	-	3,380	-	520	-	-
180	169,140	-	-	4,056	-	624	-	-
346	324,283	-	-	7,786	-	1,194	-	-
-	-	-	-	-	-	-	11,784	-
(908)	(822,484)	(2,634)	(7,122)	(12,707)	(4,000)	(1,961)	(29,470)	-
1,862	1,686,092	5,400	14,600	26,050	8,200	4,020	60,414	-
1,862	1,686,092	5,400	14,600	26,050	8,200	4,020	42,734	-
3,724	3,372,184	10,800	29,200	52,100	16,400	8,040	114,932	-
1,070	143,482	-	-	-	-	-	-	-
20,000	37,434,000	242,079	103,110	105,284	16,400	41,847	287,902	1,500,000
27,200	3,181,890	20,577	8,764	8,949	1,394	3,557	24,472	127,500
47,200	40,615,890	262,656	111,874	114,233	17,794	45,404	312,374	1,627,500
34,720	4,061,589	26,266	11,187	11,423	1,779	4,540	31,237	162,750
81,920	$44,677,479	$288,922	$123,061	$125,656	$19,573	$49,944	$343,611	$1,790,250
-	$507,699	-	-	-	-	-	-	-

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2 attach to page 3 dtd 5/6/48

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ENGINEERING DIVISION
ROUTING SLIP

SYMBOL	NAME	DATE
MCRECA-4	Col. Griffith	5/6/48
MCREXA	Col. Smith	

This is the flight test summary on the XB-37 up to the time of the wheels-up landing. It should be noted that the contractor blames the apparent low rate of climb on an 18% deficiency of thrust. The engines are being calibrated now and we should know within a few days whether or not they are up to snuff.

D.B. Thornton
Capt. D. B. Thornton
6226

INITIATED BY	SYMBOL	DATE
[illegible]	MCRECA-4	

NOTE: This routing slip refers to letter (Document No. 147) from the Curtiss-Wright Corporation, dated 4 May 1948, subject: Contract W33-038-ac-[illegible], XB-37 Airplane, Summary of Flight Testing at Muroc.

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Copy to Tech File No. 1 Flight Test Data

3

RESTRICTED

CURTISS-WRIGHT CORPORATION
Airplane Division
Columbus 16, Ohio

(RESTRICTED)

6 May 1948
WT:rac/3837-E

Subject: Contract W33-038-ac-6266
XP-87 Airplane
Summary of Flight Testing at Muroc

To: Commanding General
Air Materiel Command
Wright Field
Dayton, Ohio

Attention: Unit MCREOA-4

Through: AF Inspector in Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

References: (a) AMC ltr. MCREOA-4/OET/hw, dated 30 April 1948.

1. The XP-87 airplane at Muroc has completed 15 flights for a total accumulated time of 9 hours and 44 minutes of the 10 hours of flight testing initially authorized under the Phase I Flight Test Program. It is estimated that between 60% and 70% of this program has been completed, with satisfactory results except for difficulties encountered with the longitudinal "rough ride" characteristics and with the mechanics of the landing gear doors and its mechanism. It should be noted that no operational difficulties have been experienced with either the main gear or the nose wheel.

2. This Contractor has restricted high speed operation of the airplane because of the longitudinal "rough ride" characteristic, which, in this Contractor's estimation, would adversely affect high speed data. General flight results have been obtained on the airplane in the lower speed range, although a high speed of 530 mph, (true speed), has been obtained in a dive condition, (465 mph I.A.S. at 8,000 feet altitude).

3. Stall tests have indicated that the lift characteristics are compatible with forecast values. This test, conducted at a gross weight between 39,000# and 40,000#, with flaps and landing gear down, resulted in an uncalibrated 130 mph I.A.S.

Reply
Orig. to A. F. 5/17/48
thru AF Insp. Curtiss 14

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Subject: Contract W33-038-ac-6266 6 May 1948
XP-87 Airplane
Summary of Flight Testing at Muroc

To: Commanding General
Air Materiel Command
Wright Field
Dayton, Ohio

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4. Take-off ground distance of 4400 feet has been obtained at a 41,050 lb. gross weight, but an 18% deficiency in thrust is indicated from specification requirements. The reference to a deficiency in thrust was based on a similar experience in climb to altitude, for the purpose of exploring high altitude longitudinal "rough ride" characteristics, where the time to climb at normal rpm far exceeded calculated data. Since maximum lift characteristics during stall tests appear satisfactory and both the take-off distance and climb to altitude indicate an equivalent 18% deficiency in thrust, and since both of these flights were with varied drag configurations, this Contractor does not feel that these tests are reliable and has, therefore, during the present belly landing lay-up period, pulled the engines for individual thrust calibrations.

5. In stability tests of the airplane, this Contractor has discovered that the new feelevator device, installed in the elevator system has introduced floating characteristics into the spring tab system, which causes the spring tab to operate as an automatic trim device. This caused an apparent instability stick force wise. However, flights made with the feelevator and spring tab locked out have shown satisfactory longitudinal stability. These flights further show that apparent instability was created artificially by the feelevator loads breaking the spring tab pre-loads. At the present time the feelevator is being removed from the elevator system. This is being done not only to eliminate the above apparent instability but also to move the elevator away from the horizontal and vertical tail intersection to improve the "rough ride" characteristic. The pilot has not reported any deficiency in either directional or lateral stability.

6. This Contractor has been caused considerable difficulty in time expended to determine the primary causes, contributing factors, and solutions to the problem of longitudinal "rough ride" characteristics. At this time it has been determined that a small area of the air disturbance at the juncture of the horizontal and vertical tail, coupled with a softness of the elevator system has been causing the "rough ride" characteristics. A stinger fairing gives indications

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of solving this problem which has been discussed with and concurred in by Aircraft Lab. personnel. In addition to this stinger fairing, steps are being taken to change the natural frequencies of the control system, so that they do not couple with fuselage frequencies to render the elevator system soft. Basic hinge moment properties were explored as possible contributing factors to the "rough ride" characteristic, but indicated no required changes necessary in the basic tail configuration.

7. There are numerous miscellaneous tests that have been satisfactorily completed without requiring abnormal servicing or maintenance of the airplane, engine, equipment, etc.

a. The landing and handling characteristics at low speeds are satisfactory - a soft landing gear coupled with responsive controls at low speeds have particularly been commented on favorably. Lateral low speed control can best be exemplified by the fact that the nacelles did not touch the ground during the recent belly landing until the last 25 feet of the skid.

b. The aileron control with the boost gives a light stick load, is responsive, and has excellent feel. The combination of all three of these features has further merit in that it has been trouble free since the start of the tests. Tests conducted with the boost inoperative have also met design requirements. While the loads in this condition are high, the surfaces are still very responsive under emergency operation conditions both in the clean configuration or with landing gear and flaps down.

c. Control load coordination of all surfaces appears satisfactory up to the speeds flown to date, (mach. number of 0.7).

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Subject: Contract W33-038-ac-6266 6 May 1948
XP-87 Airplane
Summary of Flight Testing at Marc

To: Commanding General
Air Material Command
Wright Field
Dayton, Ohio

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8. It is estimated that approximately 21 hours of flight testing will be required to complete the Phase I and Phase IA Flight Test Programs.

Respectfully,

CURTISS-WRIGHT CORPORATION
Airplane Division

E. J. Ducayet
Contracts Manager

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MCPP Form No. 71-26A
(Rev 21 Jan 48)

flp/ral

Execute in triplicate C— 36196 Class— 01-C	CHANGE ORDER UNITED STATES AIR FORCE Air Materiel Command Wright-Patterson Air Force Base Dayton, Ohio	Date 21 May 1948 Change Order No. 11 to Contract No. W 33-038ac-6266 as amended

To: Curtiss-Wright Corporation, (Airplane Division), Columbus 16, Ohio

SUBJECT: Contract Change Notifications Nos. 1(N-51774) and 9(N-53291) and Miscellaneous Engineering Changes

1. In the manufacture and construction of the two (2) XP-87 airplanes, AF Serial Nos. 45-59600 and 46-522 called for under Items 5 and 6, respectively, of Article 15(a) of Contract W 33-038 ac-6266, as amended, the Contractor shall comply with each of the following requirements:

(a) Make appropriate changes to Contractor's Report No. 9566, "Model Specification, XP-87 Airplane," to reflect the changes to the airplane weight and balance due to the substitution of the R-1 generators in lieu of Q-2 generators on the two (2) XP-87 airplanes. This change decreases the normal gross weight -39.2 pounds and does not affect the performance of said airplanes. This change is made at no change in contract price.

(b) Install a Type T4-E1 seat ejector gun on each of the seats in the two (2) XP-87 airplanes, at an increase in the unit price of each airplane of $675.62; total increase in contract price $1 351.24

(c) Deviate from Army-Navy Specification AN-C-161 to allow the use of aluminum wire and fittings in all electrical applications on the two (2) XP-87 airplanes and may disregard those parts of said specification as pertain to: (1) Tensile strength requirements, (2) Extreme temperature requirements, and (3) Humidity and salt fog requirements, as directed by Contract Change Notification No. 1(N-51774), at no further change in contract price.

(d) Delete the following items of GFP armament equipment from Contractor's Report No. 9566, Revision B, dated 1 November 1946, "Model Specification, XP-87 Airplane," inasmuch as these items will not be available to the Contractor in sufficient time for installation on either of the two (2) XP-87 airplanes, as directed by Contract Change Notification No. 9(N-53291), at no further change in contract price:

Quantity	Item
1	Turret Assembly, Forward
1	Radar Scope - Pilot's
1	Radar Scope - Gunner's

This change order has been (~~authorized by~~ negotiated pursuant to) Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

1-b

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2. Contractor warrants that no amendment heretofore made to the contract has established in whole or in part the effect upon the contract price of any of the changes made by this change order.

3. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

4. This change order consists of Sheets 1, 1A and 2.

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MCPP Form No. 71-263
(21 Jan 48)

Total increase in ~~estimated cost~~ fixed price $ 1,351.24
~~fixed fee~~ $

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

THE UNITED STATES OF AMERICA

5 August 1948 (Date)

BY: /s/ Stephen Lovas (Contracting Officer)
STEPHEN LOVAS

1st Indorsement

TO: CONTRACTING OFFICER: Columbus 16, Ohio (Place) 22 July 1948 (Date)

1. Contractor hereby accepts the above Change Order.

CURTISS-WRIGHT CORPORATION
(Airplane Division) (SEAL)
(Contractor)

E.O. #430-256
TSEOA-4/Capt. O.B. Thornton

BY: /s/ G. M. Pryor
(Signature of Official with Office held)
G. M. Pryor, Assistant Treasurer

PR No. 19381

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Debits 2180705, 802-7004 P 611-09 S 33-038

Change Order No. 11 to Contract No. W 33-038 ac-6266

2-c

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C
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24 May 1948

SUBJECT: Authorization for Procurement of Aircraft

TO: Chief of Staff
United States Air Force
Washington 25, D. C.

We request authorization to contract immediately for the following aircraft in accordance with the provisions of Public Law H. R. 6226:

58 F-87 Unit Price $900,000 Total Price $52,200,000

We certify that this contract is necessary to National Defense and in our opinion will result in the maximum utilization of improvements in aircraft and equipment now available.

JOSEPH T. McNARNEY
General, USAF
Commanding General
Air Materiel Command

APPROVED:

HOYT S. VANDENBERG
General, USAF
Chief of Staff

Approved and forwarded to the
Secretary of Defense

W. STUART SYMINGTON

A. S. BARROWS
Under Secretary of the
Air Force

S E C R E T

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C
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24 May 1948

SUBJECT: Authorization for Procurement of Aircraft

TO: Chief of Staff
United States Air Force
Washington 25, D. C.

We request authorization to contract immediately for the following aircraft in accordance with the provisions of Public Law H. R. 6226:

30 RF-87A Unit Price $934,000 Total Price $28,020,000

We certify that this contract is necessary to National Defense and in our opinion will result in the maximum utilization of improvements in aircraft and equipment now available.

JOSEPH T. McNARNEY
General, USAF
Commanding General,
Air Materiel Command

APPROVED:

HOYT S. VANDENBERG
General, USAF
Chief of Staff

Approved and forwarded to the
Secretary of Defense

A. S. BARROWS
Under Secretary of the
Air Force

W. STUART SYMINGTON

SECRET

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MCPP Form No. 71-26A
(Rev 21 Jan 48)

flp

Execute in triplicate	CHANGE ORDER	Date 28 May 1948
C— 36271	UNITED STATES AIR FORCE Air Materiel Command Wright-Patterson Air Force Base Dayton, Ohio	Change Order No. 12 to Contract No. W33-038ac-6266 as amended
Class— 01		

To: Curtiss-Wright Corporation, (Airplane Division), Columbus 16, Ohio

SUBJECT: Government-Owned Property

1. Pursuant to the provisions of Section IV of Supplemental Agreement No. 1 to Contract W 33-038 ac-6266, approved October 3, 1947, the Contractor shall retain for its own use and disposition the materials listed in Exhibit "A" attached hereto and made a part hereof; and shall retain for its own use and disposition the materials listed in Exhibit "B" attached hereto and made a part hereof. The materials listed in Exhibit "A" have not been used on the XP-87 airplane and are either (a) to be retained by the Contractor as scrap or (b) to be retained by the Contractor on a negotiated sale basis. The materials listed in Exhibit "B" have been used on the XP-87 airplane and are listed at cost. As a result of the foregoing, the Government shall receive a credit of $33,391.04

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2. The credit to the Government effective by paragraph 1 above is arrived at as set forth hereinbelow:

Value of materials used on XP-87 (Exhibit B).		$26,233.67
Value of material on Exhibit 'B' not directly usable on contract (Column I, Exhibit 'A')	$15,654.03	
Less Extrustions	$3,483.55	
Less Castings	3,929.18	7,412.73
Value of material upon which Contractor Offers 80% of cost (Column II, Exhibit 'A')	$ 8,241.30	
80% of Cost		6,593.04
Scrap Value of Extrustions & Castings (Cost $7,412.73) - See Exhibit 'A'		564.33
Total Credit to the Government		$33,391.04

3. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

4. This change order consists of Sheets 1, and 2; Exhibit "A" of 1 page; and Exhibit "B" of 1 page.

This change order has been (~~xxxxxxxxxxxx~~ negotiated pursuant to) Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

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MCPP Form No. 71-26B
(21 Jan 48)

		fixed price	$ 33,391.04
Total	~~increase~~ / decrease	in ~~estimated cost~~	$
		~~fixed fee~~	$

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

THE UNITED STATES OF AMERICA

30 June 1948
(Date)

BY: /s/ Stephen Lovas
(Contracting Officer)
STEPHEN LOVAS

1st Indorsement

TO: CONTRACTING OFFICER:

Columbus 16, Ohio 25 June 1948
(Place) (Date)

1. Contractor hereby accepts the above Change Order.

CURTISS-WRIGHT CORPORATION
(Airplane Division) (SEAL)
(Contractor)

BY: /s/ Edwin J. Ducayet
(Signature of Official with Office held)
Edwin J. Ducayet, Representativ

E.O. #430

PR No. 48926

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Credit: 212/60705, 502-5150 P 611-09 S 33-038

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Exhibit "A"
attached to Change Order No. 12 to Contract W33-038ac-6266.

		Column I Total Value of Material	Column II To be retained by Contractor as scrap, no warranty	Column III To be retained by Contractor on negotiated sale basis, no warranty
A-1	Al. Al. Sheet	$ 4,098.91	$ ---	$4,098.91
A-2	Extruded Materials	3,483.55	3,483.55	---
A-3	Castings	3,929.18	3,929.18	---
A-4	Brass Sheet	10.78	---	10.78
A-4	Al.Al. Bar	2,052.34	---	2,052.34
A-4	Al. Al. Tube	1.50	---	1.50
A-4	Steel Bar & Rod	1,267.20	---	1,267.20
A-4	Seamless Steel Tube	177.82	---	177.82
A-4	Boiler Plate	32.75	---	32.75
A-4	Cored Bronze	600.00	---	600.00
	Total	$15,654.03	$7,412.73*	$8,241.30**

* Contractor's scrap offer . . . . . $ 564.33
** Contractor's negotiated sale offer . . $6,593.04

Total . . . $7,157.37

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Exhibit "B"
attached to Change Order No. 12 to Contract W33-038ac-6266.

	Total value of items received but not required	Total value of all items received and used or missing
Al. Al. Sheet	$ 4,098.91	$ 7,851.42
Brass Sheet	10.78	2.72
Al. Al. Bar	(2,052.34)	
Al. Al. Rod and Tube	(1.50)	881.23
Alloy Steels	1,267.20	2,024.68
Cerro Benno	---	239.70
Masonite	---	,501.03
Ply and Pattern Wood	---.	1,381.52
Steel Tube	177.82	5,190.74
Boiler Plate	32.75	1,665.89
Structural Steel	---	1,526.37
Castings	3,929.18	185.70
Miscellaneous	---	600.82
Extrusion	3,483.55	181.85
Corred Bronze	600.00	---
Total	$15,654.03*	$26,233.67

*Column I of Exhibit "A"

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

[illegible] May 1945
[illegible]-501

Subject: [illegible] Contract W33-038 ac-12203
Model XP-87 Airplane
Wheels-up Landing Damage
No. 1 Airplane

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPEA-41

Through: Air Inspector in Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) AMC Teletype dated 30 and 31 May 1945

Enclosure: (A) Cost Estimate Breakdown

1. In response to the reference (a) inquiries, the Contractor has compiled an estimate of the costs involved in making repairs on No. 1 XP-87 Airplane resulting from damages incurred in a wheels-up landing at Muroc on Tuesday, 30 April 1945. Although complete cost data has not been accumulated for this repair program, enough costs have been segregated to permit the preperation of data sufficiently accurate for this quotation.

2. Therefore, submitted herewith as this Contractor's estimated price of $33,[illegible].77 for accomplishing the necessary repairs required as a result of the wheels-up landing at Muroc. A breakdown of this amount is contained in Enclosure (A) attached hereto. It will be noted that Enclosure (A) indicates a split between those costs incurred at Columbus and those at Muroc in connection with the repair program. Furthermore, the breakdown for Columbus and Muroc costs are based on compilation of costs accumulated through 31 May. The costs involved in performing work from 31 May forward are shown in a separate column and represent Columbus costs only. These Columbus charges are being incurred in the fabrication of jigs and mechanisms for replacement of lost airplane parts, the necessary parts for replacement on No. 1 airplane at Muroc were removed from [illegible] the element of estimate, therefore, in this quotation is reduced to a minimum inasmuch as substantially all such estimated costs will be incurred at the Contractor's plant facility rather than at Muroc.

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4. This quotation is submitted with the understanding that the prices involved herein will be subject to downward redetermination at the time of completion of the repair program and accumulation of all costs and profit thereon. In preparing this quotation the contract overhead rates of 110% and 130% respectively for productive and engineering labor have been used. For that work accomplished at Marce for the flight hours the established rate of 75% has been applied. The Air Material Command's attention is further invited to the use of a 7% profit factor since the work is accomplished on a cost basis.

Respectfully,

REPUBLIC-MUHLHI CORPORATION
Airplane Division

By

Kevin J Dacayet
Service Manager

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ENCLOSURE (A)

Belly Landing Damage Report
AF-87 Airplane No. 1

ENCLOSURE		"A" Manic Costs Thru 1/31/46		"B" Coil's Costs Thru 5/23/46		"C" Est. Cost To Complete	"D" Total Est. Cost
Material		$ 1,100.31		$		$ 750.00	$ 1,850.31
Labor		2,794.00		2,041.50		94.50	4,930.00
Overhead	(35%)	978.32	(15%)	306.42	(15%)	37.80	1,322.54
Total		$ 4,872.63		$ 2,347.92		$ 882.30	$ 8,102.85
WELDING							
Material		$ - - - -		$ - - - -		$ - - - -	$ - - - -
Labor		- - - -		679.50		- - - -	679.50
Overhead		- - - -	(15%)	44.64		- - - -	44.64
Total		$ - - - -		$ 724.14		$ - - - -	$ 724.14
TEMPLATE							
Material		$ - - - -		$ - - - -		$ - - - -	$ - - - -
Labor		- - - -		75.55		- - - -	75.55
Overhead		- - - -	(10%)	120.88		- - - -	120.88
Total		$ - - - -		$ 196.43		$ - - - -	$ 196.43
ENGINEERING							
Material		$ 259.87		$ - - - -		$ - - - -	$ 259.87
Labor		2,307.00		760.14		- - - -	3,067.14
Overhead	(5%)	115.35	(100%)	760.14		- - - -	1,321.13
Total		$ 3,282.22		$ 1,520.28		$ - - - -	$ 4,648.50
Totals (Less Direct Charges)		$11,154.85		$ 7,341.11		$ 2,132.10	$ 21,500.00
Direct Charges Productive							6,348.40
Direct Charges Engineering							1,000.00
Total Cost							$ 28,848.40
Profit							4,151.60
Total Price							$ 33,000.00

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27 AMCIP-2/Mr.E.C.Barber/hls/4869
CONFIDENTIAL Ref: ltr 11 May 1948

JUN 1 1948

SUBJECT: Procurement Directive - 48-12 - (RF-87 Aircraft)

TO: Commanding General, Air Material Command
Wright-Patterson Air Force Base
Dayton, Ohio

ATTN: Procurement Division - MCPP

1. Authority is granted to proceed with immediate negotiations leading to the procurement of the following aircraft, including initial spares and spare parts, from Supplemental Fiscal Year 1948, Project 130 funds.

Quantity	Model
30	RF-87

2. Upon completion of the airframe negotiations, the following data will be reported by indorsement hereon:

a. Face amount of airframe contract, and the amounts apportioned to airframes, spare parts, technical data and other items.

b. A detailed breakdown of the negotiated unit airframe price, showing the usual elements of price (materials, labor, burden, general and administrative expense, engineering and tooling, profit, etc.) and the labor and overhead rates.

c. Estimated total cost of this procurement including cost of government-furnished property, and related spares and spare parts, based on the negotiated airframe contract.

d. The contract delivery schedule.

3. This directive does not dispense with the necessity for conformance with applicable procurement regulations and directives.

BY COMMAND OF THE CHIEF OF STAFF:

K. M. POWERS
Major General, USAF
Asst. to the Chief of Staff, Materiel

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27 AFMIP-2/Mr.E.G.Barber/mlm/4869
CONFIDENTIAL Writ 11 May 1948

JUN 1 1948

SUBJECT: Procurement Directive 49-15 - (F-87 Aircraft)

TO: Commanding General, Air Material Command
Wright-Patterson Air Force Base
Dayton, Ohio

ATTN: Procurement Division - MCPP

1. Authority is granted to proceed with immediate negotiations leading to the procurement of the following aircraft, including initial spares and spare parts, from Supplemental Fiscal Year 1948, Project 110 Funds.

Quantity	Model
58	F-87

2. Upon completion of the airframe negotiations, the following data will be reported by indorsement hereon:

a. Face amount of airframe contract, and the amounts apportioned to airframes, spare parts, technical data and other items.

b. A detailed breakdown of the negotiated unit airframe price, showing the usual elements of price (materials, labor, burden, general and administrative expense, engineering and tooling, profit, etc.) and the labor and overhead rates.

c. Estimated total cost of this procurement including cost of government-furnished property, and related spares and spare parts, based on the negotiated airframe contract.

d. The contract delivery schedule.

3. This directive does not dispense with the necessity for conformance with applicable procurement regulations and directives.

BY COMMAND OF THE CHIEF OF STAFF:

E. M. POWERS
Major General, USAF
Asst. Deputy Chief of Staff, Material

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CONFIDENTIAL

[illegible] [illegible] [illegible] 61-0	**CHANGE ORDER** UNITED STATES AIR FORCE Air Materiel Command Wright-Patterson Air Force Base Dayton, Ohio	Date 3 June 1948 Change Order No. 13 to Contract No W33-038ac-6266 as amended

To: Curtiss-Wright Corporation, (Airplane Division), Columbus 16, Ohio.

SUBJECT: Contract Change Notification No. 2(N-52563)

1. The Contractor shall make all repairs to XP-87 airplane, AF Serial No. 45-59600, called for under Item 5, Article 15(a) of Contract W 33-038 ac-6266, as amended, necessitated by highway accidents while en route to Muroc Air Force Base from the Contractor's Plant, to return said airplane to first class flying condition in accordance with the provisions of Contract Change Notification No. 2(N-52563), at a total increase in price of said airplane of $39,969.53

2. The provisions of paragraph 1 complete the changes directed by Contract Change Notification No. 2(N-52563) and no further adjustment of the contract price shall be made by reason thereof.

3. Contractor warrants that no amendment heretofore made to the contract has established in whole or in part the effect upon the contract price of any of the changes made by this change order.

4. Except as may be made necessary by conditions hereafter arising, the Government will furnish no facilities to the Contractor in connection with the performance of this change order, however, this provision shall not preclude Contractor from using facilities now in its possession, which were previously authorized by the Government for use in the performance of this contract, in carrying out the provisions of this change order.

5. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

Copy Received. Sufficient Funds Have Been Obligated To Cover The Maximum Amount of Monies Which the Government is Obligated to Pay Under This Instrument.
BUDGET AND FISCAL DIVISION
16 JUL 1949
By [illegible]

This change order has been ([illegible] negotiated pursuant to) Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

Encl 1-2
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MCPP Form No. 71-268
(21 Jun 40)

		fixed price	$39,969.53
Total	increase [illegible]	in [illegible]	$
		[illegible]	$ 39,969.53

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

THE UNITED STATES OF AMERICA

19 July 1948
(Date)

BY: [signature]
(Contracting Officer)
W. A. DAVIS, Lt. Colonel, USAF

1st Indorsement

TO: CONTRACTING OFFICER:

Columbus 16, Ohio — 25 June 1948
(Place) (Date)

1. Contractor hereby accepts the above Change Order.

CURTISS-WRIGHT CORPORATION
(Airplane Division) (Seal)
(Contractor)

BY: [signature]
(Signature of Official with Office held)
Edwin J. [illegible] — Representative

E. O. #430-256
TSEOA-4/O.B. Thornton, Capt., USAF
PR No. 19827

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Debit: 2180705, 802-7004 P 611-07 S 33-038

Change Order No. 13 to Contract No. W 33-038 ac-6266

2c 23 Sheet 2

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CURTISS-WRIGHT CORPORATION
Airplane Division
Columbus 16, Ohio 11 June 1948

XP-87 FLIGHT COMPARISON WITH SPECIFICATION VALUES

NOTE: 1. Data below based on a weight of 39,941#. Specification combat design gross weight is 37,026, or a 2,915# differential.
2. All data corrected to specification engine thrust.
3. All tests conducted by A.M.C. except Rate of Climb, (Rate of Climb data from Curtiss flight #18).

	MUROC FLIGHT TEST	SPECIFICATION DATA
Takeoff over 50' obstacle	4245 feet*	4300 feet
High Speed at 30,000'	531 mph**	541 mph
Rate of Climb:		
@ 4600' @ 369 mph true	4657 ft/min.	4523
@ 4300' @ 353 mph true	4452 ft/min.	4448
@ 3500' @ 308 mph true	3737 ft/min.	4163
Stall speeds Power Off:		
Flaps up	153 mph	153
Flaps down	123 mph	130

* Full 12,000 RPM was used - but power not known - data in A.M.C. possession.

** Drag of airplane not optimum:

Nacelle tail cone shortened, leaving 2.74 square ft. flat plate area.

Scoops for temporary cockpit ventilation and for instrumentation installed.

Landing gear and nose gear doors not sealed.

Instrumentation installed in one engine inlet air duct.

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CURTISS-WRIGHT CORPORATION
Airplane Division
Columbus 16, Ohio

F-87 PERFORMANCE SUMMARY

Model	XF-87	F-87B		Alternate		Alternate	
Engine Manufacturer	WESTINGHOUSE	ALLISON		PRATT & WHITNEY		WESTINGHOUSE	
Mfg. Engine Design.	21C-4B	I-40	I-40	Navy	Navy	21C-8	
A.A.F. Engine Design.	J34WE-7	J33-27	J33-29	J-48P	J-48P	J34WE-32	
Static S.L. Thrust (lbs.)							
Dry Rating	12,000	11,700	11,200	12,500	12,500	14,000	———
Wet Rating	———	13,000	———	14,000	———	———	———
Afterburner	———	———	15,000	———	16,000	———	18,000*
T.O. Gross Wt. (lbs.)	48,989	50,119	49,173	50,458	49,540	51,330	51,165
Combat Gross Wt. (lbs.)	37,026	37,860	38,470	38,441	39,026	39,200	40,098
Operational Wt. Empty (lbs.)	27,230	27,472	28,082	28,053	28,638	28,812	29,710
Max S.L. (mph)	600	600	631	593	630	613	633
Max 35,000' (mph)	524	524	557	534	562	539	557
R/C @ S.L.-ft./min.	5,680	5,190	9,800	5,400	10,370	6,966	11,000
R/C @ 35,000'-ft./min.	860	910	2,720	2,860	3,400	1,412	2,860
T/O to 35,000'-mins.	13.15	13.35	6.3	10.72	5.61	9.68	5.80
Range -tactical-miles	2,000	2,000	1,528	1,940	1,595	2,194	1,720
T.O. over 50' - ft.	6,060	6,295	4,790	5,762	4,250	5,958	4,256
Landing over 50' @ combat wt.-ft.	3,010	3,070	3,115	3,110	3,155	3,170	3,235
Stall Speed @ S.L. (mph)							
At T.O. Wt.	143.7	145.0	144	145.7	144.4	146.9	146.7
At Combat Wt.	124.7	126.2	127.2	127.2	128.2	128.5	130.0
At Operational Wt. Empty	107.0	107.2	108.4	108.2	109.6	109.8	111.5
Wing Loading - lbs./sq. ft.							
@ T.O. Gross Wt.	81.6	83.5	81.9	84.1	82.6	85.5	85.2
@ Combat Gross Wt.	61.7	63.1	64.1	64.1	65.0	65.3	66.8
@ Landing Gross Wt.	45.4	45.8	46.8	46.8	47.7	48.0	49.5
Thrust Loading							
Dry Rating	4.08	4.29	4.39	4.04	3.96	3.67	———
Wet Rating	———	3.86	———	3.60	———	———	———
Afterburner	———	———	3.28	———	3.10	———	2.84
Internal Fuel - lbs.	9,585	9,870	9,870	9,870	9,870	9,870	9,870
External Fuel - lbs.	10,228	10,922	10,091	10,585	9,902	11,518	10,455

*This power has been recently increased to 19,600#.

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AMCAD Form No. 6 (4 APR 47)

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MCCPXT/5-4102

HEADQUARTERS
AIR MATERIEL COMMAND

Wright-Patterson AFB
Dayton, Ohio
14 June 1948

TECHNICAL INSTRUCTIONS

SERIAL NO: TI 2073, Addendum No. 23.

SUBJECT: Armament for P-87 and P-89 Aircraft.

TO: Procurement Division

Note: This TI rescinds and replaces TI 2073, Addendum No. 22, to revise requirements.

1. Problem Presented:

a. To revise the requirement for armament equipment which is to be installed in P-87 and P-89 aircraft in order that these aircraft will be equipped during production with the most modern armament equipment available at that time.

b. To retrofit any of these aircraft which, during production, are not equipped with fully automatic flexible gun turrets.

2. Factual Data:

a. Production schedules indicate that the armament equipment scheduled for installation in the subject aircraft must be revised.

b. In the event the fully automatic turrets intended for these aircraft will not be available in time to meet the airplane production schedule, an absolute minimum number of aircraft will be equipped, in production, with four (4) or more fixed 20 mm guns and with the best air interception radar available at that time. This is an emergency measure which will be followed only in the event that D-1 turrets mentioned below are not available in time to meet aircraft production schedules. However, to insure that a satisfactory armament installation is available, two (2) each of the fixed nose gun installations will be developed and tested prior to aircraft production.

c. The D-1 night fighter fire control system with all of its components, including APG/29, has been classified as substitute standard. This system will be installed in as many as practicable of P-87 airplanes to be procured in Fiscal Year 1949.

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SERIAL NO: TI 2073, Addendum No. 23. 14 June 1948

SUBJECT: Armament for P-87 and P-89 Aircraft.

3. Authority:

a. Letter from Hq, USAF, dated 18 November 1947, Subject: "Armament for P-87 and P-89 Aircraft," from Director, Research and Development, DCS/M and teletype from Hq. USAF, AFMDC, dated 17 May 1948.

4. Action Desired:

a. Procurement Division will insure that production aircraft are equipped with the latest available armament as stated in "Problem Presented."

b. Maintenance Division will install fully automatic flexible gun turrets in those airplanes delivered with fixed guns.

c. Engineering Division will provide the necessary engineering data.

d. A priority of 1-B is assigned this project.

BY COMMAND OF GENERAL McNARNEY:

OFFICIAL:

BRYAN L. DAVIS
Colonel, AGD
Adjutant General

BRYAN L. DAVIS
Colonel, AGD
Adjutant General

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MCAAGP	(1)
MCAAGR	(1)
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AFMSS (Wash)	(4)

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AMC Form No. 16-3
(Rev 29 Jul 47)

3/3 (584) 18

JC 6-17

ROUTING AND RECORD SHEET

MATERIEL COMMAND

Use this form for inter-office correspondence within headquarters. Flight Test Data File MCREOA-4

Use authorized office symbols to designate addressee and addresser.

Place initials of dictator and typist, telephone number and location to right of signature.

Number all comments consecutively.

Use width of sheet, both sides.

(DO NOT ERASE BELOW THIS LINE)

Remaining space is sufficient only for proper spacing of typewritten signature.

Separate comments by horizontal lines across page

SUBJECT: XFP-87 Airplane

TO: MCREXA
Aerodynamics Branch
ATTN: Mr. Sea

FROM: MCREOA(MCREOA-4)

DATE: 15 June 1948

COMMENT NO. 1

CONFIDENTIAL

1. In order to determine the desirability of procuring production quantities of FP-87's and RP-87's in F.Y. 1949, the Flight Test Division was requested by Procurement and Engineering Divisions to conduct a "preview" of the airplane to establish high speed, rate of climb, and take-off distance data. These tests did not constitute a complete Phase II, but were necessary at the time for the purposes as indicated above.

2. In order to obtain a direct comparison between the test data as obtained by Flight Test Division and the contractor's guarantees, it is requested that your Laboratory reduce the above data to conditions of: (1) design gross weight, and (2) calculated thrust. It should be noted that the average net thrust as measured on the Muroc thrust stand is 2750# per engine which is considerably less than the contractor's calculated thrust for the same conditions. This reduction is mainly due to open tailpipes (the tailpipes having been trimmed for Army hot day conditions) and the fact that the engine manufacturer's thrust curve has been somewhat modified since the original Curtiss-Wright calculations were made. However, the reason for reduced thrust is not important for the present purposes, it being important to determine only if the airplane would meet performance expectations with the amount of thrust used by the contractor in his calculations.

3. Attached are the Flight Test Division performance points; a copy of the latest revision to the contractor's estimated performance report; and an average thrust curve obtained from the thrust calabration of the installed engines on the Muroc thrust stand. It is requested that these attachments be returned to MCREOA-4.

3 Incls
1. Prel. Informa. on Test of P-87 for Gen'l Carroll
2. C-W Perf. Data dtd 4/23/48
3. XP-87 Sea Level Thrust Curve

GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section Bldg. 14
Engineering Division

OBT/bam
29256

Encl #2 - 9 July 48
EZH/by

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FROM (CONTINUED ON OTHER SIDE) DATE COMMENT NO.

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MCREOA-4 File
Dirc. Proj. Rest. Engr. Div
Flight Test Data

AMC Flight Test J-33-27
15 J[illegible] 1945

PRELIMINARY INFORMATION ON TEST OF P-87 FOR GENERAL CARROLL

All results are for a take-off gross weight of 42,000 lbs except for landings which were obtained at a gross weight of 39,000 lbs.

(a) The best one out of four measured take-offs gave a ground roll of 3550 ft. with a total distance over a 50 ft. obstacle of 5000 ft., indicated air speed at take-off was 120 mph, and at 50 ft. height, 130 mph. This take-off was considered to be at slower than recommended speed insofar as operations for service organizations are concerned. Take-off roll was 4950 ft. at an indicated air speed of 145 mph with a corresponding total distance over a 50 ft. obstacle of 6150 (46) ft. at 145 mph.

(b) The average ground roll for four landings was 5300 ft., indicated air speed at contact 125 mph.

(c) Rate of climb data:

Altitude Ft	Rate of Climb Ft/Min
S.L.	3950
10,000	3000
20,000	2200

(d) A Mach number of .775 was reached in level flight at 100% rpm between altitudes of 15,000 ft. and 30,000 ft. (Not tested at higher or lower altitudes.) The corresponding speeds for operation under standard atmospheric conditions are as follows:

Altitude Ft	True Speed MPH
15,000	556
25,000	535
30,000	524

Russell E. Schlub
Major A.C.

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Refer to:
[illegible]

NATIONAL MILITARY ESTABLISHMENT
MUNITIONS BOARD
WASHINGTON 25, D. C.

AIRCRAFT - 1 -

TO: Director, Procurement & Industrial Planning, USAF/Material, U. S. Air Force

SUBJECT: Nomination of Aircraft, etc. - June 1948.

1. The Interservice Committee, at the meeting of June [illegible], approved the nomination of the Curtiss C-97 Airplane.

2. It is requested that you advise the contractors concerned.

FOR THE MUNITIONS BOARD:

[illegible], USN, Secretary
[illegible], USAF
Air Force Secretary

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17 June 1948

To: Col. Griffith, Mr. Smith, Col. Smith,
XP-87 Flight Test File

Subject: Flight of XP-87 Airplane

1. A flight of 1 hour 17 minutes was conducted on the XP-87 late afternoon 16 June for purpose of obtaining high speed points and checking out night flying equipment. The following high speed points were obtained:

Altitude	Cal. Airspeed	Mach No.	True Airspeed	Contractor's Estimate
29,300'	346	.785	532	542
28,700'	354	.790	552	546
17,600'	428	.750	548	560
9,200'	499	.770	570	586
8,500'	502	.760	572	588

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2. The above points were obtained in stabilized level flight at 12,000 RPM. At all high speed points the airplane was completely out of elevator trim and it was necessary for the pilot to use full forward control wheel to maintain level flight. Prior to next flight the stabilizer will be raised 1 1/2° making the range of adjustment from +1 1/2° to -2 1/2°. This should eliminate a considerable amount of drag caused by full down elevators.

3. A shallow dive from 30,000' to 29,000' followed by a 3 g turn was executed. The airplane buffet boundary was reached at a calculated speed of 328 MPH with 3 g acceleration.

4. It should be noted that the above speed points were obtained with low thrust engines (approximately 10%) and excessive drag and that all points are within 16 MPH of the contractor's specification values with one point 6 MPH above.

5. The above flight was continued until after dark in order to check out night flying and landing equipment. Pilot's comments on cockpit lighting and landing light operation and settings were favorable.

O. B. Thornton
Capt. O. B. Thornton

Cy to:
Mr. Banta, MCPPXA

PBS
GFS
HAG/hw

MCRDA-4/OBT/hw
2-9256

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AMC Form No. 10-3 (Rev 2)Jul 47)

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ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

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Use authorized office symbols to designate addressor and addressee.

Place initials of dictator and typist, telephone number and location to right of signature.

Number all comments consecutively.

Note warning signal at lower left of form. Remaining space is sufficient only for proper spacing of typewritten signature.

Separate comments by horizontal lines across page.

Use entire width of sheet, both sides.

SUBJECT Preliminary Flight Test Report on the XP-87 All-Weather Night Fighter

TO MCREOA ✓
MCPPXA

FROM MCRF

DATE [illegible] 1948

COMMENT NO. 1

1. The Phase I test of the XP-87 all-weather night fighter was interrupted for a brief period, per verbal request of Colonel George F. Smith, Aircraft Projects Section, Engineering Division, for the purpose of obtaining preliminary flight test data on this aircraft. Because of the time limit and lack of calibrated and adequate instrumentation, this report will deal primarily with the pilot's observed performance. Some factual information, however, was obtained under fairly hurried conditions and will be listed in the body of the report. Tests were conducted at Muroc Air Force Base during the period 1 June 1948 through 6 June 1948. Because of maintenance difficulties the airplane was actually available in a satisfactory condition for test only two days of this period.

2. The airplane was weighed at the main base at Muroc and grossed 42,120 pounds. The manufacturer reported combat weight for this particular model was 38,000 pounds. The manufacturer also reported that the actual thrust was less than the design thrust of the 24-C engine by approximately 250 pounds per unit. These facts should be considered in analyzing this report.

3. The entrance and exit to the cockpit of the XP-87 airplane is considered satisfactory. The general arrangement of the cockpit is satisfactory with the exception of the oxygen regulator installation which did not permit a visual check by the pilot of the tank capacity, oxygen selector, or oxygen flow. The landing gear retracting switch and flap actuating switches on the control wheel are also considered unsatisfactory. A gyro turn indicator, rate-of-climb indicator, and Mach meter had been removed from the instrument panel. These instruments are considered essential to test and service operation of the aircraft. The number of steps required to prepare for seat ejection is also considered unsatisfactory. This procedure included disengaging and removal of the pilot's control wheel prior to actual ejection. It is felt that the operations required on the part of the pilot prior to ejection should be reduced to an absolute minimum, since the only time this means of exit will be used by the pilot will be in a serious emergency. The cockpit pressurization system was inoperative during the course of the test and, therefore, could not be checked for satisfactory operation at altitude. Cockpit refrigeration appears to be satisfactory; however, this installation was not fully evaluated.

4. Cockpit Arrangement and Ground Operation

a. The throttle control system of this airplane is not considered satisfactory because of the time required on the part of the pilot to properly adjust engine rpm at the desired setting on all four engines and give adequate attention simultaneously to the flight of the aircraft.

b. Seat and rudder adjustments are considered satisfactory, as is the seating arrangement for the pilot and the observer.

c. Visibility from the cockpit, both during ground operation and in flight, was satisfactory.

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WF-L-18 MAR 48 2 MH 600M

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TO FROM CONFIDENTIAL DATE - COMMENT NO.

d. The procedure recommended by the manufacturer for engine starting was considered satisfactory. Starts were normal for jet engines using 100-octane fuel. There is little indication to the pilot of the engine actually starting other than the gradual increase in the rpm, since the tail-pipe temperature failed to indicate the initial start and the fuel pressure for starting is low when compared to other types.

e. Ground handling qualities were in general satisfactory. It is believed that nose-wheel steering should be provided, however, for all aircraft powered with a multiple number of jet engines. Necessary use of brakes in cross-wind take-offs definitely retards the acceleration of the airplane and increases the take-off run. Nose-wheel steering would eliminate this unsatisfactory characteristic.

5. Under test conditions the following measured performance data were obtained:

a. Take-off Performance

Take-off from main base, Muroc, California, altitude 2280 feet, temperature 28°C, with no wind. The take-off was made at 12,000 rpm.

Gross Weight lbs	IAS at Take-off	IAS over 50 ft	Ground Roll ft	Distance over 50 ft ft
42,000	120	130	4400	5100
37,400	135	145	4430	5800

b. Climb Performance

Only one sawtooth climb was performed from 17,000 feet to 20,000 feet, and a check climb to 33,000 feet. Climb data are listed in the following table:

Standard Day Conditions		Test Conditions		
Altitude ft	Rate of Climb ft/min	Altitude ft	Obs. Temp °C	Rate of Climb ft/min
S.L.	3900	3,000	34	2900
10,000	3000	10,000	16	2350
20,000	2200	20,000	-6	1650
		30,000	-26	600
		33,000	-33	200

It is entirely possible that the best climbing speeds were not used at altitudes in excess of 20,000 feet, and additional sawtooth climbs will be necessary to determine the best climbing speeds for an accurate evaluation of climb performance above this altitude.

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M.JREOA 4 File 3/3 17

AMC Form No. 10-3 Flight Test Data
(Rev 27 Jul 47)

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AIR MATERIEL COMMAND

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Number all comments consecutively.

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Use ... re width of sheet, both sides.

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SUBJECT Preliminary Flight Test Report on the XP-87 All-Weather Night Fighter

TO MCRE
MCREOA
MCPPXA

FROM MCRF

DATE

COMMENT NO. 1 (contd)

c. Maximum Speed and Flight Characteristics at High Mach Numbers

The maximum level flight Mach number attained at three altitudes and corresponding speeds were as follows:

Altitude ft	Mach No.	IAS MPH	V_t
15,500	.775	430	556
25,600	.775	361	535
30,400	.775	329	524

Some control difficulties were experienced at a Mach number of .775 in that mild snaking and dutch roll were encountered. Sufficient trim about the lateral axis was not provided and approximately 30 pounds of push force was necessary to maintain level flight at the maximum indicated air speed attained at 15,500 feet.

6. Flight Characteristics as Observed by the Pilot

a. The initial rate of acceleration of this airplane on take-off appeared to be less than that of jet bombers flown to date by the pilots.

b. Take-offs were conducted at indicated speeds of 125 mph to 140 mph. ...mediately after breaking ground, the airplane does not feel entirely secure and the pilot is reluctant to raise the gear until additional speed has been obtained for fear of settling back on the runway. Very careful maneuvering of the aircraft by the pilot immediately after take-off is required. Full flaps were used on all take-offs, as recommended by the manufacturer. This flap setting appeared to be the most desirable.

c. Airplane flight characteristics at indicated speeds of from 200 to the maximum obtained were considered satisfactory with the exception of accelerated stall performance which was observed as follows:

The maximum acceleration that was obtained prior to entering an accelerated stall as indicated by excessive burfeting of the airplane, was 4.7 g at 18,000 feet and 410 mph indicated air speed. This decreased to 3 g at 10,000 feet and 300 mph indicated air speed, and to 2.2 g at 10,000 feet and 250 mph indicated air speed. These tests were flown at a gross weight of approximately 35,000 pounds. It was the impression of the pilot that an accelerated stall might be experienced ...uring most simulated combat maneuvers at all speeds and that the stall would occur at ...uch lower acceleration than considered satisfactory for an all-weather type fighter aircraft. The stick forces under all conditions tested appeared to be satisfactory with the exception of the requirement for a push force at high indicated air speeds.

CONFIDENTIAL

WF-L-18 MAR 48 2 M... 600M

(CONTINUE ON OTHER SIDE)

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TO FROM CONFIDENTIAL DATE JUN 1 8 1948 COMMENT NO.

d. In the clean configuration, buffet was first experienced at 180 mph indicated air speed and actual stall occurred at 160 mph. With wheels and flaps fully extended the stall warning was very light. The stall was experienced at 125 mph indicated air speed. A slight reversal of stick forces was observed in this configuration immediately prior to the stall and care must be exercised by the pilot during recovery to avoid an accelerated stall. It was not possible to raise the flaps without stalling at a speed below 160 mph indicated air speed and at this speed extreme care must be exercised to avoid a stall.

e. Rate of descent from high altitudes was slow because the dive brakes were inoperative during the course of the test. Engine idling speed at altitude was excessive which necessitated the stopping of two engines in an emergency descent.

f. Flight characteristics of the airplane when the flaps were being lowered for landing approach were considered unsatisfactory. As the flaps are lowered the pilot experiences a nose-up tendency during the first half of flap travel with the trim immediately changing to nose-down during the second half of flap travel. It was possible to trim for level flight during this change with the use of the elevator trim tab. However, this characteristic required considerable attention on the part of the pilot and might be dangerous under certain conditions of flight. Changes in trim were attributed by the manufacturer to a lack of synchronization between the flap and horizontal stabilizer actuating motors.

g. Because of the high stalling speed of the airplane and the danger of entering an accelerated stall, it was considered desirable to first lower the flaps at least half way prior to lowering the gear. The initial approach under this condition was safe and satisfactory at approximately 170 mph indicated air speed with a final approach of 150 mph indicated air speed. The landing flareout and ground contact were normal and no unsatisfactory characteristics were apparent. Observed speeds and measured ground roll were as follows:

Minimum indicated air speed at touch-down at a gross weight of 36,000 pounds was 122 mph; the corresponding ground roll was 3600 feet. Heavy braking was required to stop in this distance.. Touch-down at 125 to 130 mph resulted in a measured ground roll of 5300 feet.. The weight of the airplane on this particular landing was 39,000 pounds, and normal braking action was used.

7. It is recommended that complete Phase II tests be conducted on the XP-87 airplane as soon as possible, in order to obtain accurate quantitative information which may be used further in the official evaluation of the airplane.

ALBERT BOYD
Colonel, USAF
Chief, Flight Test Division

AB/mac
2-3133
Bldg 8
Area B

CONFIDENTIAL

(DO NOT WRITE BELOW THIS LINE)

AGCPP Form No. 71-24
(28 Mar 46)

UNITED STATES AIR FORCE
AIR MATERIEL COMMAND
Wright-Patterson Air Force Base
Dayton, Ohio

CHANGE ORDER

Date: 19 June 1948

Serial No. 36472 | Change Order No. 11

Contract No. W33-038 ac-6266

PR No. 53777

Class No. 01-C

Fixed Price	$33,349.97
INCREASE	

TO:

Curtiss-Wright Corporation (Airplane Division)
Columbus 16, Ohio

SUBJECT: Repair of XP-87 airplane

1. The Contractor shall repair the XP-87 airplane, AF Serial No. 45-59600, called for under Item 5, Article 15(a) of Contract W 33-038 ac-6266, as amended, damaged in a "wheels-up" landing at Muroc, California, at a total increase in contract price of $33,349.97

2. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

Copy Received by Curtiss-Wright Corp.
Airplane Division
Columbus, Ohio
JUN 28 1948

This Change Order is negotiated pursuant to Public Law 413, 80th Congress, Sec. 2(c)(10), ... Except as hereby amended, all terms and conditions of the contract affected, as hetofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

1st Indorsement

TO: Contracting Officer

1. Contractor hereby accepts the above Change Order.

Columbus 16, Ohio 29 June 1948

CURTISS-WRIGHT CORPORATION
(Airplane Division)

AFFIX CORPORATE SEAL

By Edwin Shuman

(Signature of officer with power to bind)

Edwin J. Shuman - Representative

THE UNITED STATES OF AMERICA

By S. Lovas

STEPHEN LOVAS
Contracting Officer

Date: 30 June 1948

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in, and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover the cost thereof.

Debit: 2180705, 802-7004 P 611-07 S 33-038

Encl 1-2

C.014

FINDINGS AND DETERMINATION

The USAF proposes, under Purchase Request No. 53777, a Change Order to Contract W33-038 ac-6266 with Curtiss-Wright Corporation (Airplane Division), Columbus 16, Ohio, for repairs to XP-87 airplane No. 45-59600, recently damaged in a wheels-up landing at Muroc, California.

I hereby find that:

This procurement, the estimated cost of which is $33,349.97, chargeable to Project 611, Fiscal Year 1948 funds, is for accomplishing the necessary repairs required as a result of the wheels-up landing of No. 1, XP-87 airplane at Muroc, California.

The services to be procured are for technical, non-personal service in connection with the assembly and installation of equipment of a highly specialized nature.

Upon the basis of the findings set forth above, I hereby determine that pursuant to Section 2 (c) (10), Public Law 413, 80th Congress, negotiation of a Change Order for the above described procurement is authorized.

STEPHEN LOMAS
Contracting Officer

ch. 14

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COPY

DEPARTMENT OF THE AIR FORCE
Washington

Office of the Under Secretary

21 June 1948

MEMORANDUM FOR GENERAL CRAIG, DCS/M

SUBJECT: B-87 and P-87 Aircraft

The orders for the B-87 and P-87 will be subject to my approval, notwithstanding the Finding and Determination already approved by me.

A. S. BARNES
Under Secretary of the Air Force

/s/ K.B.W.
6/22/48

BUCKSLIP TO GEN CRAIG

Gen Wolfe noted and has copy of this memo.

/s/ P.

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P-67 Experimental
Gen. Bn 1
Eng. Div, C-D.

4 OCAF/Gen. Campbell/ew/73624

MD C-1

22 June 1943

MEMORANDUM FOR MR. HARMON

SUBJECT: P-67 Airplane

I am not able to tell you anything you don't already know about the capabilities or lack of capabilities of the Curtiss-Wright Corp.

As to the P-67 airplane, the officers who determine requirements for the Deputy Chief of Staff for Operations appear to have thought the problem out very thoroughly and they feel:

a. That we have a definite and almost desperate requirement for a defensive fighter with which to counter any air attack against the United States or any U.S. installation.

b. That this fighter must have a radius of action of 700-800 nautical miles or more, and that it must be capable of operating day or night in any weather. To operate at night and in bad weather, it must have some complex and automatic equipment including fire control equipment, radar, communications, etc. and at least a two man crew.

c. That the requirements for range and equipment mentioned in b. above inevitably make it a large airplane (around 40,000 lbs.) They would sooner have a small one but do not believe that a small one such as P-38 can meet the requirements.

d. That although it is a big gamble to start tooling for production of an airplane we have not completely tested, the urgency of the need justifies the gamble.

e. That the P-69 may be more nearly suitable than the P-67, but our requirements (recently increased to maximum for 16 groups) are so large that we may have to employ all available capacity.

I suggest that before we finally place contract for P-67s, that we send some Material Command test pilots to learn to fly the prototype airplane at Leach once and give us the most possible evaluation of the moment, and that we send a group of Proving Ground Command test pilots out for the same purpose but to give us their estimate of the suitability of the airplane independently.

ORVILLE A. CAMPBELL
Major General, USAF

764

CONFIDENTIAL CRAIG DOCUMENTS

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Flight Test Data
MCREC-4 File (1/2)

20

F.T.

"Preview" Phase II Flight Testing of XP-67 Airplane

MCPP MCR 0A(MCREOA-4) 29 June 48 1

1. Reference is made to R&R from MCRF to MCREOA & MCPPXA, dated 18 June 1948, Subject: "Preliminary Flight Test Report on the XP-67 All Weather Night Fighter."

2. In order to obtain a direct comparison between the performance points as contained in the referenced R&R, and the Contractor's calculated performance this office has further reduced the above data to conditions of:

a. Design Gross Weight
b. Calculated thrust available
c. Sea level standate conditions.

3. The attached chart contains the summation of these corrections and indicates that the XP-67 will successfully meet the contractors predicted performance at design gross weight and full thrust, especially in regards to rate of climb and take-off distance. It is noted that although the high speed points are together at 30,000 feet, there is a deficiency of 6 mph at 25,000 feet and 12 mph at 15,000 feet approximately. The nature of this spread indicates pure drag considerations which are attributable to:

a. Full down elevator trim tab and partially deflected control surface at all high speed points. (This condition being corrected by increasing stabalizer incidence angle).

b. A ram air scoop for instrumentation compartment ventilation.

c. Removal of nacelle tail cones due to cracking, leaving a squared off surface which is definitely a drag item although the exact extent of this effect is unknown.

d. General dirtiness due to field installation of tail stinger and deterioration of finish.

This office is of the opinion that the above items could easily account for the slight deficiency in high speed and is therefore not concerned by the high speed performance.

4. It is pointed out that the corrected figures attached hereto represent performance based on the original 24-C engines which are limited to 12,000 RPM and 3,000 lb. thrust. The Contractor has at this time removed all of the low rated engines and replaced same with the newer 24-C engines rated at 12,500 RPM and 3,300 lb. thrust. These higher rated engines will be installed during Phase II, therefore the final performance figures should be well above the Contractor's predictions in all respects.

GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division

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Bldg. 14

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XP-87 FLIGHT TEST PERFORMANCE

TAKE-OFF DISTANCE -

Actual Take-off		Observed Values		Corrected for Power, Altitude & Temperature		Contractor's Estimates	
Weight	Speed	Ground Roll	Over 50' Obstacle	Ground Roll	Over 50' Obstacle	Ground Roll	Over 50' Obstacle
42,000 lb.	120 mph	4400'	6100'	2700'	4100'	3700'	4800'
37,400 lb.	135 mph	4430'	5800'	3100'	4100'	2700'	3700'

RATE OF CLIMB -

Altitude	Observed R/C	Thrust Deficiency	Correction for Thrust	Correction for Weight	Corrected R/C	Contractor's Estimated R/C
Sea Level	3900'/min	1000 lb.	750'/min	400'/min	5050'/min	5000'/min
10,000'	3000'/min	700 lb.	500'/min	350'/min	3850'/min	3500'/min
20,000'	2200'/min	350 lb.	300'/min	300'/min	2800'/min	2300'/min

HIGH SPEED -

Altitude	Observed Air Speed	Thrust Deficiency	True Airspeed Corrected for Thrust & Weight	Contractor's Estimates
15,500'	556 mph	350 lb.	564 mph	576 mph
25,600'	535 mph	200 lb.	548 mph	554 mph
30,400'	524 mph	100 lb.	538 mph	540 mph

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File E 35(1/3)

(file)

P-87 - F3-D Characteristics Comparison

MCREOA M-REOA-4 6 July 48 1

ATTN: Colonel Smith

1. The experimental and production versions of the XP-87 airplane are compared herein with the same versions of the XF3-D airplane as to performance, armament, and equipment. In order to compare radius of action and take off distance on an equitable basis the fuel load of the production XF3-D was increased to 2600 gallons by the addition of two drop tanks of 650 gallons each. However, it should be pointed out that in adding these drop tanks it is assumed that adequate wing structual provisions are available for carrying large tanks, therefore the maximum gross weight shown for this configuration only includes allowances for weight of fuel and weight of tanks. From information available it is believed that 2000# is the maximum weight that can be carried externally, therefore structual reinforcement of the wing would probably be required to carry tanks weighing approximately 4200# each. The table below does not consider performance losses due to increased structual weight since information required for such a computation is not available to this Command.

PERFORMANCE

	(4-24C-4) XP-87	(2-24C-4) XF-3D	(2-J-33-27) P-87	(2-24C-10) P-3D	(2-24C-10) F3D with added fuel
Vmax S.L. Knots	521	455	521	527	527
Vmax 35000 Knots	455	444	455	465	465
R/C- S.L. Ft/min.	5680	3600	5200	7000	7000
R/C- 35000 Ft/min.	760	500	800	2300	2300
Service Ceiling	41,000	38,000	41,000	48,000	48,000
To Dist. over 50' Std Day Design G.W.	3600	1700	3700	1800	4000*
Combat Radius Naut. Miles	868	219	868	288	1300
Max. Gross Wt.	48,989	21,500	50,119	22,000	31,200

* At 31,200# TO Gross Wt.

[See next page]

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PERFORMANCE

	(4-24C-4) XP-87	(2-24C-4) XF-3D	(2-J-33-27) P-87	(2-24C-10) F-3D	(2-24C-10) F-3D with added fuel
Vmax S.L. Knots	521	455	521	527	527
Vmax. 35000 Knots	455	444	455	465	465
R/C - S.L. Ft/min.	5680	3600	5200	7000	7000
R/C - 35000 Ft/min.	860	500	800	2300	2300
Service Ceiling	41,000	38,000	41,000	48,000	48,000
TO Dist. over 50' Std Day Design G.W	3600	1700	3700	1800	4000*
Combat Radius Naut. Miles	868	219	868	288	1300
Max. Gross Wt.	48,989	21,500	50,119	22,000	31,200

* [illegible] 31,200# Th Gross Wt.

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ARMAMENT

P-87 - 4X20 MM nose turret automatically controlled by modified AN/APG-3 gun laying radar. Full forward hemisphere fire coverage - 270 rounds per gun.

F3-D - 4 fixed 20 MM guns forward firing, 200 rounds per gun.

RADAR

P-87 - Modified AN/APG-3 for automatic gun laying and search.
AN/APS-15 - Tail Warning

F3-D - AN/APS-21 - Search and aiming.
AN/APS-28 - Tail Warning

ANTI-ICING

P-87 - Complete thermal anti-icing of wing, horizontal stabilizer and vertical fin. Electrical windshield anti-icing.

F3-D - None

PILOT ESCAPE

P-87 - Air Force type Ejection seats

F3-D - Escape tunnel through aft cockpit bulkhead extending through lower fuselage fin

HUGH A. GRIFFITH, JR.
Lt. Colonel, USAF
Chief, Fighter Branch
Aircraft Projects Section

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P-87 Experimental
Opns. Br.,
Eng. Div, R&D

R&D

DATE..... 9 July 1948

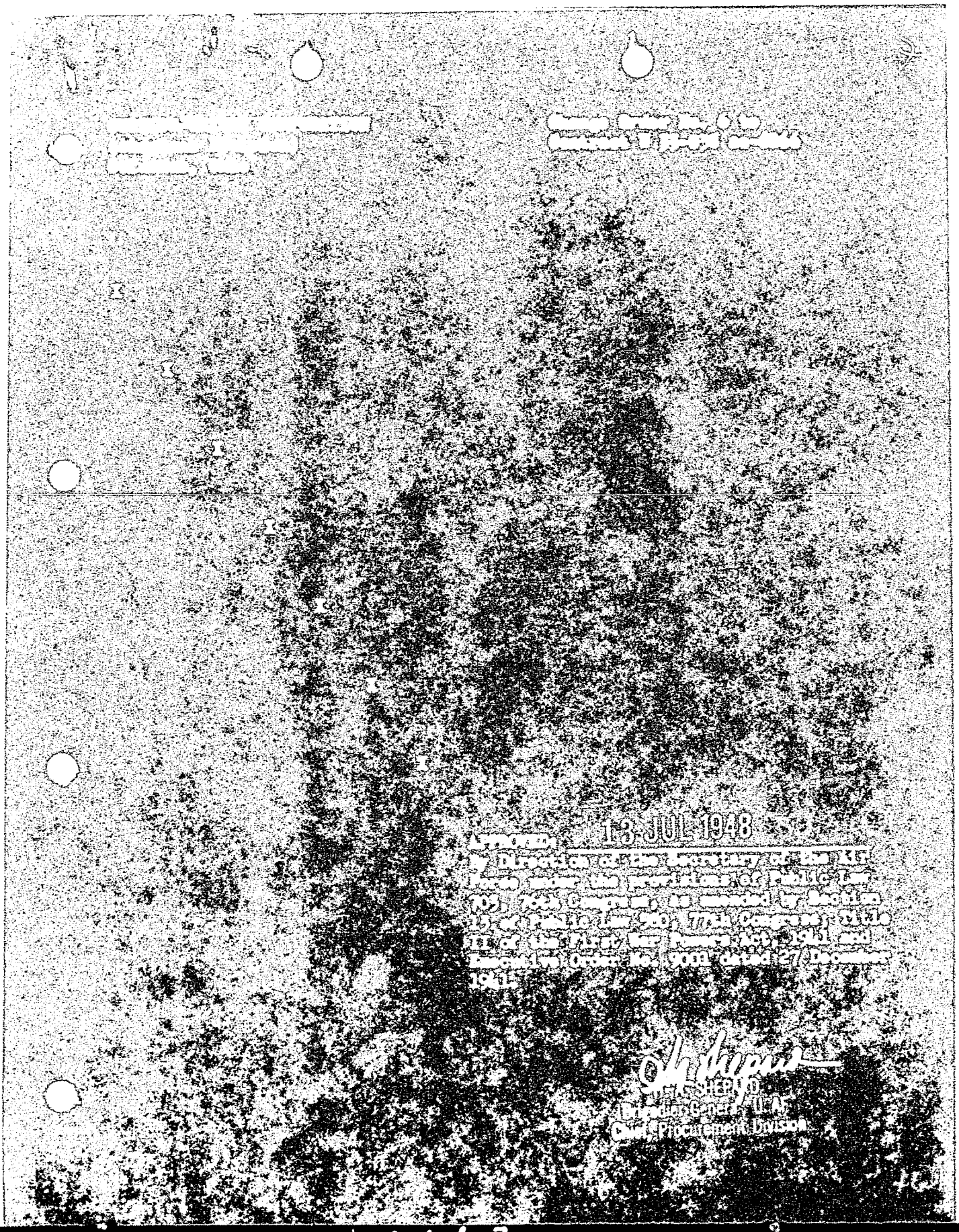
DAILY ACTIVITY REPORT OF: Director of Research and Development
Office, Deputy Chief of Staff, Material

CONFIDENTIAL..... F-87 Flight Tests

Flight Test Division at the request of Procurement and Engineering Divisions, Air Material Command, made advance flight tests on the XF-87 to obtain preliminary Air Force data as to the general flight and handling characteristics of the aircraft. The flight test pilots were disappointed in the performance of the aircraft in that buffet boundries and high speed stalls were encountered in low "G" maneuvers. Although the F-87 exhibited poor manouverability when compared to conventional ships, reduction of the flight test data to standard conditions showed that all performance was as good or better than the calculated characteristics for an aircraft with wing loadings as high as those of the F-87.

(Captain L. Standifer - 6213)

D.F. 166A


13 JUL 1948

WCAF Form No. 71-36A
(Rev '51 and '48)

Execute in triplicate

C— 35226

Class— 01-A

CHANGE ORDER

Date 2 February 1948

Change Order No. 6 to

Contract No. W33-038 ac-6266

as amended

UNITED STATES AIR FORCE
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

To: Curtiss-Wright Corporation, (Airplane Division), Columbus 16, Ohio

SUBJECT: Ten-Hour Phase I Flight Test Program

Contract No.

1. The following item is hereby added to paragraph (a), Article 15 of Contract W 33-038 ac-6266, as amended:

"Item 11 - The Contractor shall disassemble the first XP-87 airplane, AAF Serial No. 45-59600, called for under Item 5 hereof, at the Contractor's plant, Columbus, Ohio, and cause it to be transported to Muroc Air Force Base, Muroc, California, where it shall be reassembled and prepared for flight. Contractor shall then conduct a flight testing program on said airplane substantially in accordance with Exhibit "A" attached hereto and hereby made a part hereof by Change Order No. 6, for a period of 135 days beginning with the date of shipment of such airplane from the Contractor's plant and shall use every effort to complete ten (10) hours of flight testing on such airplane during such period. However, such flight test program will be deemed to have been fully completed at the expiration of such 135 days period or at the completion of ten (10) hours of such flight testing, whichever is the earlier.

Total Price $141,268.33

The Flight Test Program at Muroc Air Force Base on said XP-87 airplane, AAF Serial No. 45-59600 shall be in accordance with the following special terms and conditions:

(a) The airplane and all other equipment and supplies (both Government and Contractor-owned) required at Muroc shall be shipped at Government expense on Government bill of lading both to and from Muroc as required. Furthermore, the airplane and other equipment shall be transported to Muroc by truck (U.S. Airplane Carriers, Incorporated, Dover, Delaware.)

(b) In cases of emergency the Air Material Command will make every effort to place an Army-manned C-47, or similar type airplane, at the disposal of the Contractor at no cost to the Contractor.

Copy Received. Sufficient Fund Have Been Obligated To Cover Maximum Amount of Money Government is Obligated To Pay Under This Instrument.
BUDG. AND FISCAL
BY

This change order has been (negotiated pursuant to) Public Law 703, 78th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

1-b Sheet 1

(c) [illegible] the [illegible] ground and flight test.

(d) Crane equipment service shall be [illegible] in unloading the airplane, equipment and supplies.

(e) Hangar and office facilities and living [illegible] contractor's male personnel only shall be furnished at standard rates at Muroc to the extent available."

2. This Change Order supersedes Amendment No. 18, dated 20 May 1947, to Letter Contract W 33-038 ac-6266, dated 22 May 1945. In the event of conflict between said Amendment No. 18 and this Change Order No. 6, this Change Order shall govern.

3. The following article is hereby added to said contract, as amended, and shall be applicable to this Change Order No. 6 only:

"ARTICLE 47. Price Revision — for retroactive pricing with limited upward revision.

"(a) Because of the experimental and developmental nature of the work called for by this contract and the great uncertainty as to the cost of performance hereunder, the parties agree that the contract price fixed in Item 11 of Article 15 (a) hereof may be increased or decreased in accordance with the provisions of this Article.

"(b) Within sixty (60) days after the completion or termination of this contract, the contractor will file with the Contracting Officer a statement showing, in such form and detail as the Contracting Officer may prescribe, the contractor's cost of producing the supplies or furnishing the services called for hereunder, together with such other information as may be pertinent in the negotiations for a revised price pursuant to this Article. Such statement of cost shall fairly reflect the normal operation of the contractor's cost system. The Contractor will establish and maintain such records of the costs of performing this contract as the Contracting Officer may require in writing. The Contracting Officer shall have the right at all reasonable times to make or cause to be made such examinations and audits of the contractor's books, records and accounts as he may request.

"(c) Upon the filing of the statement and other pertinent information required by paragraph (b) of this Article, the Contractor and the Contracting Officer will promptly negotiate in good faith to agree upon a reasonable revised price for the entire contract which, upon the basis of such statement and other pertinent information, will constitute fair and just compensation to the contractor for the performance of this contract. In determining the extent of any estimated allowance for profit to be taken into account in fixing such revised price, consideration will be given to the extent to which the contractor has performed the contract with efficiency, economy and ingenuity. In no event shall the revised price exceed the sum of $169,522.00. The revised price shall be evidenced by a supplemental agreement to this contract.

(c) For any of the purposes of Article 30 (Termination at the Option of the Government) of this contract (including, without limitation, computation of the "contract price" and "the contract price of work not terminated") the contract price shall be the revised contract price agreed upon under paragraph (c) of this Article or determined under paragraph (d) of this Article, as the case may be.

5. The Government shall furnish to the Contractor, pursuant to the provisions of Article 22 of the contract, for use in connection with this change order the following equipment:

1 each	8300-858470	Suit, Anti-G, Small-long
1 each	8300-858460	Suit, Anti-G, Large-long
3 each	8300-160150	Cylinder Assembly, Emergency Oxygen Type H-2
2 each	Helmets, Pilot's Crash, Size 7-1/4	
2 each	Helmets, Pilot's Crash, Size 7-1/8	
1 each	VU Recorder	

At the completion of the work under this contract for which the above equipment is required, the Contractor shall return the above equipment to the Government.

6. This Change Order No. 6 cancels and voids Contract Change Notification No. 6(M-5296) as of the date of issuance of such Contract Change Notification.

7. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

8. This change order consists of Sheets 1, 1A, 1B and 2, and Exhibit "A" of 6 pages.

AFPR Form No. 71-34C
(Rev 2, Feb 48)

Total increase in ~~increase~~ fixed price ~~decrease~~ $169,522.00

$ _____

$ 169,522.00

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

This Change Order shall be subject to the written approval of the Secretary of the Air Force or such individual as said Secretary shall designate and shall not be binding until so approved. The date of such approval shall be deemed to be the true date for the purpose of determining all times of performance.

UNITED STATES OF AMERICA

BY: _____
Contracting Officer
STEPHEN [illegible]

1ST INDORSEMENT

TO: CONTRACTING OFFICER:

1 Contractor hereby accepts the above Change Order. Columbus 16, Ohio (Place) 27 April 1948 (Date)

CURTISS-WRIGHT CORPORATION
(Airplane Division) (SEAL)
(Contractor)

BY: _____
(Signature of person duly authorized to sign)
Marvin J Dunyon - Representative

E.O. #430-256
TSEOA-4/O.B. Thornton

PR No. 450209

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Debit: 2170705, 702-700; P 611-09 S 33-038

Approved: _____, 1948.
By Direction of the Secretary of War under the Provisions of Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order 9001, 27 December, 1941.

Change Order No. 6 to Contract No. W 33-038 ac-6266

Sheet 2

3-b

EXHIBIT "A" TO [illegible]

to Contract W 33-038 ac-6266 identified, attached to and made a part thereof by Change Order No. 6 thereto.

EXHIBIT "A"

XP-67 Phase I Flight Test Program

Phase I Flight Tests will be accomplished on the subject airplane as outlined herein. The flight tests will be divided into the following categories for presentation:

I. Ground Tests
II. Investigation of Aerodynamic Characteristics
III. Functional Tests
IV. Instrumentation Shakedown

The actual flight testing may not be accomplished in the order of presentation hereafter; each flight may incorporate items from one or all of the above listed categories. Instrumentation for all tests will be in accordance with Curtiss-Wright Report No. 29-X-1, Preliminary Test Instrumentation Proposal for XP-67, dated 6 October 1946.

I. Ground Tests

A. All routine ground tests required by AAF Specifications before the first flight of an experimental airplane will be complied with and authorized in detail by separate directives.

B. An actual weight and balance determination will be made and the airplane will be ballasted to approximately design C.G. wheels up with full internal fuel (no tip tanks).

C. Instrumentation calibration will be accomplished for both the test and cockpit instruments. All instrument circuits and systems will be checked for proper operation.

D. Static tests will be made to determine the following items:

1. Spring tab constants and preloads.
2. Mechanical advantage of flight controls.
3. Down spring hinge moment.
4. Control system friction.

E. The following power plant tests will be conducted:

1. Perform depreserving runs on all engines in accordance with Westinghouse procedures as approved by Engineering Division of Air Material Command.

1148

3. Start both engines of the left aircraft and then operate simultaneously at 11,000 rpm for one minute.
4. Start all four engines and operate simultaneously at each of the following speeds for the time noted:

   (1) Idling - 1 minute
   (2) 10,000 rpm - 1 minute
   (3) 11,000 rpm - 1 minute
   (4) 12,000 rpm (or limit turbine outlet temperature) - 30 seconds.

F. During the tests of Paragraph E-3, the canopy will be closed and the cabin ventilation system will be in operation.

G. A minimum of four (4) taxi runs at increasing speeds and one lift-off will be made prior to the first flight. All runs will be started by releasing brakes after all engines have been brought up to 12,000 rpm (or limit turbine outlet temperature).

II. Investigation of Aerodynamic Characteristics

A. Control and tab flutter, trimming characteristics, and longitudinal stick-free stability will be investigated by trimming the airplane at approximately 10,000 ft. pressure altitude and attempting to induce flutter by rapidly vibrating controls and then releasing them. This will be accomplished at the following equivalent airspeeds: 200, 250, 300, 350, 375, 400, 425, 450, 470 and 480.

1149

1	Up	Up	Level flight at 300 mph T.A.S.
2	Up	Up	Off
3	Down	Down	Off
4	Down	Down	Level flight at 190 mph I.A.S.
5	Down	Down	Take-off
6	Down	Up	Take-off

Stability points will be derived in terms of "indicated" airspeed as no airspeed calibration will be available.

C. Power-off level flight characteristics and stick-free stability and control will be investigated at approximately 10,000 ft. pressure altitude (approximate design gross weight and C.G.) by trimming in level flight at the trim speeds listed below and then stabilizing in configurations shown at all listed speeds without retrimming.

Gear	Flaps	Trim Speed	Test Power	Test Speeds
Up	Up	260	Max.	190, 210, 230, 250, 270, 300, 320, 340.
Down	Down	175	50% Max.	110, 130, 150, 165, 190, 200.

D. Investigation of trim changes will be made by trimming under conditions shown below, making the changes listed, and then stabilizing the airplane without changing trim.

Speed	Flap	Gear	Trim Power	Change
200	Up	Up	Off	Gear - down
200	Up	Down	Off	Flap - down
1.4 V_{s_1}	Down	Down	Off	Take-off Power
1.2 V_{s_1}	Down	Down	Take-off	Gear-Up
1.4 V_{s_1}	Down	Up	Take-off	Flaps - Up

1150

V_{s1} is stalling speed in landing configuration as determined in Paragraph II-B on preceding page.

E. Investigation of directional and lateral stability will be made at 10,000 feet pressure altitude (approximate design gross weight and C.G.) by performing steady straight sideslips to both the left and right progressively increasing the rudder angle up to full throw or maximum permissible pedal force (150 lbs.) at an equivalent airspeed of 150 mph with the gear and flaps down and normal rated power. These tests will be repeated with the critical engine inoperative and the others at normal rated power.

F. Investigations of aileron control power will be made approximately at 10,000 ft. pressure altitude (approximate design gross weight and C.G.) by trimming the airplane at an equivalent airspeed of 325 mph (gear and flaps up), locking the rudder in trim position, and applying abrupt aileron deflection to 1/2 and full deflection (or maximum wheel force). Recovery will be executed after 60° of bank is obtained.

Rolls will be made both to the left and right. These roll tests will also be made at an equivalent speed of 175 mph with gear and flaps down. The landing configuration tests will be repeated with aileron boost inoperative.

G. An airspeed calibration from 150 mph I.A.S. to placard speed in level flight will be made if facilities are available. A radio calibrated range or calibrated aircraft of at least 500 mph I.A.S. capabilities will be necessary for this calibration. Placard equivalent airspeeds at various pressure altitudes are:

500 at sea level
480 at 10,000'
440 at 15,000'
390 at 20,000'
345 at 25,000'
280 at 35,000'

H. If paragraph (G) above is accomplished a preliminary investigation of high speed up to approximately normal rated power will be made by stabilizing in level flight and recording complete engine, flight and fuel flow data under the following conditions:

RPM	Standard Temperature Altitude		
11,000	9,000	6,000	3,000

Ex. "A"
XF-87 Phase 1
Flight Test Prog.

III. Functional Tests

A. The following tests will be accomplished on the left inboard engine with the other three engines at NEF.

1. At approximate pressure altitude of 10,000 ft. start by windmilling and accelerate to 11,000 rpm. (Reduce power on other engines if necessary so as not to exceed placard speed.)
2. Determine minimum idling speed of the engine.
3. In the tests of Paragraph (1) above the throttle will be quickly reduced to idling rpm position to determine burner blow-out tendencies.
4. After idling rpm is established in Paragraph (3) above, the throttle will be moved rapidly to full open to determine pulsation tendencies.

Tests will be discontinued if operating temperatures become excessive.

B. The following tests will be accomplished on all four engines simultaneously (except where noted otherwise):

1. Check minimum idling speed of engine with airplane in Configuration (L).
2. After idling rpm is established in Paragraph (1) above, rapidly move the throttle to full open to determine pulsation tendencies.
3. After the high rpm is obtained in Paragraph (2) above, quickly close the throttles to the idle position to determine burner blow-out tendencies. Test in order: singly, by pairs, and all.
4. At 11,000 rpm (or lower if speeds exceed placard value) stable runs will be made at 9,000 ft. and 25,000 ft. pressure altitude and in a climb from 9,000 ft to 25,000 ft. Cooling, thrust and induction air flow data will be recorded on these tests.

Tests will be discontinued if operating temperatures become excessive.

C. The following tests will be performed on the hydraulic systems:

1. Extend and retract landing gear at 200 mph I.A.S.
2. Lower landing gear by free fall at 200 mph I.A.S. and near the stall speed for clean configuration as determined in Paragraph II-B.
3. Operate the dive flaps in level flight at the following equivalent airspeeds at approximately 10,000 ft. pressure altitude: 250, 300, 350, 400, 425, 450 and 480.

[redacted]

D. [redacted]

1. [redacted]

2. Operation of (1) standby compass, (2) [redacted] (3) automatic pilot, (4) [redacted] (5) [redacted] (6) pressurization, and (7) [redacted] will be checked under conditions of paragraph [redacted]

3. Investigation of radio (pilot's operation) will be made in all test conditions used in paragraph (2) above.

4. Operation of canopy both electrically and manually at approximately 10,000 ft. pressure altitude and 300 mph I.A.S. (cabin pressurization off).

E. Checks will be made for carbon monoxide under various flight conditions. Carbon monoxide colorimeter detection tubes will be used for this check.

IV. Instrumentation Shakedown

A. On the first flight all instrumentation will be operated on take-off, climb, final approach, landing and any other times at which records of tests are desired.

Exhibit "A" to Item 11 attached to Contract W33-038ac-6266 by Change Order No. 6 thereto.

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MCPP Form No. 71-26A
(Rev 21 Jan 48)

Execute in triplicate

C— 36005

Class— 01-C

CHANGE ORDER

UNITED STATES AIR FORCE
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

flp/ral

Date 8 April 1948
Change Order No. 3 to
Contract No. W33-038ac-19837
as amended

To: Curtiss-Wright Corporation, (Airplane Division), Columbus 16, Ohio

SUBJECT: New Item of Work (Production of Photo Reconnaissance Prototype)
Contract Change Notification No. 2(N-52900).

1. Contract W 33-038 ac-19837, as amended, is hereby further amended as follows:

(a) By adding the following new item to paragraph (a), Article 15 thereof:

"Item 4 - Modification of XP-87 Airplane, AF Serial No. 46-522, including the services and supplies more specifically described hereinbelow, at a total price of $202,819.54

(a) The Contractor shall receive, service, store, and maintain said airplane during the period required for modification thereof in accordance with paragraph (h) of Article 3[illegible] and other applicable provisions of this contract;

(b) The Contractor shall modify certain parts of the airplane in order to produce a photo reconnaissance prototype. These modifications shall consist of the following items, the details of which shall be subject to the approval of the Air Materiel Command prior to incorporation in the airplane:

(1) Changes to airplane structure and furnishings in the nose, cockpit, and bomb bay area to accommodate items of equipment necessary for photo reconnaissance purposes, including installation of such equipment.

(2) Design, fabricate and install a camera nose.

(3) Install flash bomb and infra red lighting equipment.

(4) Accomplish miscellaneous clean-up items, pre-flight and ground functional testing of all equipment.

(5) Submit all engineering data including drawings, reports, and appropriate appendices to the airplane model specification, weight and balance report, pilot's handbook, and erection and maintenance manual.

This change order has been (~~authorized~~ negotiated pursuant to) Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

1-3

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CURTISS-WRIGHT CORPORATION
Columbus, Ohio

Charge Order No. 3 to
Contract W 33-038 ac-19837

APPROVED: 19 July 1948
By Direction of the Secretary of the Air Force under the provisions of Public Law 703, 76th Congress, as amended by Section 13 of Public Law 580, 77th Congress; Title II of the First War Powers Act, 1941 and Executive Order No. 9001 dated 27 December 1941.

/s/ H. A. Shepard
H. A. SHEPARD
Brigadier General, USAF
Chief, Procurement Division

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(b) By adding the following subparagraph to paragraph (g), Article 16 thereof:

"(4) The modification of airplane, AAF Serial No. 46-522, and all supplies and services called for under Item 4, paragraph (a), Article 15 hereof, shall be completed on or before 30 September 1948."

(c) By deleting the word and figure "Item 1" appearing in line 3 of paragraph (h), Article 38 thereof and substituting the words and figures "Items 1 and 4."

(d) By deleting the word and figure "Item 1" appearing in line 4 of paragraph (a), Article 41 and substituting therefor the words and figures "Items 1 and 4."

(e) By increasing the ceiling price in paragraph (c), Article 41 from $572,347.77 to $815,731.21.

2. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

3. The provisions of paragraph 1 hereof complete the changes directed by Contract Change Notification No. 2(N-52900) and no further adjustment of the contract price shall be made by reason thereof.

4. This change order consists of Sheets 1, 1A and 2.

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MCPP Form No. 71-26C
(Rev 5 Feb 48)

		fixed price	$ 243,383.44
Total	increase ~~decrease~~	in ~~estimated cost~~	$
		~~fixed fee~~	$

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

This Change Order shall be subject to the written approval of the Secretary of the Air Force or such individual as said Secretary shall designate and shall not be binding until so approved. The date of such approval shall be deemed to be the true date for the purpose of determining all times of performance.

UNITED STATES OF AMERICA

BY: /s/ W. A. Davis
Contracting Officer
~~STEPHEN LOVASS~~
W. A. DAVIS, Lt. Col., USAF

1ST INDORSEMENT

TO: CONTRACTING OFFICER:

1. Contractor hereby accepts the above Change Order. Columbus 16, Ohio (Place) 9 July 1948 (Date)

CURTISS-WRIGHT CORPORATION
(Airplane Division) (SEAL)
(Contractor)

E.O. #430-256
MCREOA-4/O.B. Thornton

BY: /s/ Edwin J. Ducayet
(Signature of Official with Office held)
Edwin J. Ducayet, Representative

PR No.: 19392

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Debit: 2180705, 802-7004 P 611-09 S 33-038

Approved: .....1948.
By Direction of the Secretary of War under the Provisions of Public Law 703, 76th Congress, as amended by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order 9001, 27 December, 1941.

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ATSC Form No. 70-18A (2 DEC 44) ARMY AIR FORCES AIR MATERIEL COMMAND

MCRIXF-2 [illegible] jr

Dayton AF Procurement Field Office
Wright-Patterson AF Base
Dayton, Ohio

23 July 19 45
(W-53868)
Mat'l Cont'l No.

CONTRACT CHANGE NOTIFICATION NO. 8 (135) 40
Rec. Loc. No. CCN No.

TO: Curtiss-Wright Corporation
Airplane Division
Columbus 16, Ohio

Purchase Order No.
Contract No. W 33-038 AC-6266

Pursuant to the Articles of the contract relating to changes, the above named Contractor is hereby authorized and directed to accomplish the changes listed below in accord to the effects called for under said contract as the same has heretofore and may hereafter be amended; subject, however, to the terms and conditions set forth on the reverse side hereof.

Description of Change:

"a. The Contractor shall remove 24C-4B engine, Serial No. WE-20011, from the XP-67 airplane, Serial No. 45-59600 and replace it with experimental "B" engine Serial No. WE-002048

b. The Contractor shall crate the following listed production "B" engines for shipment to Westinghouse Electrical Corporation, Lexington, Pennsylvania:

WE-20011	WE-20022	WE-20052
WE-20012	WE-20023	
WE-20013	WE-20029	

c. The Contractor shall ship 24C-4B engines, Nos. WE-20007 and WE-20006, from Columbus, Ohio to Muroc, California for use as spares.

d. The Contractor shall remove 24C-4B engine, No. WE-002048, because of faulty ignition system and crate same for return to Westinghouse.

e. The Contractor shall remove experimental 24C-4B engine No. WE-002043 from the XP-67 airplane and replace same with a production type 24C-4B engine."

PROPERTY CLASS

Page 1 of 2 pages

Authority for Issuance
T & R dtd 21 July-45
MUROC

LAWRENCE H. PRUGH, Major, USAF
Contracting Officer

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AMC Form No. 70-18B
(20 Aug 47)

INSTRUCTION SHEET FOR CONTRACT CHANGE NOTIFICATION

1. In the event compliance with this Contract Change Notification will affect the delivery schedules contained in the contract or the performance characteristics of the articles to which the change hereby ordered applies and such change in delivery schedules or performance characteristics is not satisfactorily covered herein, the contractor shall notify the AF representative thereof as soon as practicable after receipt of this Contract Change Notification. Such notice shall be sent to the office and address designated on the face hereof, marked for the attention of the AF representative or contracting officer who signed this Contract Change Notification. The failure of the contractor to submit such notice to such AF representative or contracting officer within 30 days after receipt by the contractor of this Contract Change Notification (or within such additional period prior to the date of final settlement of the contract as the contracting officer, if he determines that the facts justify an extension of the above period, may approve) shall be taken as conclusively indicating that compliance with this Contract Change Notification will not affect delivery schedules or performance characteristics as aforesaid. Any notice given pursuant to the terms hereof will contain either (a) a detailed statement of the manner in which delivery schedules or performance characteristics will be affected, other than as provided herein, together with a proposal for amendment of the contract so as to avoid defaults by the contractor, or (b) a statement that the manner in which delivery schedules or performance characteristics will be affected cannot be ascertained within 30 days from the date of this Contract Change Notification, the reason therefor, and an estimate of the date upon which such information can be furnished. Any amendment to the delivery schedules or performance characteristics agreed upon by the parties as necessitated by this Contract Change Notification and not satisfactorily covered herein will be accomplished by further Contract Change Notification.

2. Within 60 days after receipt of the first Contract Change Notification under the contract and at intervals of approximately 60 days thereafter, the contractor shall submit to the AF representative an itemized list setting forth changes required by Contract Change Notifications received by the contractor in respect to the contract and not included in any such list previously furnished. The change ordered by this Contract Change Notification must be incorporated in either the first or second bi-monthly list submitted after receipt hereof, unless (a) the contractor, prior to the submission of such second bi-monthly list, submits a separate proposal for negotiating a change in price or in estimated cost and fixed fee occasioned by compliance with this Contract Change Notification, as provided in paragraph 4 below, or (b) the contracting officer approves an extention of time for the submission of a proposal for negotiating such a change. The provisions of this paragraph constitute an extension of the period for asserting claims for adjustment under the "Changes" article of the contract.

3. Each bi-monthly list submitted pursuant to the terms of paragraph 2 hereof shall indicate as to each change covered thereby the estimated increase or decrease in the contract price or estimated cost and fixed fee occasioned by such change, or shall state that no such change will result. Such list shall state the aggregate estimated net increase or decrease for all the changes shown thereon. Each such list will be accompanied by substantiating cost data for each change for which an adjustment is indicated, and the contractor shall, upon demand of the contracting officer, submit substantiating cost data even though no adjustment is indicated. Any aggregate net increase or decrease determined as a result of any negotiations will be incorporated in an appropriate change order to the contract.

4. Notwithstanding the procedure set forth in paragraphs 2 and 3 hereof, the contractor may at any time within the period provided for presenting claims for adjustment under the "Changes" article of the contract, as the same may be extended by the contracting officer, submit a proposal for negotiation of a separate change order to give effect to any increase or decrease in the contract price or estimated cost and fixed fee occasioned by compliance with this Contract Change Notification or with a group of Contract Change Notifications which includes this Contract Change Notification.

5. Any disagreement in respect of any question of fact arising hereunder shall be determined in the manner provided in the article of the contract relating to "Disputes."

6. Pending completion of the negotiations mentioned above, the contractor will be paid at the unit prices or other consideration specified in said contract as amended from time to time for the articles affected by the change, subject to appropriate credit, refund, or further payment. of this Contract Change Notification by signing and de-

7. The contractor is requested to indicate receipt postal card immediately upon receipt hereof.
livering to the AF representative the inclosed return postal card immediately upon receipt hereof.

WF-O-24 MAR 48 65M

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File 29 077 n7 Cy. retained Correspondence

HEADQUARTERS
AIR MATERIEL COMMAND

MCWPAIR/EXA/eb
Wright-Patterson Air Force Base
Dayton, Ohio
26 July 1948

SUBJECT: Letter Contract dated 29 March 1948
Designated W 33-038 ac-20650

TO: Curtiss-Wright Corporation
(Airplane Division)
Columbus 16, Ohio

Amendment No. 5 to subject Letter Contract.

1. Subject Letter Contract, as heretofore amended, placed an order with you for the supplies or services therein described.

2. It is now desired to amend subject Letter Contract, as heretofore amended by providing for the following revisions to Contractor's Tentative Model Specifications 29-C-8 and 29-C-9 referred to in Item 1 of Exhibit "A":

(a) The wing area shall be increased from 600 square feet to 740 square feet, with an aspect ratio change from 6 to 7, and an upper surface split flap type aileron shall be provided to supplement the normal aileron.

(b) Provision shall be made for automatic half flap setting for use in approach and maneuvering at lower altitudes and speed ranges.

(c) A permanent liquid rocket installation shall be provided with droppable alcohol and liquid oxygen tanks.

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3. If the foregoing is acceptable to you, kindly so indicate by signing three (3) copies of this Amendment and return same to the Contracting Officer for Execution, whereupon subject Letter Contract shall be deemed amended accordingly.

4. This Instrument has been negotiated pursuant to Public Law 703, 79th Congress, as amended by Section 15 of Public Law 880, 77th Congress; Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December 1941.

NOTE: Type or print names under all signatures.

THE UNITED STATES OF AMERICA

BY: W. A. DAVIS, Lt. Colonel, USAF
(Contracting Officer)

ACCEPTED 4 August, 1948

CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION)

BY: (Signature)
(Official Title)
Erwin J. Dorsey - Representative

ATTEST: (Corporate Seal)

Witness: (Name & Address)

Class: None

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MC "XAA

MCR A-41/RMP/ase

Request for authority to Proceed with Procurement of F-87 and RF-87 Airplanes — 27 July 1948

Under Secretary of the Air Force
Washington 25, D. C.

ATTN: Chief of Staff
U. S. Air Force
Washington 25, D. C.

Attn: DC/S, Material, Director of Procurement and Industrial Planning

1. Pursuant to instructions contained in Memorandum for General Craig, DCS/M, dated 21 June 1948, from A. S. Barrows, Under Secretary of the Air Force, relative to procurement of F-87 and RF-87 airplanes, authority is requested to proceed with subject procurement.

2. Air Material Command and Curtiss-Wright Corporation have resolved apparent difficulties encountered in flight tests and have determined the necessary changes required to make the airplane satisfactory. It is desired to place this order and complete a definitive contract as early as possible.

FOR THE COMMANDING GENERAL:

A. M. SMITH
Brigadier General, USAF
Chief, Procurement Division

(7)

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CONFIDENTIAL

AIR TECHNICAL SERVICE COMMAND

[illegible]

INCOMING MESSAGE

[illegible]

DTIC FILE COPIES TO	NOTES
RECORDS SECT	
[illegible]	
[illegible]	
[illegible]	
PERMANENT	NONRECORD

PRIORITY

FROM: MUROC AFB MUROC CALIF 21Jul52

TO: ARCWTC

[illegible]

R Report, Cont: (MUROC 7-12)

Refer X-67 airplane as airplane was being maneuvered into/out from [illegible] position prior to being taxied onto Ramp for take off this date inter[illegible] fitting between Oleo nut Oleo and lower strut section failed from torsional load allowing lower section of nose wheel assembly to break free failure was not progressive give airplane nosed down and considerable damage resulted to nose wheel assembly and fairing door nose wheel doors under fuselage skin in nose wheel area, etc. Fitting Fitting which failed was apparently very weak with respect to torsional loads imposed during taxis decision regarding replacement and/or redesign of failed fitting has not yet been made additional information will be forwarded when available signed MIX

NOTE: Called Col Griffith & Col Smith and Maj. Bailo unable to contact them 7/21 15:00 MP

CM-IN 284-J - MWT 21Jul52
Received MCAGMU21 14:43, 21 Jul 48(1952)
Typed by MCAGMU21 15:30, 21 Jul 48 (2030Z) vm

COPY No. 1

DISTRIBUTION: MP
1. NCTR(MCRMOA) Action
2. MCAGMU21
3. MCAF- [illegible] number of additional copies of this message desired
4. MCAGMU-27 - Info

Only such extracts as are absolutely necessary will be given and marked CONFIDENTIAL. This copy will be safeguarded with that prescribed under AR-380-5 with be destroyed by CLASSIFIED [illegible] SECTION without delay.

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P-87 Experimental

Air, Br.
Eng. Div, Navy

HEADQUARTERS, U. S. AIR FORCES
DIRECTOR OF RESEARCH AND DEVELOPMENT, DCS/M

Inter-Desk Memorandum

SUBJECT: P-87 Developments

DATE 29 July 1948
Maj Smith/pfw/6210

TO: Major General L. C. Craigie

1. The following information was furnished by Mr. Jerry Clark of Curtiss-Wright this date:

a. As a result of a conference held at Air Materiel Command on 21 July 1948, the final decision was reached for Curtiss-Wright to go ahead on the design work for a new P-87 wing configuration. Contractural awards will not be issued until after Phase II flight testing has been completed on the XP-87. In order to permit the Phase II testing to be undertaken at the earliest possible date, Curtiss-Wright will minimize Phase I and I-A flight tests.

b. In reference to the new wing configuration, the 740 sq.ft. wing in lieu of the 600 sq.ft. wing with an aspect ratio of seven instead of six is considered satisfactory.

c. The permanent installation of liquid rockets is approved.

2. In accordance with your instructions, a weekly diary item on the P-87 development, has been submitted for the past three weeks. This action will be continued until the P-87 maneuver problem is corrected.

J. S. HOLTONER
Colonel, U. S. Air Force
Chief, Aircraft Branch

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CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION
COLUMBUS 16, OHIO

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AFSC Form No. 76-10A (2 DEC. 44) ARMY AIR FORCES

COMMAND

MCPIXV-2:WDT:jr

Dayton AF Procurement Field Office

2 August 19 48

(N-53962)
Master Serial No.

CONTRACT CHANGE NOTIFICATION NO. R (133) 11
Rec. Loc. No. CCN No.

TO: Curtiss-Wright Corporation
Airplane Division
Columbus 15, Ohio

Purchase Order No.
Contract No. W 33-038 AC-6266

Pursuant to the Articles of the contract relating to changes, the above named Contractor is hereby authorized and directed to accomplish the changes listed below in respect to the articles called for under said contract as the same has heretofore and may hereafter be amended; subject, however, to the terms and provisions set forth on the reverse side hereof.

Description of Changes:

"a. The Contractor is authorized to continue Phase I flight testing of XP-87 airplane, Serial No. 45-59600, at Muroc Lake, California for a total of not to exceed 40 flying hours.

b. The following tests shall be conducted in the order as listed prior to completion of the above authorized 40 hours total Phase I flight time:

(1) Determination of flap-slot settings.

(2) Determination of stabilizer-flap settings.

(3) Determination of stabilizer settings for trim at V max. and buffet boundry.

(4) Maximum gross weight (with tip tanks) tests to include the following:

(a) Pilot's observations of stability and control through speed range corresponding to powers up to and including maximum cruising power.

(b) Pilot's observations of airspeeds for stall and take-off.

(c) Measured take-off and landing distance."

PROPERTY CLASS _____

Page 1 of 1 Page(s)

Authority for Issuance
R & R dtd 29 July 1948
MCREOA-4

Lawrence H. Prugh

LAWRENCE H. PRUGH, Major, USAF
Contracting Officer

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AMC Form No. 70-18B
(20 Aug 47)

INSTRUCTION SHEET FOR CONTRACT CHANGE NOTIFICATION

1. In the event compliance with this Contract Change Notification will affect the delivery schedules contained in the contract or the performance characteristics of the articles to which the change hereby ordered applies and such change in delivery schedules or performance characteristics is not satisfactorily covered herein, the contractor shall notify the AF representative thereof as soon as practicable after receipt of this Contract Change Notification. Such notice shall be sent to the office and address designated on the face hereof, marked for the attention of the AF representative or contracting officer who signed this Contract Change Notification. The failure of the contractor to submit such notice to such AF representative or contracting officer within 30 days after receipt by the contractor of this Contract Change Notification (or within such additional period prior to the date of final settlement of the contract as the contracting officer, if he determines that the facts justify an extension of the above period, may approve) shall be taken as conclusively indicating that compliance with this Contract Change Notification will not affect delivery schedules or performance characteristics as aforesaid. Any notice given pursuant to the terms hereof will contain either (a) a detailed statement of the manner in which delivery schedules or performance characteristics will be affected, other than as provided herein, together with a proposal for amendment of the contract so as to avoid defaults by the contractor, or (b) a statement that the manner in which delivery schedules or performance characteristics will be affected cannot be ascertained within 30 days from the date of this Contract Change Notification, the reason therefor, and an estimate of the date upon which such information can be furnished. Any amendment to the delivery schedules or performance characteristics agreed upon by the parties as necessitated by this Contract Change Notification and not satisfactorily covered herein will be accomplished by further Contract Change Notification.

2. Within 60 days after receipt of the first Contract Change Notification under the contract and at intervals of approximately 60 days thereafter, the contractor shall submit to the AF representative an itemized list setting forth changes required by Contract Change Notifications received by the contractor in respect to the contract and not included in any such list previously furnished. The change ordered by this Contract Change Notification must be incorporated in either the first or second bi-monthly list submitted after receipt hereof, unless (a) the contractor, prior to the submission of such second bi-monthly list, submits a separate proposal for negotiating a change in price or in estimated cost and fixed fee occasioned by compliance with this Contract Change Notification, as provided in paragraph 4 below, or (b) the contracting officer approves an extention of time for the submission of a proposal for negotiating such a change. The provisions of this paragraph constitute an extension of the period for asserting claims for adjustment under the "Changes" article of the contract.

3. Each bi-monthly list submitted pursuant to the terms of paragraph 2 hereof shall indicate as to each change covered thereby the estimated increase or decrease in the contract price or estimated cost and fixed fee occasioned by such change, or shall state that no such change will result. Such list shall state the aggregate estimated net increase or decrease for all the changes shown thereon. Each such list will be accompanied by substantiating cost data for each change for which an adjustment is indicated, and the contractor shall, upon demand of the contracting officer, submit substantiating cost data even though no adjustment is indicated. Any aggregate net increase or decrease determined as a result of any negotiations will be incorporated in an appropriate change order to the contract.

4. Notwithstanding the procedure set forth in paragraphs 2 and 3 hereof, the contractor may at any time within the period provided for presenting claims for adjustment under the "Changes" article of the contract, as the same may be extended by the contracting officer, submit a proposal for negotiation of a separate change order to give effect to any increase or decrease in the contract price or estimated cost and fixed fee occasioned by compliance with this Contract Change Notification or with a group of Contract Change Notifications which includes this Contract Change Notification.

5. Any disagreement in respect of any question of fact arising hereunder shall be determined in the manner provided in the article of the contract relating to "Disputes."

6. Pending completion of the negotiations mentioned above, the contractor will be paid at the unit prices or other consideration specified in said contract as amended from time to time for the articles affected by the change, subject to appropriate credit, refund, or further payment.

7. The contractor is requested to indicate receipt of this Contract Change Notification by signing and delivering to the AF representative the inclosed return postal card immediately upon receipt hereof.

WF-O 12 Jul 48 120M

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

5 August 1948
RHA:mw-358

Subject: Contract W33-038 ac-19837
Model XP-87 Airplanes
Photographic Viewfinder Procurement

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPPXA-41

Through: AF Inspector In Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Reference: (a) AMC Ltr MCPPXA41/JWE/asc dated 29 July 1948
(b) MCPPXA-41/JWE/asc dated 28 July 1948
(c) CW Ltr REA:hw-182 dated 21 April 1948

Enclosure: (A) Cost Estimate Breakdown

1. In accordance with the requests contained in Air Materiel Command letters references (a) and (b), the Contractor quotes herewith a total price of $21,965 for the procurement of a wide angle viewfinder for installation in XP-87 Airplane No. 2 as a component unit of the photo reconnaissance version. This price is based directly on charges as quoted this Contractor by the Chicago Aerial Survey Company and supersedes the Contractor's quotation of reference (c). A breakdown of this amount is contained in Enclosure (A) attached hereto.

2. The Air Materiel Command's attention is invited to the fact that Chicago Aerial Survey has indicated that it will take from four to six months to complete this first unit for delivery after receipt of order. Therefore, in the interest of expediting the photo reconnaissance modifications, the Air Materiel Command's early consideration of this quotation will be appreciated.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

F. R. 53776

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ENCLOSURE (A)

ESTIMATE OF VIEWFINDER COSTS
(Per Chicago Aerial Survey Quote)

DIRECT LABOR -		
	Machining ($1.05/hr)	$ 1,201.00
	Assembly ($2.00/hr)	276.00
	Total Direct Labor	$ 1,477.00
	Overhead (90%)	1,329.00
	Total (including Overhead)	$ 2,806.00
ENGINEERING -		
	Research ($3.75/hr)	$ 502.00
	Laboratory ($2.20/hr)	647.00
	Designing ($2.50/hr)	1,455.00
	Detailing ($2.10/hr)	1,017.00
	Testing ($2.70/hr)	313.00
	Total Engineering	$ 3,994.00
	Overhead (90%)	3,595.00
	Total (including Overhead)	$ 7,589.00
OUTSIDE CONSULTANTS		$ 1,000.00
DIRECT MATERIAL -		
	Raw and Small Parts	$ 780.00
	Plating and Finishing	224.00
	Boxes and Containers	26.00
	Total	$ 1,030.00
PURCHASED PARTS -		
	Major	$ 380.00
	Sub-contract	1,264.00
	Total	$ 1,644.00
DIRECT CHARGES -		
	Patterns and Data	$ 500.00
	Flight Test	525.00
	Total	$ 1,025.00
TOTAL MANUFACTURING		$15,100.00
G & A Expense (14%)		2,114.00
Other Expense		939.00
TOTAL COSTS		$18,153.00
Vendor Profit (10%)		1,815.00
Selling Price (To Curtiss)		$19,968.00
Curtiss Profit (10%)		1,997.00
		$21,965.00

F R Smith

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AF 30-22 (26 MAY 48) USE PREVIOUS EDITIONS

HEADQUARTERS ARMY AIR FORCES

ROUTING AND RECORD SHEET

SYMBOL	
FILE NO.	

SUBJECT: Future Performance of All Weather Fighters

TO: Dir. Research & Development, DCS/M Material — DATE 5 APR 1948

FROM: Requirements Division, Dir. Trg & Req, DCS/O Operations — COMMENT No. 2 — Lt Col Johnson/mbj/72715

1. Performance figures have been noted.

2. The F-89 proposal appears to have very good stall and take-off characteristics.

3. It is requested that this office be kept informed of further developments of the F-87 and F-88 in order that proper consideration can be given to their position in the procurement program.

THOMAS S. POWER
Brig General, USAF
Chief, Requirements Division

TO: Requirements Division, Dir. Trg & Req, DCS/O — DATE 5 August 1948

COMMENT NO. 3

FROM: Director of Research & Development, DCS/M — Maj McLaughlin/pfw/6210

1. The following information is submitted on the all-weather fighter program:

a. XF-87.

(1) A conference was held at Air Material Command on 21 July 1948 at which time a final decision was reached for Curtiss-Wright to go ahead on the design work for a new F-87 wing configuration. A 740 sq.ft. wing in lieu of the 600 sq.ft. wing with an aspect ratio of 7 instead of 6 was considered satisfactory.

(2) The XF-87 is currently undergoing repairs at Curtiss as a result of nose wheel failure while taking off. Repairs should be completed by 23 August 1948.

b. XF-89.

(1) No. 1 aircraft is due to fly the week of 9 August 1948.

(2) Air Material Command was notified on 28 July to have the J-35-17A

TO CENTRAL FILES — Classified

(Date)

(Name) (Grade)

(Official Title)

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HEADQUARTERS UNITED STATES AIR FORCE

ROUTING AND RECORD SHEET

CONFIDENTIAL

SUBJECT: Performance of Turbine Engines

TO: Engineering Division, Dir. Tech. Svc., DCS/O

DATE: 5 August 1948

COMMENT NO. 2 Cont'd

FROM: Director of Research & Development, DCS/M

Maj McLaughlin/cf/6210

engine placed in the No. 2 nacelle. The J35-A-7 engine will give an additional thrust of approximately 1150 pounds over the J33-A-23 engine presently scheduled for the No. 2 model. This will increase the performance of the experimental model to almost that of a modified aircraft. The No. 2 model is to fly sometime in October.

F. O'Donnell Jr Lt Col

L. C. CHASE
Major General, U. S. Air Force
Director of Research & Development
Office, Deputy Chief of Staff, Material

AFDRD-D was GLM
AFDRD-A

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

11 August 1950

[illegible]-162

Subject: Contract W [illegible] 837 -Model XP-87
Incorporation of Engineering on No. 2 Airplane

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio
Attention: MCPPXA-1F

Thru: Chief, Dayton PF Procurement Dist. Office
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio
Attention: MCPPAV-35

Enclosure: (A) XP-87 Program Summary
(B) Statement of Work
(C) Cost Estimate Breakdown

1. As a result of informal negotiations with the Air Materiel Command, the Contractor submits herewith a revised program for the proposed XP-87 airplane. This program involves shifting the J-33 engine installation from No. 1 to No. 2 airplane and providing for a production type engine at the same time as well as incorporating a larger wing and changes related thereto. A detailed schedule of the revised program is attached hereto as Enclosure (A). A detailed statement of work involved in this proposal is attached as Enclosure (B).

2. For accomplishing the modification program on No. 2 XP-87 airplane as defined in Enclosure (B), the Contractor proposes herewith a total price of $1,418,283. Since the Contractor considers this program extremely important, the quotation has been made on a non-profit basis and in such a manner as to eliminate the provision for upward redetermination of the J-33 engine installation and the profit on the J-33 engine installation and utilizes the maximum funds already allocated to decrease the total additional funds required. Enclosure (C) attached hereto indicates the derivation of the price as quoted above. It should be noted that the credit resulting from the J-33 as shown on Enclosure (C) is less than the total amount already allocated. The difference between the two figures is the amount spent on the present J-33 engine installation which cannot be utilized on the revised installation, but for which the Contractor must still receive compensation. Since the Contractor has eliminated profit and made the quoted price equal to the ceiling price, there is no necessity for including in the contract provision for upward redetermination. The Contractor is, however, willing to accept provision for downward redetermination should the Government desire to leave such provisions in the contract. It should be noted that the above quotations have no effect on Item 2 of subject contract covering spare parts for the J-33 engine installation which has been left unchanged. Should the Government desire to procure additional spares to cover the revised wing installation, additional money can be allocated at the discretion of the Government to Item 2 of the contract.

P. R. 46628

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To: Air Material Command

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3. It should be noted that the delivery schedule and progress as covered by Enclosure (4) have been improved slightly as discussed with Air Material Command personnel. The Contractor will make every effort to meet or further improve the schedule and as the program progresses will advise the Air Material Command of the exact date on which the No. 2 airplane is to be returned to the Contractor to start installation of the wing and nacelle should the Contractor require the airplane earlier than the date specified in Enclosure (5).

4. In order to effect the schedule proposed herein for the No. 2 airplane, it is necessary that provision be made for acceptance and payment for the No. 2 airplane on Contract W [illegible]-ac-[illegible] without the [illegible] for flight testing this airplane prior to transferring the airplane from Contract W [illegible]-ac-[illegible] to Contract W [illegible]-ac-[illegible]. Since this change eliminates work included in the original contract, the Contractor quotes herewith a price reduction on Contract W [illegible]-ac-[illegible] of $16,736 representing the amount included in the original contract as covering flight test for the second airplane.

Very truly yours,

CONSOLIDATED VULTEE AIRCRAFT CORPORATION
Airplane Division

[illegible]
Contract Manager

cc: AF IN CHICAGO

P.P. 46628

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ENCLOSURE (B)
STATEMENT OF WORK
GOVERNING
INCORPORATION OF ENLARGED WING ON NO. 2 XP-87 AIRPLANE

1. The second XP-87 airplane will be made available to this Contractor on or before April 1, 1949. To meet this date, as well as install and test the photo recon version, the second XP-87 airplane on Contract W33-038 ac-6200 shall be accepted without Phase I and II Flight Testing.

2. The J35-A-27 engine and nacelle installations will be made in conjunction with the wing change. The J35-A-27 will replace the J35-A-5 engine installation now contracted for.

3. Provisions shall be made for the ultimate installation of the J33-A-29 engine in lieu of the J35-A-27.

4. For purposes of continuation of engineering on the most economical basis, only those items on the J-33 engine installation which can be utilized in the new wing configuration will be continued after 15 August 1948.

5. No provisions shall be made for water injection.

6. No provisions shall be made for assist take-off devices.

7. Instrumentation of the wing nacelle and power plant installations, similar to that supplied for the same installations on #1 XP-87, shall be provided.

8. Changes to the tail configuration to adopt the larger wing shall be made in conjunction with the larger wing. These changes will include such items as:

   a. Incorporate higher angular stabilizer adjustment both for landing and Vmax conditions.
   b. Use of new elevator with 6 inch longer chord.
   c. Changes to elevator tabs.
   d. Changes to the dorsal fin.
   e. Addition of booster system for the elevator.

9. Provisions shall be made for the installation of tip tanks.

10. Since the purpose of the experimental wing shall be mainly to obtain aerodynamic data, the construction of the subject wing shall utilize:

    a. Optimum beam location to fit the XP-87 fuselage and landing gear structure.
    b. No tapered skins.
    c. XP-87 landing gear.
    d. Load factors of 7 in lieu of 9.07 so that detailed structural analysis will not be required.

11. No anti-icing system shall be provided in the wing.

12. This Contractor, in the interest of expediting this project, will use a simplified drawing system adapted to facilitate the project. Therefore, engineering information furnished to AMC will be limited to copies of drawings and data actually used in the construction and installation of the experimental wing and nacelles.

13. No wind tunnel model construction or testing shall be considered as part of this program. Similarly, no ground or flight testing shall be considered as part of this program.

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ENCLOSURE (C)

COST ESTIMATE BREAKDOWN

ENLARGED WING CN NO. 2 XP-87 AIRPLANE

PRODUCTIVE		
	Material	$ 43,800
	(Labor Hours)	(183,100)
	Labor @ $1.67/hr	305,677
	Overhead @ 150%	458,815
	Total Productive	$ 808,493
TOOLING		
	Material	$ 10,220
	(Labor Hours)	(30,108)
	Labor @ $1.67/hr	50,280
	Overhead @ 150%	75,420
	Total Tooling	$ 135,920
TEMPLATES		
	Material	$ 2,370
	Labor	10,350
	Overhead	24,525
	Total Templates	$ 42,245
ENGINEERING		
	Labor	$ 154,000
	Overhead	154,000
	Total Engineering	$ 309,200
TOTAL COSTS Less G & A		$ 1,296,558
G & A @ 8%		103,725
TOTAL COST Including G & A		$ 1,400,283
Credit resulting from J-35 Contract W 33-038 ac-19837		553,347
Amount required in addition to Contract W 33-038 ac-19837		$ 846,936
Amount allocated (less spares) by Contract W 33-038 ac-19837		572,347
TOTAL REVISED CONTRACT		$ 1,419,283

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BREAKDOWN OF

COST INCREASE RESULTING

FROM ENLARGED WING

REQUIREMENTS

PRODUCTIVE	
Material	$ 29,454
(Labor Hours)	(140,381)
Labor @ $1.67/hr	234,447
Overhead @ 150%	351,672
Total Productive	$ 615,572
TOOLING	
Material	6,103
(Labor Hours)	(8,[illegible])
Labor @ $1.67/hr	13,[illegible]91
Overhead @ 150%	19,[illegible]51
Total Tooling	$ 51,626
TEMPLATES	
Material	$ 1,570
(Labor Hours)	(3,570)
Labor @ $2.00/hr	5,742
Overhead @ 100%	5,742
Total Templates	$ 13,054
ENGINEERING	
(Labor Hours)	$ (30,937)
Labor @ $2.00/hr	61,873
Overhead @ 100%	61,873
Total Engineering	$ 123,746
TOTAL COST (Less G & A)	$ 784,200
G & A @ 8%	62,736
TOTAL (Including G & A)	$ 846,936

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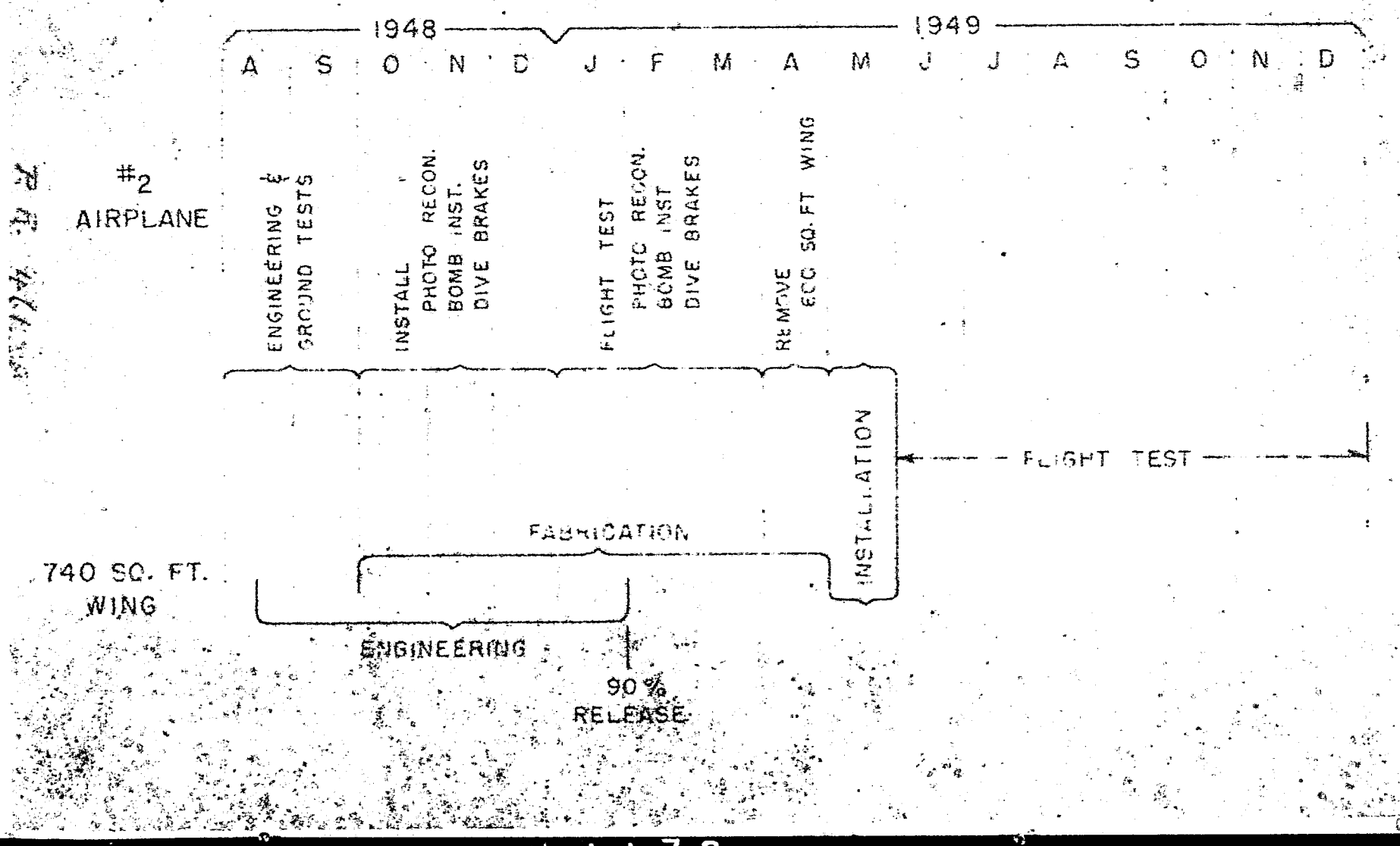
XP-87 SCHEDULE

ENCLOSURE (A)



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CONFIDENTIAL 24

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D. C.

AUG 12 1948

SUBJECT: Fire Control System for F-87 Aircraft

TO: Commanding General, Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

1. Information is requested as to whether the fire control system presently being developed by Glenn L. Martin Company can be installed, without major modification, in the F-89 aircraft.

2. This information is desired as additional justification for authorizing negotiation of contract for production engineering, tools, sub-assemblies, etc., inasmuch as there is a possibility of the F-89 being procured in addition to or in lieu of the F-87.

BY COMMAND OF THE CHIEF OF STAFF:

Ruthven Smith CalUSAF

ALFRED A. KESSLER, JR.
Brigadier General, U.S.A.F.
Director, Procurement & Ind.
Planning, DCS/Materiel

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HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE
DAYTON, OHIO

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL, AIR MATERIEL COMMAND, ATTENTION FOLLOWING OFFICE SYMBOL:

MCPPIA

MCPPIA&1/PMB/djb/F-2,24

25 August 1948

SUBJECT: Contract W33-038 AC-20450.
F-87B Series Airplanes -
Reduction in Weight.

TO : Chief of Staff
U. S. Air Force
Washington 25, D. C.

Attn: Director, Procurement & Industrial Planning Office,
Deputy Chief of Staff, Materiel.

Reference: Military Characteristics for Aircraft (Proposed), dated 23 September 1947.

1. The Air Materiel Command has been vigorously prosecuting a weight reduction program for subject airplane and as the following weight saving changes require Headquarters, USAF final approval, they are herewith forwarded for that action.

a. A reduction in the thickness of the airplane armor plate from 5/8" to 1/2" and from 3/8" to 5/16". The present 5/8" armor plate extends from behind the Pilot's and Navigator's head down approximately nine (9) inches, and from this point to the bottom of the seats, 3/8" armor plate is used.

It is believed the protection from fragmentation, afforded by the 1/2" and 5/16" armor plate, will be satisfactory and comply in every way with Military Requirements. Foregoing is based on the fact that during the last hostilities, USAF aircraft with 1/2" and 5/16" armor plate operated successfully against ME-109 - 20mm shrapnel. The tumbling effect of the thes thin skinned aircraft was considered satisfactory and the tumbling effect of subject airplane will be far superior due to the thick skins to be used in production airplane. The reduction in thickness of armor plate will effect a weight saving of approximately eighty-three (83) pounds. It is believed, the foregoing request for reduction in armor plate thickness is consis[redacted] approved for production F-88 airplanes.

[redacted]

b. Omit bomb bay door operating mechanism, including the hydraulic struts and linkag[redacted]all be considered as overload items along with the doors on the F-87B. The XF-87A will include the bomb bay

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CONFIDENTIAL -14

AMC/MCPPIA41/FWR/4Jb/P-2,24 ltr, 6/25 Aug 48, subject: AC-20450, P-67B Spns. Reduction in Weight - to C/S, Hqs, USAF, Attn: DC/SM

door mechanism in the design gross weight.

(1) The operation of bomb bay doors in the P-67B will not be required on normal fighter missions, but when same is desired, it can be expeditiously accomplished and with a minimum of effort. The omission of the bomb bay door mechanism will effect a decrease in weight of approximately forty-eight (48) pounds.

2. The reduction of thickness in armor plate, and omission of bomb bay operating mechanism as outlined above, will decrease the airplane weight approximately one hundred thirty-one (131) pounds and accordingly therefore, approval for this action is requested.

FOR THE COMMANDING GENERAL:

D Wbrahaw

GEORGE E. SCHAEFFER, JrCol
Colonel, USAF
Chief, Aircraft and
Missiles Section,
Procurement Division

cc: Dayton AF PEO

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Contract Files

Reports in triplicate
C— 36954
Class— 01-C

CHANGE ORDER

UNITED STATES AIR FORCE
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

rms/ob/rlp

Date 30 August 1948
Change Order No. 15 to
Contract No. W 33-038
as amended ac-6266

Copy Received; Sufficient Funds Have Been Obligated To Cover The Maximum Amount of Liability Which The Government is Obligated To Pay Under This Instrument.
BUDGET AND FISCAL DIVISION
SEP 20 1948
By

To: Curtiss-Wright Corporation, Columbus 16, Ohio

SUBJECT: CCN 10 (N-53883)

1. Contract W 33-038 ac-6266, as amended, is hereby further amended by providing that the Contractor shall accomplish the changes on XF-87 airplane, Serial No. 45-59600, as more specifically set forth in Contract Change Notification 10 (N-53883), dated 23 July 1948, incorporated herein by reference, at a total increase in contract price of $26,981.00

2. The provisions of paragraph 1 hereof supersede Contract Change Notification No. 10 (N-53883), and completes all the work directed by said Contract Change Notification and no further adjustment of the contract price shall be made by reason of said Contract Change Notification.

3. Contractor warrants that no amendment heretofore made to the contract has established the effect upon the contract price of any of the work for which the effect upon the contract price is established herein.

4. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles or supplies, or to perform any work, as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable to the extent stated therein to any articles, supplies or work called for hereby or otherwise referred to herein.

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5. The following Article is applicable to the additional work called for in paragraph 1 hereof:

"Renegotiation. - (a) This contract is subject to the Renegotiation Act of 1948. The Contractor agrees to furnish quarterly to the Contracting Officer (or to such person and at such times as may be otherwise prescribed by regulations issued under the Renegotiation Act of 1948) a report showing the name and address of each person and firm to whom is issued a contract or purchase order in excess of $1,000 to make or furnish any article or to perform all or any part of the work required for the performance of this contract. Such report shall refer to the number assigned to the prime contract with the Government.

This change order has been (negotiated pursuant to) Public Law 413, 80th Congress, Sec. 2(c)(10).

Sheet 1

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"(b) The Contractor agrees to file with the Contracting Officer on or before the first day of the sixth month following close of its fiscal year (or with such person and at such time as may be otherwise prescribed by regulations issued under the Renegotiation Act of 1948) a financial statement setting forth such information as may be prescribed by regulations as necessary to carry out the Renegotiation Act of 1948.

"(c) The Contractor agrees to insert the provisions of this Article, including this paragraph (c), in all contracts and purchase orders in excess of $1,000 to make or furnish any article or to perform all or any part of the work required for the performance of this contract."

6. The provisions of paragraphs (a) and (b) of Article 36 of the contract shall be applicable to the additional work called for under this Change Order No. 15.

7. ThisChange Order consists of Sheets 1, 1-A and 2.

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AYSC Form No. 71-3018

	fixed price	$ 25,981.00
Total increase in [redacted]		$
		$ 26,981.00

This Change Order has been negotiated pursuant to Public Law 703, 76th Congress, as amended by Public Law 880, 77th Congress, Section 18, Title II of the [redacted] First War Powers Act, 1941, and Executive Order No. 9001, 27 December, 1941.

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

THE UNITED STATES OF AMERICA

12 October 1948
(Date)

BY: Stephen Lovas
Contracting Officer.
STEPHEN LOVAS

1ST INDORSEMENT

TO: CONTRACTING OFFICER:

Columbus 16, Ohio 29 September 1948
(Place) (Date)

1. Contractor hereby accepts the above Change Order.

Curtiss-Wright Corporation (SEAL)
Airplane Division

BY: Edwin J. Buckyet
(Signature of Official with Office Held)
Edwin J Buckyet - Representative

Initiator: O. B. Thornton, Capt., USAF
Exp. Ord. No. 450-256 (MCREOA-4)
PR: 53781

APPROPRIATION

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Debit
5790200, 902-7004 P 611-09 S 53-058 - $26,981.00

Change Order No. 15 to Contract No. W 33-038 ac-6266

Sheet 2

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(AF) 1 Apr 46)

INSERT OFFICE SYMBOL AND FULL SIGNATURE IN APPROPRIATE BLOCK

CG, CO OR DIRECTOR

AIR INFORMATION

PUBLIC INF. OFFICE

COMPTROLLER

PERSONNEL & ADM.

RESEARCH & DEV.*

INTELLIGENCE

SUPPLY AND MAINT.

OPNS. & MOB. PLANS.*

CONFIDENTIAL

Ltr, Hq, USAF Air to AGO 414 12 August 1946, subject: Fire Control System for P-87 Aircraft.

1st Ind. MCPTAM/rnd/431/Tech

Hq, Air Material Command Wright-Patterson AF Base, Dayton, Ohio, 30 August 1946.

TO: Chief of Staff, U.S. Air Force, Washington 25, D.C., Attn: Director, Procurement & Industrial Planning Office, MCS/K.

The fire control system as outlined in basic letter can be readily installed in P-87 aircraft with very little, if any modification. This fire control system, which is now standardized and designated as T9A2 type 3-I, will be specified for incorporation as a precaution item on any production P-87 and/or P-88 aircraft.

FOR THE COMMANDING GENERAL:

Whitwell T. Tison Col USAF
for Brigadier General, USAF
Chief, Procurement Division

*AREA COMMANDS WILL LINE OUT ORGANIZATIONAL TITLE NOT APPLICABLE WHEN ADDITIONAL SPACE IS NEEDED IN COORDINATION BLOCK

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CONFIDENTIAL 14

Basic Ltr fr Hq AMC, Wright-Patterson AFB, Dayton, Ohio, dtd 27 Jul 48, subj: "Request for Authority to Proceed with Procurement of F-87 and RF-87 Airplanes"

1st Ind. AFMIR-2

HQ UNITED STATES AIR FORCE, Washington 25, D. C. 17 August 1948

TO: Commanding General, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio ATTN: MCPPXA4

1. With reference to basic communication, information is requested regarding the effect on the F-87 and RF-87 Program if authority to complete definitive contract is withheld until after:

a. The F-89 has flown and been evaluated.

b. Curtiss-Wright Corporation has demonstrated a satisfactory flying article incorporating AMC's proposed changes.

BY COMMAND OF THE CHIEF OF STAFF:

ALFRED A. KESSLER, JR.
Brigadier General, U.S.A.F.
[redacted]

2d Ind.

Hq, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio.

To: Chief of Staff, U. S. Air Force, Washington 25, D. C. Attn: MC/S, Materiel Sect.

1. The Air Materiel Command again requests the authority to proceed with the F-87 procurement program for the following reasons:

a. At the time the F-87 was originally planned for procurement and programmed to satisfy the Air Force requirements it appeared to be the most desirable airplane available that had been designed to the military characteristics of an all-weather fighter. Subsequent flight testing of the experimental airplane proved that it not or exceeded all its performance

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Basic ltr fr Hq AMC, W-P AFB, Dayton, Ohio, dtd 27 Jul 45, subject: "Request for Authority to Proceed with Procurement of F-87 and RF-87 Airplanes."

24 Ind. (Continued)

guarantees and the military characteristics to which it was designed. However, certain undesirable flight characteristics were noted during preliminary evaluation flights by AMC pilots. At this time the AMC determined it desirable to defer final execution of a definitive contract for production quantities until these undesirable features could be resolved.

b. Engineering studies by the Contractor and AMC revealed that an increase of wing area would eliminate the undesirable flight characteristics and provide flight characteristics comparable with the F-80, the adopted standard jet fighter. Therefore the AMC determined it desirable to proceed withthe procurement program as planned in order to meet the established schedule requirements. Further, it was determined desirable to proceed with the fabrication of a set of the larger wings for the second experimental airplane in order to gain engineering knowledge of the new configuration and to obviate future difficulties which are often encountered in adapting an experimental airplane to production.

2. The AMC considers it mandatory that this program be released immediately since the contractual coverage afforded by letter contract W33-038 ac-20490 no longer allows program continuity as evidenced by the attached letters from the contractor. In this connection it is desired to point out that the revised USAF 5-Year aircraft procurement schedule as distributed by Hq USAF with approval by the Chief of Staff as of 6 Aug 45 includes the F-87 airplane. This program with complete comparisons was presented to the Air Staff on 5 Aug and was subsequently approved on 6 Aug 45. The AMC was of the opinion that this constituted authority to proceed with procurement of aircraft as shown on the program, but if this assumption is incorrect, a delineation of policy is requested.

3. With reference to the request for information contained in the 1st Indorsement the following is submitted:

a. The F-87 airplane is presently undergoing phase I flight testing at Muroc Lake and to date no major deficiencies have been discovered; however only four short flights have been conducted, and no conclusions can be drawn at this time. It is estimated that a minimum of four months will be required to complete the necessary flight testing and evaluation of the proposal for a production configuration since it is already known that several major engineering changes are necessary in order to make it a satisfactory production airplane.

b. The second XF-87 with the production wings, engines, and nacelles, is scheduled to fly in June 1946. Every effort was made to improve this schedule but because of the nature of the type of manufacturing required, it

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Basic Ltr fr HqAMC, W-P AFB, Dayton, Ohio, dtd 27 Jul 45, subject: "Request for Authority to Proceed with Procurement of F-87 and RF-87 Airplanes."

2d Ind. (Continued)

was impossible to accomplish the work in less time. This schedule will give seven months of flying on the airplane prior to delivery of the first production airplane, which is highly desirable in gaining flight experience on a production prototype.

c. If the F-87 program is deferred until after the accomplishment of the action indicated in 3 a or 3 b above, the delay would be intolerable for several obvious reasons.

4. Since the quantity of this type airplane required for the 70-group program is such that two types must be procured, the AMC is of the opinion that the F-87 should logically be one of the two. Preliminary pilot observation flights by AMC pilots are to be conducted immediately, and if the F-89 proves to be a more desirable airplane than the F-3D, it can still be procured to fulfill the additional quantity required.

5. The desirability of proceeding with the F-87 program is enhanced by the fact that a go-ahead at this time will assure the delivery of an all-weather fighter as scheduled while any further delay will make this impossible. Further, should some other airplane prove more desirable during subsequent months this contract could be terminated without serious loss to the Government considering the advantages gained.

2 Incls:
Incl 1 C-4 ltr 8-30-45
EJD:af-271
Incl 2 C-4 ltr 8-30-45
EJD:af-272

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Ha AMC Form No 10-513 (Rev 20 Feb 48

WF-L-15 JUN 48 200M

HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE
DAYTON, OHIO

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL, AIR MATERIEL COMMAND, ATTENTION FOLLOWING OFFICE SYMBOL

[illegible] MCPTR-3

1 September 1948

SUBJECT: Request for Patent Application.
Model XB-47 airplane.

TO : Chief, District Procurement Field Office
[illegible] South LaSalle Street
Chicago 3, Illinois

Attn: Lt. Colonel [illegible]

Reference: AMC Ltr [illegible] dated 8 Jan 1948.

Enclosure: (A) Certificate of Insp. Ltr. [illegible]
dated [illegible] to AMC (orig)

1. Enclosure (A) certifies that the items presented by the subject contractor, Curtiss-Wright Corporation, Clifton, N. J. Dayton, Ohio Procurement Field Office have met the criteria with respect to the patent information of the aerial [illegible], as set forth in the referenced letter. It is requested that your office investigate the [illegible] of presented [illegible] and, if found to be patentable, file application for patent.

2. The subject aircraft is a [illegible] which is equipped with [illegible] engines which will be installed in the prototype XB-47 airplane. It is the understanding that the [illegible] this engine, i.e., that the engine project is [illegible] and this aircraft is intended for [illegible].

3. Please refer to this number in your reply.

BY DIRECTION OF COMMANDING GENERAL:

[illegible]
Chief, Patent Division

cc: Dayton AF TIC
Wright-Patterson Aero.

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v 1 Apr 48)

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MCPXX41/JW2/45

1 September 1948

SUBJECT: Request for Permission to Negotiate Purchase Request Number 46628.

TO : Under Secretary of the Air Force

THROUGH: Chief of Staff
United States Air Force
Washington 25, D. C.

Attn: Director, Procurement & Industrial Planning Office,
Deputy Chief of Staff, Materiel.

1. Pursuant to Armed Services Procurement Regulation 3-302, there is forwarded a proposed statement of the required Findings and Determination, prepared for signature of the Under Secretary of the Air Force, requiring authority to negotiate the following procurement:

a. Contractor: Curtiss Wright Corporation
Columbus 16, Ohio

b. Services: The contractor shall design and fabricate an enlarged (740 square foot) wing and install same on the No. 2, XB-37 airplane, redesignated YB-37. This installation will be accomplished in conjunction with the J35 engines and nacelles, and in so doing will provide a complete prototype of the new wing assembly for production airplanes, while flight testing is being continued on the No. 1 airplane.

c. Prices: Estimated cost - $846,936.00

d. Time of Performance: Within ninety (90) days from receipt of an award.

e. Funds: Fiscal Year 1949.

f. Research and Development: This is required for a production prototype airplane in order that the necessity for increasing the wing area may be proven. The amount required, it is anticipated, will be sufficient to complete the work.

H.A. Craigie
D.L. Graham
E. E. Eschenburner

OTHER 1 - 160562

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AMC Form No. 10-7
(Re Apr 48)

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AIR INSPECTOR

PUBLIC INF. OFFICE

COMPTROLLER

PERS EL & ADM.

RESEARCH & DEV *

INTELLIGENCE

SUPPLY AND MAINT

PROC & IND. MOB PLNG *

OTHER

Ltr to Under Secretary of the Air Force thru C/S, Hq, USAF, dtd September 1948 from AMC/[illegible]/JWW/djb, subject: Request for Permission to Negotiate Purchase Request No. 46628.

g. Selection of Source: Contractor has nearly completed contract W33-038 AC-6266 for the No. 1 and No. 2, XP-87 airplanes. Because of the Contractor's know-how, developed over a period of 2-3 years in building this particular type of fighter airplane and because the contractor has built these airplanes to their present state of completion, it will be to the best interest of the Government for the contractor to complete this project.

2. Negotiation of this procurement is authorized under Section 2 (c) (11), Public Law 413, 80th Congress since it is for the manufacture and furnishing of supplies for experimentation, development, research and tests.

FOR THE COMMANDING GENERAL

Lt Col USAF

for Brigadier General, USAF
Chief, Procurement Division

Approval Recommended:

K. B. WOLFE
Major General, USAF
Director, Procurement and Industrial Planning

Incl:
Statement

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AMC Form No. 10-7
Apr 45

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PERSONNEL & ADM

RESEARCH & DEV.*

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PROC & IND. MOB PLNG.*

OTHER

FINDINGS AND AUTHORIZATION

The USAF proposes under Purchase Request Number 46638, a Change Order to Contract W33-038 ac-19837 with the Curtiss-Wright Corporation, Columbus 16, Ohio, to design and fabricate a (740) square foot wing and install same on the No. 2, XP-87 airplane. This is required as a production prototype airplane in order that the necessity for increasing the enlarged wing area may be proven. This installation will be accomplished in conjunction with the J35 engines and nacelles, and in so doing will provide a complete prototype of the new wing assembly for production airplanes. This model will be redesignated YP-87 airplane.

I hereby find that:

This procurement, the estimated cost of which amounts to $46,936.00, is chargeable to project 110, Fiscal Year 1949 funds.

Supplies: The items of work to be procured constitute additional procurement since the program involves shifting the engine installation of the XP-87 airplane at the same time and providing for a production type J35 engine, in lieu of Model J47 engine, as well as, incorporating a larger wing and changes related thereto, and required under change order over and above that called for in the basic contract. This procurement is for the manufacture and furnishing of supplies for experimentation, development, research and tests.

The procurement is required in the interests of National Defense.

Upon the basis of the findings set forth above, I hereby determine that pursuant to section 2 (c) (11), Public Law 51, 80th Congress, negotiation of a change order for the above described procurement is authorized.

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[illegible] dq. AAC, Wright-Patterson AFB, Dayton, Ohio, dtd 27 July 48, subj: "Request for Authority to Proceed With Procurement of [illegible] Airplanes".

AFMPI/Col. Smith/rw/2936

3rd Ind.

Hq. United States Air Force, Washington 25, D.C. 3 September 1948

To: Commanding General, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio ATTN: [illegible]

1. This headquarters has reviewed correspondence submitted with your basic letter dated 1 September 48 to basic letter dated 27 July 48, subject as above.

2. Your request to proceed with the B-47 procurement program is approved. This approval is predicated on the recommendation of the Commanding General, Air Materiel Command, as contained in the basic Ind. above, that it is mandatory that this program be released immediately.

By Direction of the Chief of Staff:

3 Incls:

Incl: 1 & 2 w/c
Added:
Incl 3 - copy of
teletype
same subj.

H. A. CRAIG
Lieutenant General, USAF
Deputy Chief of Staff, Materiel

AFMPI

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MESSAGEFORM

MESSAGE CENTER No.	TRANSMITTING MEANS	CRYPTOGRAPH OR CLEAR TEXT

CALLS	STA. SER. No.	PRECEDENCE	TRANSMISSION INSTRUCTIONS	ORIGINATOR	DATE-TIME GROUP
V	NR			MPF	

ACTION	INFORMATION	EXEMPT	OPERATING SIGNALS	GROUP COUNT
				68

SPACE ABOVE FOR SIGNAL CENTER ONLY

FROM: (Originator)

~~HQ USAF AFMPI~~

ACTION TO:

CG AIR MATERIEL COMMAND

WRIGHT-PATTERSON AIR FORCE BASE

DAYTON, OHIO

INFORMATION TO:

SECURITY CLASSIFICATION

~~CONFIDENTIAL~~

PRECEDENCE FOR

ACTION	INFORMATION

☐ ORIGINAL MESSAGE

X REFERS TO ANOTHER MESSAGE

IDENTIFICATION	CLASSIFICATION

7824

FROM AFMPI SIGNED AFCCS

THIS HEADQUARTERS HAS REVIEWED CORRESPONDENCE SUBMITTED WITH YOUR SECOND INDORSMENT DATED ONE SEPTEMBER FOUR EIGHT TO BASIC LETTER DATED TWO SEVEN JULY FOUR EIGHT SUBJECT REQUEST FOR AUTHORITY TO PROCEED WITH PROCURSMENT OF FOX EIGHT SEVEN AND RICHARD FOX EIGHT SEVEN AIRPLANES PD YOUR REQUEST TO PROCEED WITH FOX EIGHT SEVEN PROCUREMENT PROGRAM IS APPROVED PD THIS APPROVAL IS PREDICATED ON THE RECOMMENDATION OF THE COMMANDING GENERAL, AIR MATERIEL COMMAND AS CONTAINED IN THE SECOND INDORSEMENT TO BASIC LETTER THAT IT IS MANDATORY THAT THIS PROGRAM BE RELEASED IMMEDIATELY.

SECURITY CLASSIFICATION — AUTHORIZATION

CONFIDENTIAL

ORIGINATING AGENCY

SYMBOL	DATE-TIME GROUP	SIGNATURE	PAGE OF
AFMPI/Col. Smith/mw/2936	5 Sept 48	PHILIP W. SMITH Col. USAF	

WD AGO FORM 11-168 15 JUN 1943 This form supersedes WD AGO Form 11-168, 28 Aug 44, and WD AGO Form 601, 12 Mar 43, which are obsolete.

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PRIORITY

MCPPXA41/HMF/djb/F-1

HQS, AMC 7 SEP 46

GEORGE E. SCHAETZEL, Colonel, USAF
Chief, Aircraft & Missiles Section,
Procurement Division

CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION
COLUMBUS 16, OHIO

THRU: AF INSPECTOR IN CHARGE.

MC PXA41-9-2 . . . . . REFERENCE AMC MCPPXA41-4-5 DATED 11 APRIL 1946.....

CONTRACTOR IS AUTHORIZED TO PROCEED IMMEDIATELY WITH FABRICATION OF (58) F-87C AND (30) RF-87C TYPE AIRPLANES, IN ACCORDANCE WITH CURTISS-WRIGHT SPECIFICATIONS 29-Z-10 AND 29-Z-11 RESPECTIVELY, TO INCLUDE SPARE PARTS EQUIVALENT TO 7 PERCENT AIRFRAME COSTS, SPECIAL TOOLS AND GROUND HANDLING EQUIPMENT EQUIVALENT TO 2.06 PERCENT, ONE STATIC TEST ARTICLE, COCKPIT MOCK -UP, TECHNICAL DATA, AND ADDITIONAL SPECIAL TOOLING REQUIRED TO ACCELERATE TO PEAK RATE OF (19) AIRCRAFT PER MONTH BY 1951. ABOVE AIRCRAFT ARE TO BE DELIVERED IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

	1950											1951
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN
F-87C	1	2	2	3	4	4	5	6	6	6	7	7	
RF-87C						1	3	3	4	4	4	5	5

CANCELLED EXPENDITURE CONTROL SEC. BUDGET & FISCAL OFFICE WRIGHT FIELD DAYTON, OHIO DEC 1 1948

FUNDS ON SUPPLEMENTAL FISCAL YEAR 1946 APPROPRIATION ARE AVAILABLE FOR THIS PROCUREMENT. INFORMATION RELATIVE THIS PROCUREMENT IS RESTRICTED AND NOT TO BE DISCLOSED. TELEGRAPH ACCEPTANCE OF THIS ORDER IS REQUESTED. SIGNED: W.A. DAVIS, LT. COLONEL, USAF, CONTRACTING OFFICER.

PR NO.	PROJECT NO. F.I. FUNDS	QUANTITY	TYPE	CONTRACT	PR AMOUNT
48928	110/1946	58	F-87C	ac-20450	48,677,984
		30	RF-87C		

cc: C-W Dayton Rep.
DAYTON AF RPO
MCCRIE (2)
MCPPIS - Mr. White

PR-48928-Cancelled (8 SEPT. 1948)

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File 59 (11)

J-33 Engines for XF-87 Airplane

MCREOA-6 MCREOA-4 8 Sept 48 1

1. As a result of the recent "Preview" Phase II flying conducted by Flight Test Division pilots on the XF-87 at Muroc, the Procurement Division, Air Materiel Command has decided to increase the wing area of the production airplanes from 600 to 740 sq. ft. in order to improve certain performance features of the airplane. The Engineering Division therefore will install a 740' wing on the No. 2 XF-87 in order to provide a prototype wing at least from the aerodynamic standpoint. In so doing about six to eight months of additional time in which to make the J-33 engine installation are gained provided the J-33's are installed in the second airplane rather than in the first as originally intended. This additional time will allow the installation of production type engines (J-33-29) which is of course more desirable than making the interim J-33-A8 engine installation.

2. Accordingly, it is requested that the procurement action with Allison to provide the J-33-A8 engines be changed to call for J-33-29 engines and the starter procurement with Westinghouse for A8 starters be cancelled.

3. Additional action should then be taken with an approved source to provide starters for the J-33-A8 engines.

HUGH A. GRIFFITH, JR.
Lt. Colonel, USAF
Chief, Fighter Branch
Aircraft Projects Section

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XF-87

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CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

ERAshw-377

To contract file
Esch 10/22/48

This proposed project has been abandoned Esch

Subject: Contract W33-038 ac-19837
Phase III Flight Testing
XP-87 Airplane No. 1

To: Commanding General
Air Material Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCREDA

Through: AF Inspector In Charge
Curtiss Wright Corporation
Columbus 16, Ohio

Through: Chief, Dayton AF Procurement District Office
Air Material Command
Wright-Patterson Air Force Base
Dayton, Ohio

References: (a) CW Ltr ERA:hw-156 dated 16 April 1948
(b) CW Ltr ERA:af-252 dated 11 August 1948

Enclosure: (A) Phase III Flight Test Program Outline
(B) Cost Estimate breakdown

1. Because of the recent decision to install an enlarged wing and the J-33 engine installation on No. 2 XP-87 Airplane in lieu of No. 1, as proposed by the Contractor's letter reference (b), it is necessary to revise the flight test program for No. 1 XP-87 Airplane now at Muroc. The original Phase III-A flight test program, quoted by reference (a), is therefore cancelled and superseded by the enclosure for Phase III flight testing submitted herewith.

2. Inasmuch as XP-87 Airplane No. 1 will remain at Muroc after the completion of Phase II flight testing for the purpose of investigating and correcting stability and control items, the Contractor has prepared a tentative Phase III flight test outline which is submitted herewith as Enclosure (A) for consideration and approval by the Air Material Command. The quotation contained herein for accomplishing Phase III flight testing for a total estimated price increase of $452,804 is based on a program substantially in accordance with Enclosure (A) attached hereto. A breakdown of the above quoted amount by stages is contained in Enclosure (B).

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Subject: Contract [illegible] ac-1[illegible]
Phase III Flight Testing
XF-[illegible] Airplane No. 1

10 SEPT. 1948

To: Commanding General, AMC Page Two

3. As noted above, the Phase II flight test program satisfied retain is based on the following stages which will be accomplished in accordance with the [illegible] noted:

STAGE I - This portion of the program will be accomplished immediately following completion of Phase II tests for the purpose of investigating and correcting stability and control items considered unsatisfactory as a result of the Phase II tests. Costs are based on ten hours of flight at Muroc for a period not to exceed four weeks. If a stage I of the program involves an estimated additional six hours of flight time for ferrying the airplane from Muroc to Columbus, with a period not to exceed two weeks for the preparation of the airplane for flight to Columbus and the actual return flight [illegible] time.

STAGE II - A 75-hour flight program to be conducted at Lockbourne Army Air Base for the purpose of conducting stability and control performance and turret tests is contemplated by this portion of the program. Such 75-hour flight is not to exceed a period of six months, however.

STAGE III - A 20-hour flight test program at Lockbourne is covered by this portion of the program for the purpose of evaluating the simulated turret and to determine the effect on flight performance of the airplane. Such program of flight testing of the turret is not to exceed a period of two months. Attention is invited to the fact that this portion of the program contemplates flight test evaluation of the turret only, and does not cover fabrication-installation charges which have previously been covered by change Order No. 1 to subject contract.

STAGE IV - A 20-hour flight test program at Lockbourne Army Air Base for the evaluation and flight performance effects of the Martin turret, such program not to exceed three months elapsed time. Costs for this portion of the program, likewise, cover the flight test evaluation only, the Martin turret installation costs being subject to separate negotiations.

STAGE V - A 20-hour flight test program at Lockbourne for structural demonstration purposes, such demonstration not to exceed two months elapsed time.

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Subject: Contract W[illegible]-58 ac-19637
Phase III Flight Testing
XF-87 Airplane No. 1

10 SEPT. 1948

To: Commanding General, AMC Page Three

4. It will be noted from the above outline that the actual flight investigation program is estimated to require approximately fifteen (15) months. However, attention is invited to the intervals for installation and removal of the turrets necessary for the accomplishment of Stages III and IV. Such installation and removal time requirements necessarily will prolong completion of the program. Therefore, it is possible only to estimate the flight test elapsed time requirements by stages as set forth above.

5. In view of the nature of this program, this proposal is submitted on the understanding that the price quoted ($452,804) will be subject to price redetermination provisions, with a ceiling of 10% ($45,280) on upward redetermination, or a maximum allowable price of $498,084.

6. This quotation includes consideration for flight bonus in the amount of $40,000, the same amount as was contained in the Contractor's Phase III-A quotation, reference (a). Although the Phase III program submitted herewith reflects a reduction in total flight hours as compared to Phase III-A, such reduction constitutes an elimination of those portions of the flight test program which are considered less hazardous. Inasmuch as the most difficult and dangerous flight test evaluations have been retained for Phase III, use of the above mentioned bonus rate is considered equitable. The labor costs contained in Enclosure (b) are based on maintenance and service functions only during Phase III and do not include consideration for repairs or replacements resulting from damage or failures. The labor rates applied reflect the actual rates, insofar as possible, of the personnel who will be assigned to the project. Both the Muroc and Lockbourne portions of the program are based on a work-week of five, ten-hour days, which is compatible with the current operation under Phases I, I-A and II. Overtime premium amounting to five hours per week has been included for all hourly workers and a 50% bonus for salaried personnel. Per diem expenses during Stage I at Muroc are calculated at the rate of $7. The per diem rate for the Lockbourne phases of the program is $4, to cover transportation and other expenses away from the Columbus plant.

7. It will be noted that the overhead application contained in Enclosure (b) is in accordance with the previous flight test program quotations submitted by this Contractor for work to be accomplished away from the Columbus plant, a rate of 35% having been applied in such instances. Engineering overhead is calculated at the rate of 100%. No G & A overhead has been applied to the Columbus direct labor costs involved in this program inasmuch as such Columbus costs are considered minor; the general and administrative overhead factor therefore is waived and the quotation submitted on the same basis as the original flight test quotations.

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Subject: Contract W[illegible] 38 ac-19037
Phase III Flight Testing
XP-[illegible] Airplane No. 1

10 SEPT. 1948

To: Commanding General, AMC Page Four

8. The Air Materiel Command's early consideration of the quotation submitted herewith will be appreciated inasmuch as formal contractual coverage for the conduct of Phase III will be necessary if such program is to be continued immediately following the Phase II Army conducted program.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

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Curtiss Wright Corp. 3-7-47
Ltr. R RA: Ltr. 10 Sept. 1945

ENCLOSURE (B)
SUMMARY OF ESTIMATED COSTS

PHASE III FLIGHT TEST

	Stage I	Stage II	Stage III	Stage IV	Stage V	Total
Productive						
Flight Test Material	$ 5,549	$ 26,010	$ 6,937	$ 6,936	$ 6,936	$ 52,368
Miscellaneous Material	1,380	2,600	900	1,300	900	7,080
Automotive Equip Maintenance	736	1,170	405	585	405	3,321
Per Diem Expense	2,582	7,280	2,520	3,640	2,520	21,546
Total Productive Material	$13,271	$ 37,060	$10,762	$ 12,461	$10,761	$ 84,315
Labor (Air Base)	10,938	35,050	12,075	17,[illegible]	12,075	87,863
Overhead 35%	3,828	12,268	4,226	6,1[illegible]	4,226	30,862
Overtime Premium	1,546	2,473	1,832	2,737	1,832	13,046
Total Productive Costs	$29,583	$ 89,851	$28,958	$38,657	$ 28,957	$216,306
Engineering						
Material	$ 3,528	$ 6,840	$ 1,156	$ 1,970	$ 2,312	$ 15,906
Labor (Columbus)	980	4,160	1,408	2,080	1,408	10,016
Overhead 100%	980	4,160	1,408	2,080	1,408	10,016
Labor (Air Base)	9,360	40,560	6,864	11,830	13,728	82,342
Overhead 35%	3,276	14,196	2,402	[illegible],141	4,805	28,820
Overtime Premium	936	4,056	686	1,183	1,373	8,234
Total Engineering Cost	$19,120	$ 73,972	$13,924	$ 23,284	$ 25,034	$ 155,334
Flight Bonus *						40,000
Total Cost	$48,603	$163,823	$42,882	$ 62,141	$ 53,991	$ 411,640
Profit 10%	4,860	[illegible],382	4,288	6,214	5,399	41,164
Total Price	$ 53,463	$180,205	$ 47,170	$ 68,355	$ 59,390	$ 452,804

* Flight Bonus shown in total column only

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CO, CG OR DEPUTY

AIR INSPECTOR

BUFFALO

PUBLIC INF. OFFICE

COMPTROLLER

PERSONNEL & ADM.

RESEARCH & DEV.

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SUPPLY AND MAINT.

PROC. & PHI. REL. ...

BUFFALO/EMP/ACS/P-7

23 September 1948

SUBJECT: Contract W33-038 ac-19697.
Model XF-87 Airplanes.
Photographic Viewfinder Procurement.

TO : Curtiss-Wright Corporation
Airplane Division - Plant No. 3
4300 East Fifth Avenue
Columbus 16, Ohio

Through: AF Officer In Charge

Reference: C-W ltr [illegible]-33 dated 5 August 1948.

1. In referenced letter the Contractor submitted quotation for the procurement of photographic viewfinder for prototype photographic airplanes. Because the price breakdown as submitted by the prime contractor was questionable, the Chicago AF Procurement Field Office was requested to analyse the cost quotation as presented, since the sub-contractor, Chicago Aerial Survey Company, was within the jurisdiction of their office.

2. A report upon the analysis on the price breakdown for subject procurement has been received and therein it is indicated that a reduction in price of $1,052.73 is in order. In the opinion of the Air Materiel Command Inclosure "A" indicates an appropriate price and breakdown therefor. The $1,052.73 reduction in price is arrived at by deleting the item "Anticipated Increase - [illegible]" in the amount $999.00 and the profit of 10 percent computed thereon.

3. As agreed in the telephone conversation, 10 September 1948 between Mr. E. J. Dumont and Captain Fletcher, a Contract Change Notification will be issued to grant authorized coverage to the prime contractor for the procurement of subject photographic viewfinder. Such action is contingent upon the prime contractor's negotiations of a fair and just price with the Aerial Survey Company, substantially in accordance with the inclosure "A" hereunto.

FOR THE COMMANDING GENERAL:

Edwin D. Fletcher, Jr. Capt. U.S.A.F.
EDWIN D. FLETCHER, JR.
Contract, MEMP
Chief, Aircraft and [illegible]

1 Incl
Incl "A"
Price Breakdown

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attach to Ltr 9/13/45

AEC Form No. 164
(Rev. 1 Aug 45)

INSERT OFFICE SYMBOL AND FULL SIGNATURE IN APPROPRIATE BLOCK
CR, CQ OR DIVISION

AIR INSPECTOR

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INTELLIGENCE

SUPPLY AND MAINT.

PROC. & IND. MOB. PLNG.

OTHER

ENCLOSURE "A"

ESTIMATE OF VIEWFINDER COSTS

(Per Chicago Aerial Survey Quote)

DIRECT LABOR -	
Machining ($1.65/hr)	$1,201.00
Inspection Assembly ($2.00/hr)	276.00
Total Direct Labor	$1,477.00
Overhead (90%)	1,329.00
Total (including Overhead)	$2,806.00
ENGINEERING -	
Research ($3.75/hr)	562.00
Laboratory Assembly ($2.20/hr)	417.00
Designing ($2.50/hr)	1,455.00
Detailing ($2.10/hr)	1,017.00
Testing ($2.70/hr)	313.00
Total Engineering	$3,954.00
Overhead (90%)	3,595.00
Total (Including Overhead)	$7,589.00
OUTSIDE CONSULTANTS	$1,000.00
DIRECT MATERIAL -	
Raw and Small Parts	786.00
Plating and Finishing	224.00
Boxes and Containers	26.00
Total	$1,036.00
PURCHASED PARTS -	
Major	380.00
Sub-contract	1,264.00
Total	$1,644.00
DIRECT CHARGES -	
Patterns and Data	500.00
Flight Test	525.00
Total	$1,025.00
TOTAL MANUFACTURING	$15,100.00
G & A Expense (14%)	2,114.00
TOTAL COSTS	$17,214.00
Fee (10%)	1,721.40
Selling Price (No Royalties)	$18,935.40

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attach to Ltr 9/12/42

AMC Form No. 10-J
(Rev 1 Apr 42)

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PUBLIC INF. OFFICE

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OTHER

Enclosure "A" — Page Two

Balance Forwarded	$18,955.40
Curtiss Profit (5%)	96.77
Curtiss Handling Charges (5%)	96.77
TOTAL	$20,825.94

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Department of the Air Force
HEADQUARTERS UNITED STATES AIR FORCE
Washington

15 September 1946

MEMORANDUM FOR COLONEL SESSUMS:

SUBJECT: COST OF F-87 WING CHANGE.

The $846,000. cost of changing the wing on the F-87 is for increasing the wing area and changing the engine nacelles to house two engines instead of the four originally housed. The breakdown of the cost is as follows:

Productive Costs			
Material		$ 29,454	
Labor Hours	140,387		
Labor Cost		254,447	
Overhead		331,671	
Total Productive Cost			$615,572
Tooling Costs			
Material		$ 6,100	
Labor Hours	6,162		
Labor Cost		10,291	
Overhead		15,437	
Total Tooling Cost			$ 31,828
Templates			
Material		$ 1,570	
Labor Hours	2,870		
Labor Cost		5,742	
Overhead		5,742	
Total Template Cost			$ 13,054
Engineering Costs			
Labor Hours	30,957		
Labor Cost		$61,873.	
Overhead		61,873	
Total Engineering Costs			$123,746.
Total Cost Less General Administrative			784,200
General & Administrative (8%)			62,736.
TOTAL			$846,936.

/s/ J. S. Holtzner
J. S. HOLTZNER
Colonel, U. S. Air Force
Chief, Aircraft Branch

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Ky. Encl 2

CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

CONFIDENTIAL

15 September 1948
EJD:hw-394

Subject: Letter Contract W33-038 ac-20450
Model F87 and RF87 Airplanes
Quote for Production Procurement

Contract File

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPPXA15

Reference:
(a) CW Ltr to AMC EJD:af-165 dated 30 April 1948
(b) CW to AMC EJD:af-201 dated 7 June 1948
(c) CW Ltr to AMC WGT:ejc-167 dated 4 June 1948
(d) AMC Telegram dated 9 September 1948
(e) CW Telegram dated 9 September 1948

Enclosure:
(A) Detailed Price Breakdown
(B) Price Derivation Data
(C) Plancor
(D) GFP Requirements Schedule

1. GENERAL - Subject letter contract was entered into on 31 March 1948 to provide the Contractor with a preliminary release to prepare for production to meet the desired delivery schedule of the Air Force for F87 and RF87 Type Airplanes. Work was started immediately and references (a) and (b) submitted cost proposals to cover the procurements which were preliminarily negotiated. As a result of flight test of the XP-87 Airplane at Muroc and various discussions and conferences with Air Materiel Command personnel, many changes have been introduced into the design of the airplane and the specifications changed accordingly. Reference (a) and (b) quotations are, therefore, hereby cancelled and superseded, and a new production quotation submitted herewith in accordance with telegraphic authority to proceed with work as submitted by reference (d) and acknowledged and accepted by reference (e).

2. DISCUSSIONS AND PRICE - Tabulated below are the items to be procured with unit and total prices:

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL PRICE
I(a)	26	F-87C Type Airplanes in accordance with Contractor's Specification 29Z-10 dated 1 September 1948	$ 798,389	$ 20,758,114

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2 (2/6)

Subject: Letter Contract W33-038 ac-20450
Model F87 and RF87 Airplanes
Quote for Production Procurement

To: Commanding General, AMC

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL PRICE
I(b)	32	F-87C Type Airplanes in accordance with Contractor's Specification 29Z-10 dated 1 September 1948	364,653	11,668,896
I(c)	9	RF-87C Type Airplane in accordance with Contractor's Specification 29Z-11 dated 1 September 1948	859,224	7,733,016
I(d)	21	RF-87C Type Airplane in accordance with Contractor's Specification 29Z-11 dated 1 September 1948	399,563	8,390,823
II		Spare Parts for Items I(a), I(b), I(c), and I(d) in a total amount of approximately 7% of the total value of Item I		3,398,559
III		Special Tools and Ground Handling Equipment in a total amount of approximately 2.06% of the total value of Item I		1,000,147
IV		Static Test Article in accordance with Curtiss Requirements Report 29Z-7, Revision A, dated 1 September 1948		321,885
V		Mockup in accordance with Curtiss Requirements Report 29Z-7, Rev A, dated 1 September 1948		126,843
VI		All Drawings, Handbooks, Reports, Data, Tests and other miscellaneous items as specified in Curtiss Requirements Report 29Z-7, Rev A, dated 1 September 1948		(Included in the price of Item I)

3 (3b)

Subject: Letter Contract W33-038 ac-20450
Model F87 and RF87 Airplanes
Quote for Production Procurement

To: Commanding General, AMC

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL PRICE
VII		Additional Tooling Required to increase from 12 airplanes to 19 airplanes per month		1,946,261
VIII		Wind Tunnel Models and Tests		87,583
		TOTAL		$ 55,432,127

3. DELIVERY - Delivery of all items shall be as noted below:

Items I(a), I(b), I(c), and 1(d) Airplanes shall be delivered, set up, serviced and ready for flight at Port Columbus, Ohio, in accordance with the following schedule:

Date	F-87C - Items I(a) and I(b)	RF-87C - Items I(c) and I(d)
1950		
January	1	
February	2	
March	2	
April	3	
May	4	1
June	4	1
July	5	3
August	5	3
September	6	4
October	6	4
November	6	4
December	7	5
1951		
January	7	5
	58	30

Item II - All Spare Parts shall be delivered f o b Columbus, Ohio, in accordance with the provisions of "5 Air".

Subject: Letter Contract W33-038 ac-20450
Model F87 and RF87 Airplanes
Quote for Production Procurement

To: Commanding General, AMC Page Four

Item III - Special Tooling and Ground Handling Equipment will be delivered concurrently with the production airplane articles.

Item IV - The Static Test Article shall be delivered in January 1950 f o b Columbus, Ohio, disassembled and loaded on a truck suitable for transportation to the Wright-Patterson Air Force Base on a Government Bill of Lading.

Item V - The mockup shall be delivered to the Government at Columbus, Ohio, 90 days prior to delivery of the first airplane.

Item VI - All Drawings, Data, Tests and other miscellaneous items shall be delivered f o b Wright-Patterson Air Force Base in accordance with the dates specified in Curtiss Requirements Report 29Z-7, Revision A, dated 1 September 1948

Item VIII - Wind Tunnel Models and Tests to be completed concurrently with first production article.

4. PRICE BREAKDOWN - The prices quoted in paragraph 2 above are on the basis of a fixed price contract including price redetermination. Detailed breakdowns of each of the various prices are included in Enclosure (A) attached hereto. Additional supporting data and explanations showing the derivations and increments in price are included herewith as Enclosure (B). Enclosure (B) includes, however, only data which differs from that submitted with references (a) and (b), since the price has been derived in the same general manner using an increased manufactured weight. It should be noted that labor rates have increased since we submitted our original proposal, to reflect the increases encountered by the Contractor in June 1948. It is understood that all quotations are on the basis of a five-day week and one-shift operation. Additional tooling required to increase the monthly schedule from 12 airplanes per month to 19 airplanes per month has been included as Item VII. Since this tooling is procured under the initial procurement, it is believed that the cost should be pro-rated over the 88 airplanes covered by Item I, the same as is the practice for the original tooling. The prices for Item I have been divided into individual unit prices for each of the two types of airplanes and each type has also been divided into two groups; the first group, Items I(a) and I(c), covering the airplanes to be delivered up to the period of price redetermination, and the other group, Items I(b) and I(d), covering the airplanes to be delivered after price redetermination. It is believed that this method of pricing is desirable since the cost data on which redetermination will be accomplished will more nearly match the actual prices as included in the contract and, furthermore, the Con-

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tractor will receive reimbursements for the early airplanes more nearly in line with actual costs and expenditures for said airplanes. Although no subcontracting has been indicated as such in the price breakdown, it is anticipated that in actual practice there will be some subcontracting but it will not exceed 10% of labor hours.

5. TERMS AND CONDITIONS - This proposal is submitted on the basis of the following terms and conditions:

(a) It is understood that this is the definitive contract contemplated by subject letter contract. The contract shall be of a standard fixed-price type in accordance with ATSC Form 32 except as modified herein.

(b) The contract shall contain provisions for partial payments in an amount of seventy-five percent of the costs incurred. Any partial payments made under the letter contract shall automatically become partial payments under the definitive contract.

(c) All risk of loss or damage during flight shall be borne by the Government.

(d) The contract shall contain a Form 2B price redetermination article providing for redetermination of the entire contract price both retroactively and prospectively at only one point not to exceed the delivery of 40% of the articles under Item I. The Contractor in its original proposal contemplated only one point redetermination since the deliveries are sufficiently short that it is not believed practicable to have the contract subject to call for an additional redetermination. The redetermination article shall also provide for an increase in price in the event of labor rate increases at any time during the life of the contract. Since it is impossible to furnish the data required for redetermination within the time stipulated in the standard clause (5 days), it is requested that this time increment be increased to 90 days.

(e) Articles covering patent rights, notice and assitance, royalties, filing of patent applications, and authorization and consent shall be identical to those in the letter contract.

(f) A standard tooling article substantially in accordance with Article 45 of Contract W33-038 ac-5266 shall be included.

Subject: Letter Contract W33-038 ac-20450
Model F8F and RF8F Airplanes
Quote for Production Procurement

To: Commanding General, AMC Page Six

(g) It is understood that all Government-owned tooling and equipment currently in the possession of the Contractor as a result of the provisions of Contract W33-038 ac-6266 and Contract W33-038 ac-19837 shall remain in the possession of the Contractor and shall be utilized under this proposed contract at no cost to the Contractor.

6. SPARES - This proposal is made on the basis of spares provisioning and procurement in accordance with "5 Air" as modified by reference (c).

7. GOVERNMENT FURNISHED PROPERTY - In order to allow adequate time for test and acceptance of the airplanes and some leeway for unforeseen difficulties, the Contractor has scheduled the airplanes off the production line at dates appreciably in advance of those specified in the delivery schedule in paragraph 3 above. In order to prevent any possible misunderstanding, the Contractor has included herewith as Enclosure (D) a general list of Government-Furnished Property with a schedule for each item. Detailed revised lists of GFP for subject airplanes are currently being negotiated, but such lists will conform to the categories noted in Enclosure (D).

8. FACILITIES AND EQUIPMENT - In order to meet the ultimate delivery requirements as specified in the letter contract and references (a) and (b), Contractor requires additional facilities and equipment as specified in detail in Enclosure (C) hereto. This proposal is submitted on the basis that all of the facilities and equipment in the Plancor will be furnished by the Government at no cost to the Contractor. It should be noted that the total dollar value of the facilities and equipment requested herein is greater than was originally requested. This increase is the result of more accurate cost information and increased prices, and does not reflect any change in the items requested. The remaining facilities and equipment required for the performance of the contract are the property of the Navy and are leased by the Contractor.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Ducayet
Contracts Manager

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AF MO-38 (20 MAY 44) 452.1 Jet Prop. Aircraft, Vol 2 - 1947

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HEADQUARTERS ARMY [redacted]

ROUTING AND RECORD SHEET

TALLY NO	
FILE NO.	

SUBJECT: Weight Reduction of F-87B Series Aircraft.

TO: Director of Training & Requirements, DC/S-Operations.

DATE 16 SEP 1948

Mr. I.G. Boehm/rm/42682
COMMENT No. 1.

FROM: Fire Control Branch, Dir. of Armament, DC/S-Materiel.

1. Consistent with the present program of weight reduction in Air Force aircraft, the Air Materiel Command has proposed the following deletions from the F-87B series airplanes being procured under Contract No. W33-038-AC-20450:

a. A reduction in the thickness of the airplane armor plate from 5/8" to 1/2" and from 3/8" to 5/16". The present 5/8" armor plate extends from behind the Pilot's ar Navigator's head down approximately 9", and from this point to the bottom of the se. 3/8" armor plate is used.

b. Omit bomb bay door operating mechanism including the hydraulic struts and linkage. These, then, will be considered as overload items along with the bombs.

2. It is the opinion of Air Materiel Command that the fragmentation protection afforded by 1/2" and 5/16" armor plate could be considered satisfactory and comply in every way with existent Military Requirements. This is based on the fact that U.S. Air Force aircraft with these thicknesses of armor plate operated successfully against the ME-109 - 20mm shrapnel. Further, subject airplanes will have thicker skins than the corresponding airplanes in the past and to date it is not definitely known what size projectiles or fragments must be considered and must be armored against. A weight saving of approximately 83 lbs will result.

3. Omission of the bomb bay door operating mechanism, in the ~~way~~ wr empty of the aircraft, will effect a savings of 48 pounds. The aircraft will be designed so that the bomb bay door mechanism can be readily and quickly installed by the using service when bombing missions are scheduled. It is anticipated that approximately eight (8) man hours may be required to install or remove this gear.

4. The above will not apply to the RF-87A aircraft which will include the bomb bay door mechanism in the designed gross weight.

5. An early reply would be appreciated.

Lt. Col. USAF
For R. C. COUPLAND
Brigadier General, U. S. Air Force
Director of Armament
Office, Deputy Chief of Staff, Material

COORDINATION:

AFMEN-1 Wm. G. McCaughey

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Contract file

CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

CONFIDENTIAL

21 September 1948

EJD:hr-405

CONFIDENTIAL

Subject: Letter Contract W33-038 ac-20450
Model F87 and RF87 Airplanes
Revision to Quotation for Production Procurement

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPPIA-15

Reference: (a) CW Conf ltr EJD:hr-394 dated 15 September 1948

Enclosure: (A) Revised Price Breakdown
(B) Revised Price Derivation Sheets } attached

1. By reference (a), the Contractor submitted a quotation for production procurement of subject airplanes. However, since the submittal of reference (a), a mathematical error has been discovered in the data which was used to compile the redetermination group unit prices contained therein. Correction of this error results in an overall total contract price of $55,413,891 in lieu of $55,432,127 as quoted by reference (a).

2. Therefore, to revise the contract item prices to reflect the necessary correction, paragraph two of reference (a) is cancelled and superseded, and new prices established as follows:

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL PRICE
I(a)	26	F-87C Type Airplanes in accordance with Contractor's Specification 29Z-10 dated 1 September 1948	$ 798,389	$ 20,758,114
I(b)	32	F-87C Type Airplanes in accordance with Contractor's Specification 29Z-10 dated 1 September 1948	364,656	11,668,992

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Subject: Letter Contract W33-038 ac-20450
Model F87 and RF87 Airplanes
Revision to Quotation for Production Procurement

To: Commanding General, AMC

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL PRICE
I(c)	9	RF-87C Type Airplane in accordance with Contractor's Specification 29Z-11 dated 1 September 1948	$ 859,586	$7,736,274
I(d)	21	RF-87C Type Airplane in accordance with Contractor's Specification 29Z-11 dated 1 September 1948	398,607	8,370,747
II		Spare Parts for Items I(a), I(b), I(c), and I(d) in a total amount of approximately 7% of the total value of Item I		3,397,389
III		Special Tools and Ground Handling Equipment in a total amount of approximately 2.06% of the total value of Item I		899,805
IV		Static Test Article in accordance with Curtiss Requirements Report 29Z-7, Revision A, dated 1 September 1948		321,885
V		Mockup in accordance with Curtiss Requirements Report 29Z-7, Rev A, dated 1 September 1948		126,843
VI		All Drawings, Handbooks, Reports, Data, Tests and other miscellaneous items as specified in Curtiss Requirements Report 29Z-7, Rev A, dated 1 September 1948		(Included in the price of Item I)
VII		Additional Tooling Required to increase from 12 airplanes to 19 airplanes per month		1,946,261
VIII		Wind Tunnel Models and Tests		87,287
		TOTAL		$ 55,413,891

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Subject: Letter Contract W33-038 ac-20450
Model P87 and XP87 Airplanes
Revision to Quotation for Production Procurement

To: Commanding General, AMC Page Three

3. Enclosure (A) attached hereto reflects the revised price breakdowns for the various items and supersedes Enclosure (A) of reference (a). Likewise, the applicable revision sheets for the price derivation data are submitted herewith as Enclosure (B) and supersede the respective pages (1, 2, and 10) of Enclosure (B) to reference (a). Except to the extent necessary to correct the prices quoted by paragraph 2 of reference (a), all terms and conditions as quoted by reference (a) are applicable.

Respectfully

CURTISS-WRIGHT CORPORATION
Airplane Division

Edwin J Daggett
Contracts Manager

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ANNEX (A) REVISED

//

F-87C & RF-87C PRODUCTION ESTIMATE
(58) F-87C - (30) F-87C - Total (88) Airplanes
At Scheduled Rate of 12/mo. with Est. Cost of Added Tools for 19/mo.

	Unit Cost 26 F-87C	Unit Cost 32 F-87C	Unit Cost 9 RF-87C	Unit Cost 21 RF-87C	Total Cost 88 Airplanes	Total Cost Static Tests
PRODUCTIVE						
Material	$ 66,931	$ 66,931	$ 76,320	$ 76,320	----	$ 47,811
(Labor Hours)	(111,329)	(63,676)	(122,747)	(69,625)	(7,490,785)	(65,850)
Labor @ $1.48/hr.	164,767	94,240	181,074	103,045	----	97,458
Overhead @ 120%	197,720	113,088	217,289	123,654	----	116,950
Total Prod. Cost	$429,418	$274,259	$474,683	$303,019	$30,576,702	$262,219
TOOLING						
Material	$ 12,209	$ 2,688	$ 12,209	$ 2,688	----	---
(Labor Hours)	(32,298)	(7,172)	(32,298)	(7,172)	(1,510,546)	---
Labor @ $1.73/hr.	55,876	12,408	55,876	12,408	----	---
Overhead @ 120%	67,051	14,890	67,051	14,890	----	---
Total Tool Cost	$135,136	$ 29,986	$135,136	$ 29,986	$ 6,319,018	---
TEMPLATES						
Material	$ 413	$ 17	$ 416	$ 18	---	---
(Labor Hours)	(2,306)	(92)	(2,344)	(95)	(85,001)	---
Labor @ $1.73/hr.	3,990	160	4,055	165	---	---
Overhead @120%	4,788	192	4,866	198	---	---
Total Template Cost	$ 9,191	$ 369	$ 9,337	$ 381	$ 342,808	---
ENGINEERING						
Material	$ ---	$ ---	$ ---	$ ---	$ ---	$ ---
(Labor Hours)	(25,176)	(1,027)	(27,517)	(1,045)	(957,038)	(2,815)
Labor @ $2.00/hr.	50,352	2,053	55,033	2,090	---	5,630
Overhead @ 100%	50,352	2,053	55,033	2,090	---	5,630
Total Eng. Cost	$100,704	$ 4,106	$110,066	$ 4,180	$ 3,828,070	$ 11,260
FLIGHT TEST COST	3,876	1,098	1,098	1,098	168,852	---
TOTAL COST Less G. & A.	$678,325	$309,818	$730,320	$338,664		$273,470
G. & A. Overhead @ 7%	47,483	21,687	51,122	23,706	---	$ 19,144
TOTAL COST	$725,808	$331,505	$781,442	$362,370	---	$292,623
Profit @ 10%	72,581	33,151	78,144	36,237	---	29,262
TOTAL PRICE	$798,389	$364,656	$859,586	$398,607	$48,534,127	$321,885
Approximate Average Unit Price					$551,524	

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F-87C & RF-87C PRODUCTION ESTIMATE
(88) F-87C - (30) F-87C - Total (88) Airplanes
Scheduled Rate of 12/mo. with Est. Cost of Added Tools for 19/mo.

14 September 1948

Unit Cost 9 RF-87C	Unit Cost 21 RF-87C	Total Cost 88 Airplanes	Total Cost Static Tests	Total Cost of Mockup	Wind Tunnel Models and Tests	Add. Cost of Tools For 19/mo. Prod.
$ 76,320	$ 76,320	----	$ 47,811	$ 8,760	$ 100	---
(122,347)	(69,625)	(7,490,785)	(65,850)	(20,428)	(3,520)	---
181,074	103,045	----	97,458	30,233	5,210	---
217,289	123,654	----	116,950	36,280	6,252	---
$474,683	$303,019	$30,576,702	$262,219	$ 75,273	$11,562	---
$ 12,209	$ 2,688	----	---	$ 250	---	$ 143,170
(32,298)	(7,172)	(1,510,546)	---	(800)	---	(396,849)
55,876	12,408	----	---	1,384	---	686,549
67,051	14,890	----	---	1,661	---	823,559
$135,136	$ 29,986	$ 6,319,018	---	$ 3,295	---	$1,653,578
$ 416	$ 18	---	---	---	---	---
(2,344)	(95)	(85,001)	---	---	---	---
4,055	165	----	---	---	---	---
4,866	198	----	---	---	---	---
$ 9,337	$ 381	$ 342,808	---	---	---	---
$ ---	$ ---	$ ---	$ ---	$ ---	$41,250	---
(27,517)	(1,045)	(957,038)	(2,815)	(7,300)	(5,400)	---
55,033	2,090	----	5,630	14,600	10,800	---
55,033	2,090	---	5,630	14,600	10,800	---
$110,066	$ 4,180	$ 3,828,070	$ 11,260	$ 29,200	$62,850	
1,098	1,098	168.852	---	---	---	---
$730,320	$338,664		$273,470	$107,768	$74,412	$1,653,578
51,122	23,706	---	$ 19,144	7,544	5,209	115,750
$781,442	$362,370	---	$292,623	$115,312	$79,621	$1,769,328
78,144	36,237	---	29,262	11,531	7,962	176,933
$859,586	$398,607	$48,534,127	$321,885	$126,843	$87,583	$1,946,261

$551,524

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UNITED STATES AIR FORCE
AMC ENGINEERING LIAISON OFFICER
AIR MATERIEL COMMAND

22 September 1954

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[illegible] Colonel Gordon P. Smith, USAF, Norair
[illegible] Colonel E. [illegible] Griffith, USAF, Norair

[illegible] Col. P. [illegible] Olmsted, USAF, Norair
Col. P. [illegible], USAF, Norair (Langley)

Flights #6-9. These flights were made during the period beginning 30 August and ending 1 September. Numerous tests were made on each of which have been forwarded in more detail previously. However, the following will serve as a summary of these results.

a. Elevator/Stabilizer Synchronization. Tests made with the maximum down travel of the stabilizer limited to about 4 degrees and the original elevator down spring operative were not satisfactory. Synchronization was poor and, as the flaps and stabilizer were lowered, a general nose-up pitching moment resulted which required the use of an objectionable push force at the maximum down setting of the control surfaces. In addition, sharp variations in wheel forces were felt as the elevator down spring became effective.

b. Maneuvering Flight Control. Tests were made by lowering the flaps and stabilizer to their maneuvering position with the airplane trimmed at 265 m.p.h. IAS. A nose-up pitching moment resulted indicating that the stabilizer down travel (approximately -1.5°) was excessive.

c. Low Speed Stability. The airplane was trimmed at several airspeeds for various configurations and longitudinal stability was investigated to the point of stall, with the elevator horn balances maintained. The horn balances were removed during the early stages of the aerodynamic buffet investigation. A more positive force gradient was obtained below trim and, as stall was approached, the nose of the airplane tended to drop when the control column was released. Elevator forces were light at the point of stall. Earlier stalls performed with the horn balances removed exhibited less positive stability, in that, as stall was approached and the control column was released, the attitude of the airplane did not change. Additional tests made with the elevator down springs removed resulted in decreased longitudinal stability in the stall region.

d. Stabilizer Trim Control in Buffet Region. The new high speed stabilizer trim control was investigated in the buffet region at 30,000, 20,000 and 10,000 ft. Stabilizer trim actuation was too rapid but the air-

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3/Ltr Prog. Dpt Ltr AP. SN 45-59600, NRMPP (NCHEDL), dtd 22 Sept 45

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plane would be trimmed to zero control force to the maximum Mach number reached (0.811). Considerable rudder and elevator buffet were experienced from 0.78 to 0.811 Mach number and stability decreased about all three axes; however, control was satisfactory. The optimum stabilizer setting for the high Mach number range was found to be approximately plus 3/4 deg. for which setting stability was considerably more positive. The following calibrated results were obtained during these tests:

Flight	TIAS	ALT.-FT.	T.A.S.	Mm	Cl
47	371	27890	567.5	0.811	0.166
47	437.5	18660	586	0.795	0.1255
47	522.5	7580	598.5	0.777	0.0825
45	411	22250	577.5	0.800	0.146

e. High Altitude Snaking. Snaking was investigated at approximately 325 m.p.h. IAS at 30,000 ft. with rudder trailing edge cords installed above the trim tab cut out section. The use of cords up to 22 inches in length greatly reduced snaking. Yaw (induced by deflecting the rudders) was less sustained than previously.

f. Wing Tip Tank Functional. One flight, #49, was made with wing tip tanks installed and partially fueled. The elevator down spring was not installed during this flight. The effect of the tip tanks on stability was investigated at low air speeds. Some loss in longitudinal and directional stability was detected in the vicinity of stall. The loss in longitudinal stability apparently resulted partially from the removal of the elevator down springs.

2. Flights #50-53. These flights were made during the period beginning 3 September and ending 6 September. During these flights, maximum performance take-off and landing tests were performed with the tip tanks installed. The gross weight and c.g. at take-off were 48,969 lbs. and 20% MAC, respectively. Results of these tests have been forwarded by the Contractor and will not be repeated herein.

3. As a result of the investigations made in the preceding flights, the decision was made to perform the following major modifications, etc:

a. Installation of modified stabilizer down spring to eliminate erratic operation and improve low speed stability characteristics.

b. Decrease speed of stabilizer actuator control in the high speed range.

c. Provide for separate control of stabilizer and flaps for determination of optimum synchronization curve.

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d. Reduction of maximum down travel of stabilizer from -4 to -3 degrees.

e. Replacement of #2 engine.

f. Removal of tip tanks.

g. Removal of rudder trailing edge cords and installation of trailing edge bulb extending 26.25 inches above the rudder trim tab cut out section.

4. Following performance of the above items, flight #54 was made 14 September. The following items were checked:

a. Flap-Stabilizer Synchronization: At 10,000 ft., the airplane was trimmed at 200 m.p.h. IAS, gear down, and the control was actuated. As the flaps and stabilizer lowered a nose-up tendency developed; however, this tendency was gradual and no sharp variations in wheel force were felt as the elevator down spring became effective. At the maximum down position of the control surfaces, approximately 5 degrees nose-down trim was required. The speed of the airplane dropped to 175 m.p.h. IAS with the flaps and stabilizer in their extreme down positions. The airplane was retrimmed at 150 m.p.h. IAS with the gear down and with the flaps and stabilizer in the synchronized down position. Take-off power was used. The flaps and stabilizer were then retracted. Approximately 5 degrees nose-up trim was required to offset the resulting nose-down tendency. Both of these tests indicated that the minus 3 degree stabilizer setting was still excessive.

b. Flap-Stabilizer Synchronization Curve. The airplane was trimmed at 200 m.p.h. IAS at 10,000 ft. with the gear down. The flaps were then lowered in 5 degree increments and, at each flap setting, the stabilizer was used to trim out. Power was held constant. An optimum flap-stabilizer synchronization curve was thus obtained.

c. Low Altitude Snaking. Snaking was investigated to 520 m.p.h. IAS at 5500 ft. with the rudder trailing edge bulb installed. No snaking was obtained. At 500 m.p.h. IAS an attempt was made to induce yaw by deflecting the rudder. The resulting yaw was unsustained and dampened quickly.

5. Following flight #54, the flap-stabilizer synchronization control was adjusted in accordance with the optimum synchronization curve obtained in the test mentioned in paragraph 4b above. The down travel of the stabilizer was limited to minus 1.5 degrees. Flight #55 was made 15 September. The following items were investigated:

a. Snaking at High Altitude. Snaking was investigated to 355 m.p.h. IAS at 24,500 ft. Attempts to induce yaw with the rudder were again unsuccessful, in that, the resulting motion was unsustained and dampened rapidly. The use of the rudder trailing edge bulb has apparently eliminated any objectionable snaking at either high or low altitudes.

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3/24 Prog. Rpt Ltr AF, SM 45-59600, MBEP (MCREOL), dtd 22 Sept 45

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b. Stabilizer Trim Control in Buffet Region. At approximately 25,000 ft., the stabilizer actuator system was investigated to a Mach number of 0.80. Response to stabilizer control was considerably improved by the decreased rate of travel of the stabilizer. The comments contained in paragraph 1d. will serve to illustrate the stability and buffet characteristics encountered during this test.

c. Flap-Stabilizer Synchronization. Tests conducted as in paragraph 4e indicated that flap stabilizer synchronization and elevator down spring action were satisfactory. At the maximum down position of the control surfaces a very slight pull force was required to maintain a level flight attitude.

d. Maneuvering Flaps Control. With the airplane trimmed at 225 m.p.h. IAS in the clean configuration at 10,000 ft., the maneuvering flaps control was actuated. The results were satisfactory in that very little trim change was required to maintain level flight. The maximum down travel of the flaps for this test was 22 degrees and, for the stabilizer, 0 degrees.

e. Low Speed Stability. Power on and power off stalls were made in the landing configuration to investigate low speed stability with the elevator horn balances and modified down springs installed. A positive force gradient was obtained from trim speed to the point of stall.

6. Following flight #55, the airplane was prepared for Phase II tests. A replacement engine was installed in position #4 in order that all engines would have sufficient time remaining to allow uninterrupted performance of the Phase II tests which were scheduled to begin 20 September. Inasmuch as the Phase II pilot, Major R. L. Johnson, was not available at this time, the Contractor performed flight #56 on 20 September. During this flight, an investigation of the buffet boundary was made to 0.81 Mach number at 25,000 ft. with the elevator and rudder spring tabs locked in neutral. The pilot reported that control buffet was somewhat more noticeable at 0.81 Mach number with the spring tabs locked; however, he also stated that stability of the airplane appeared to be identical to that described in paragraph 1d. A check climb was also made to 30,000 ft. and functionals were conducted on the flap-stabilizer synchronization, maneuvering flaps control, etc. The Contractor feels that all controls are now satisfactory.

7. The airplane was turned over to the Flight Test Division on 21 September for performance of instrumentation and thrust calibrations prior to the start of Phase II tests (23 September).

FOR THE COMMANDING OFFICER:

PREPARED BY: R. L. King
R. L. KING
ANC Engineering
Field Officer

APPROVED BY: Sidney T. Smith
SIDNEY T. SMITH
Lt. Col., USAF
Chief, Technical
Engineering Div.

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AMC Form No. 19-7
(Rev 1 Apr 48)

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COMPTROLLER

PERSONNEL & ADM.

RESEARCH & DEV.*

INTELLIGENCE

SUPPLY AND MAINT.

PROC. & IND. MOB. PLNG.*

OTHER

24 September 1948

Ge 19837

300.6 OR.

SUBJECT: Request for Permission to Negotiate
Purchase Request Number [redacted].

TO : Under Secretary of the Air Force

ATTN: Chief of Staff
United States Air Force
Washington 25, D. C.

ATTN: Director, Procurement & Industrial Planning Office,
Deputy Chief of Staff, Material.

1. Pursuant to Armed Services Procurement Regulation 3-308, there is forwarded a proposed statement of the required Findings and Determination, prepared for signature of the Under Secretary of the Air Force, requiring authority to negotiate the following procurement:

a. Contractor: Curtiss-Wright Corporation
Columbus 16, Ohio

b. Services: The contractor shall design and fabricate an enlarged (340) square foot wing and install same on the No. 2, XB-67 airplane, redesignated XF-87. This installation will be accomplished in conjunction with the J57 engines and nacelles, and in so doing will provide a complete prototype of the new wing assembly for production airplanes, while flight testing is being continued on the No. 1 airplane.

c. Price: Estimated Cost - $[redacted]

d. Funds: Supplemental Fiscal Year 1949.

e. Additional Information:

(1) This work is Research and Development to the extent that the (340) square foot wing is entirely new to the F-87 and is required in providing a production prototype configuration of this airplane.

(2) To date the Government has invested in the ultimate product, a production F-87, [illegible] airplanes, [illegible] which will be retained by the Government for [illegible]

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[illegible] to Under Secretary of the Air Force thru C/S, Hqs, USAF dtd [illegible] from AMC/MCPPA&I/JMC/dlp, subject: Request for Permission to Negotiate Purchase Request No. [illegible].

AIR INSPECTOR

expended on production, approximately $12,500,000.00.

(3) The amount indicated in this request will complete the project.

(4) The Contractor already has been working on this project six weeks without contractual coverage in order to provide the end product in time to gain a maximum from the project.

f. Selection of Source: Contractor has nearly completed Contract W-33-038 ac-4266 for the No. 1 and No. 2, XF-87 airplanes. Because of the Contractor's know-how, developed over a period of 2-½ years in building this particular type of fighter airplane and because the Contractor has built these airplanes to their present state of completion, it will be to the best interest of the Government for the Contractor to complete this project.

2. Negotiation of this procurement is authorized under Section 2 (c) (11), Public Law 413, 80th Congress since it is for the manufacture and furnishing of supplies for experimentation, development, research and tests.

FOR THE COMMANDING GENERAL:

[signature]

[illegible]
Brigadier General, USAF
Chief, Procurement Division

PUBLIC INF. OFFICE

COMPTROLLER

PERSONNEL & ADM.

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Fletcher

OTHER

Approval Recommended:

Encl: Statement.

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AIRC Form No. 10-7
(Supp 1 Apr 48)

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FINDINGS AND DETERMINATION

The USAF proposes under Purchase Request Number 46628, a Change Order to Contract W33-038 ac-19837 with the Curtiss-Wright Corporation, Columbus 16, Ohio, to design and fabricate a (740) square foot wing and install same on the No. 2, XF-87 airplane. This is required as a production prototype airplane in order that the F-87 with the large wing installed may be tested sufficiently in advance of production delivery to allow for any changes which may be required. This installation will be accomplished in conjunction with the J33 engine and nacelles, and in so doing will provide a complete prototype of the new wing assembly for production airplanes. This model will be redesignated YF-87 airplane.

I hereby find that:

a. This procurement, the estimated cost of which amounts to $6,334,334.00 is chargeable to project 110, Supplemental Fiscal Year 1948 funds.

b. Supplies: The items of work to be procured constitute additional procurement since the program involves changing the engine installation of the XF-87 airplane at the same time and providing for a production type J33 engine, in lieu of Model 35C engine, as well as incorporating a larger wing and changes related thereto, and required under change order over and above that called for in the basic contract. This procurement is for the manufacture and furnishing of supplies for experimentation, development, research and tests.

c. The procurement is required in the interests of national defense.

Upon the basis of the findings set forth above, I hereby determine that pursuant to Section 2 (c) (11), Public Law 415, 80th Congress, negotiation of a change order for the above described procurement is authorized.

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OTHER

COPY

Basic: Ltr AMC to AC, [illegible] 30 Aug 48
Subject: Request for Permission to Negotiate
Purchase Request No. 46[illegible]
Curtiss-Wright Corporation

(C 19837 Shelf 30-0.6 Shelf)

AFMPC-2A 1st Ind

Headquarters, United States Air Force, Washington 25, D.C. 16 Sep 48

TO: Commanding General, Air Material Command, Wright-Patterson Air Force Base, Dayton, Ohio ATTENTION: Major General K. B. Wolfe

Returned without action pursuant to telephone conversation between Mr. Barrows and General Wolfe.

BY COMMAND OF THE CHIEF OF STAFF:

/s/ Alfred A. Kessler, Jr.

ALFRED A. KESSLER, JR.
Brigadier General, USAF
Director of Procurement and
Industrial Planning, Office of
Deputy Chief of Staff, Material

2 Incls
Incl 1 n/c (Basic ltr)
Incl 2 added: attached
Memo, 15 Sep 48

MCPPIA&I/ROF/43b
Dictated-22 Sep 48
Dispatched-

2nd Ind.

Hq, Air Material Command, Wright-Patterson Air Force Base, Dayton, Ohio

TO: Chief of Staff, U. S. Air Force, Washington 25, D. C. ATTN: DC/S, Material, 24 September 1948

1. Herewith resubmitted is a Request for Permission to Negotiate Purchase Request No. 46[illegible] and a Findings and Determination for the installation of a new wing on the XF-87 airplane. The cost of changing the wing is $[illegible],356.00 as compared to $[illegible],956.00 on the original submittals.

2. In order to clarify the reduction in price, it is desired to point out that the cost of accomplishing the work has not been decreased but that more of the cost is being absorbed by the contractor. To analyze the cost, it is necessary to consider all of the work which is being accomplished in conjunction with the new wing and which is an integral part thereof, that of the J35 engine and nacelle installation which was negotiated more than one year ago. A breakdown of cost is

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Fletcher

OTHER

2nd Ind. to Hq, AMC, Wash, D.C. ATI/AMTSAR/MCP/AJP dtd subj: Request for Permission to Negotiate Purchase Request No. [redacted] Curtiss-Wright Corp.

shown as Enclosure "A" hereto and shows the actual cost which Curtiss-Wright Corporation anticipates, a duplication of the $[redacted] cost as originally submitted to your Headquarters and a duplication of the $[redacted] cost as submitted herewith.

3. The actual costs anticipated by the contractor are based on the overhead and general and administrative rates actually incurred during the last six months of fiscal year 1948 as approved by the Naval Auditor at Curtiss-Wright Corporation, Columbus, Ohio. These rates were [redacted]% for production, tooling, and template cost; [redacted]% for engineering; and [redacted]% for general and administrative expense. The current rates on the contractor's facility are running even higher, but these rates will decrease as the contractor gets into the J-67 production contract, the negotiated rates for which are [redacted]%, [redacted]% and [redacted]% respectively.

4. The rates utilized to complete the cost figure of $[redacted] as originally submitted, were [redacted]% for production, tooling and template overhead; [redacted]% for engineering overhead; and [redacted]% for G & A. These rates were more or less arbitrary in that, they were less than anticipated. Since no provision for changes to the tail section was provided, no profit was included and because there was to be a provision for redetermination document only, the contractor would incur approximately a $[redacted],706.00 Loss under this price.

5. At the suggestion of this Headquarters, the contractor has submitted a new cost figure $[redacted] based on [redacted]% for production, tooling and template overhead; and [redacted]% for engineering overhead inclusive of G & A expense, with no provisions for tail change or no profit.

6. The credit of $[redacted] shown on each of the breakdowns of Enclosure "A" is the amount already provided under the basic modification contract W33-038 ac-19087, allotted from 41 Fiscal Year [redacted] Funds for the installation of a [redacted] engine in a new nacelle on the XB-47. Approximately eighteen months ago, it was decided that in production the B-47 should have two (2) [redacted] engines instead of four (4) [redacted] engines and that an installation should be made in one of the experimental airplanes. This was applicable to the ([redacted]) square foot wing. Consequently, the change can now appropriately be made at the same time and in conjunction with the new wing. Since the two changes are so closely related, the provisions of Enclosure "A" show the combined cost, and at the end the cost of the engine installation is subtracted in order to indicate the net cost of the new wing.

7. Combining the engine and wing cost as indicated in the preceding paragraph, subjects the contractor to a further loss, as the $[redacted] includes a profit of $[redacted] which was allowed in the engine change and an increase of protection for subcontractors [redacted] which is the result of [redacted] negotiations provided for the [redacted] basis as applied to actual cost.

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Subj: Bid, Ltr Bk, WAV, Wash, D.C. Sr. AMA/Warrick/Ser/Sub. 464 Sep 48, Request for Quotation to Negotiate Purchase Request No. [illegible], Curtiss-Wright Corp.

Consequently, the contractor has a prospective loss in the new price as follows:

Anticipated Cost	$2,[illegible]	
Current Cost	[illegible]	
		$[illegible]
Profit originally negotiated on .55 change.		$7,[illegible].00
Underestimation protection on .55 change		[illegible]
	Total Indicated Deficit	[illegible]

5. In conclusion, it is the belief of this Headquarters that the price here indicated for the new wing installation is as low or lower than any minimum manufacturer could furnish. When it is considered that no other manufacturer would accomplish this work without profit and without increased cost protection, the price seems more than reasonable.

FOR THE COMMANDING GENERAL:

George E. Schuetz, Col
Brigadier General, USAF
Chief, Procurement Division

2 Incls:
Incl 1 n/c
Incl 2 n/c
Incl 3 n/c Ltr, Curtiss-Wright Corp. (Work Sprinkler Equipment)
Incl 4 n/c Ltr, AMA/Warrick Ser, dtd Sep 48.
Incl 5 n/c Memo for Record -- (Findings & Determination).

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(Rev 1 Jul 48)

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ENCLOSURE "A"
To 2nd Ind, to Ltr, WCAF, Wash. D.C.
Hr. AMC/MCPTIAL dated September 1948.

COST ESTIMATE BREAKDOWN

"Enlarged Wing on No. 2 XF-87 Airplane"

	Actual Cost	Original Quote	Present Quote
[redacted]			
PUBLIC [redacted]	$ 43,820.	$ 43,820.	$ 36,820.
Labor	388,554.	388,677.	287,257.
Overhead	548,617.	648,674.	534,277.
COMPTROLLER [redacted]	$980,575.	$1081,168.	$858,354.
[redacted]			
Material	$ 11,[illegible].	$ 10,[illegible].	$ 10,280.
Labor	57,[illegible].	50,251.	50,[illegible].
Overhead	101,140.	75,[illegible].	69,145.
[redacted]	$167,[illegible].	$135,[illegible].	$129,[illegible].
[redacted]			
RESEARCH & DEV.*			
Material	$ 2,070.	$ 2,070.	$ 2,070.
Labor	14,390.	14,390.	14,390.
Overhead	23,880.	24,535.	22,525.
[redacted]	$ 42,340.	$ 42,995.	$ 40,985.
[redacted]			
INTELLIGENCE			
Labor	$15[illegible],600.	$15[illegible],600.	$15[illegible],600.
Overhead	209,[illegible].	156,600.	153,600.
[redacted]	$365,[illegible].	$309,200.	$309,200.
SUPPLY [redacted] Items G & A	$1,521,781.	$1,[illegible],354.	$1,[illegible],745.
G & A	[illegible],[illegible].	[illegible],[illegible].	
TOTAL COST [redacted] G&A	$1,661,[illegible].	$1,[illegible],[illegible].	$1,[illegible],745.
Rental [illegible] Items	[illegible],[illegible].	[illegible],[illegible].	[illegible],[illegible].
PROC. & PROD. [illegible] 48-[illegible].	[illegible],[illegible].	[illegible],[illegible].	[illegible],[illegible].
Amount required [illegible]	$1,[illegible],[illegible].	$ [illegible],[illegible].	$ [illegible],[illegible].

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HEADQUARTERS UNITED STATES AIR FORCE

ROUTING AND RECORD SHEET

TALLY NO.	
FILE NO.	

SUBJECT: Weight Reduction of F-87B Series Aircraft

TO: Fire Control Branch, Dir. of Armament, DC/S-Material

DATE: SEP 2 0 1948

COMMENT NO. 2
Col Johnson/mch/71716

FROM: Director of Training & Requirements, DC/S-Operations

1. This office concurs in the weight reduction requested in Comment 1.

2. In the near future a complete study on weight reduction of fighter aircraft will be made. At that time this will also be included.

Col USAF

FOR
KENNETH A. BRANDT
Brigadier General, USAF
Chief, Requirements Division

AFORQ/F
AFORQ/A
AFORQ/W

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B/L fr CG, AMC, MCPPKA, subj: Contract W33-083 AC-20450, F-87B Series Airplanes - Reduction in Weight.

CONTRACT FILES

AFMTD-5 60.104 1st Ind

Department of the Air Force, Headquarters, U. S. Air Force, 7 OCT 1948
Washington 25, D. C.

TO: Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Wright Field, Ohio.

1. This Headquarters concurs in the elimination of the armor plate and omitting the bomb bay door operating mechanism including the hydraulic struts and linkage from the F-87B aircraft as indicated in Paragraph 1. a. and b. of basic correspondence.

2. In this connection, however, it is advised that in the near future a complete study will be undertaken on the weight reduction of all fighter type aircraft at which time subject airplane will be further considered.

BY COMMAND OF THE CHIEF OF STAFF:

David J. Kluman
Lt. Colonel, USAF
for R. C. COUPLAND
Brigadier General, U. S. Air Force
Director of Armament
Office, Deputy Chief of Staff, Materiel

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File: all weather fighter

Aero. Br. Eng Div
R&D, Materiel

SAMA—Aug. 47—

SAVE

HEADQUARTERS MUROC AIR FORCE BASE
MUROC, CALIFORNIA

8 October 1948

SUBJECT: Conference at Muroc Air Force Base, Muroc, California on All Weather Fighter Requirements.

TO: Chief of Staff
United States Air Force
Washington 25, D. C.

1. The conference was convened at Muroc Air Force Base, Muroc, California, on 6 October 1948, for the purpose of conducting an evaluation of the XF-87, XF-89 and XF3D all weather fighters. The following listed personnel were in attendance during the course of the conference:

* Maj. Gen. K. B. Wolfe, Hq., AMC
* Maj. Gen. F. O. Carroll, Hq., AMC
* Brig. Gen. C. A. Brandt, Hq., USAF
Brig. Gen. N. L. Coupland, Hq., USAF
* Col. Bruce K. Holloway, Hq., ADC
* Col. Albert Boyd, Hq., AMC
Col. Chapman, LAPPO
* Lt. Col. Gordon D. Timmons, 325th Ftr Grp, Hamilton Fld, Calif.
* Lt. Col. Cris B. Johnson, Hq., USAF
* Maj. Barney E. Turner, Hq., ADC
Maj. Robert L. Cardenas, Flt Tst Div, Hq., AMC
Maj. R. L. Johnson, Flt Tst Div, Hq., AMC
Capt. C. E. Yeager, Flt Tst Div, Hq., AMC
Capt. O. B. Thornton, Eng. Div., Hq., AMC
Capt. H. M. Fletcher, Procurement Div., Hq., AMC
* Capt. D. M. Dessert, 3200th FTS, Eglin AFB, Fla., AFC
* 1st Lt. F. J. Smith, AFC, Eglin AFB, Fla.
* 1st Lt. R. A. LaBeaf, 325th Ftr Grp, Hamilton Fld., Calif.
M/Sgt. Mark A. Griesinger, FMC, Eglin AFB, Fla.
M/Sgt. Chas E. Solecki, 14th Ftr Grp., Dow AFB, Maine
Sgt. C. L. Rowland, ADC, Mitchel AFB, New York
Mr. John M. Merald, XF-89 Project Engineer, Hq., AMC
Mr. Robt. T. Coleman, Flt Tst Div., Hq., AMC

(* - Voting Members)

2. It was decided that in order to properly evaluate the above-mentioned three aircraft, flight by qualified night fighter pilots should

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Ltr to Chief of Staff, USAF, Wash. 25, D. C., dtd 8 Oct 48, from Committee on Evaluation of XF-87, XF-89 and XF3D Acft, Subj: "Conference at MAFB, Muroc, California, on all Weather Fighter Requirements".

be made in each of the airplanes in order to compare the performance characteristics of each type. Also, maintenance personnel from each of the commands, were requested to conduct inspections of the aircraft and to submit comments and recommendations from a maintenance standpoint. The following pilots conducted flights on each of the three aircraft: Colonel Bruce K. Holloway, Major Barney E. Turner, and Captain Donald M. Dessert. In addition, Col. O. B. Johnson and Lt. F. J. Smith, conducted flights as observers. Following the actual flying of the airplanes, which was accomplished on 6 and 7 October 1948, the meeting was re-convened for the purposes of receiving comments from the pilots, observers, and maintenance personnel relative to the merits of each of the aircraft.

3. As a result of the discussions, the following recommendations are submitted:

a. All members of the voting committee were agreed upon procurement of al all weather fighter version of the TF-80 airplane. This airplane is to carry modified APG3 radar, and a radar operator.

b. None of the members voted to procure the XF-87 or the XF3D airplanes.

c. The following members voted to procure the Northrop XF-89: Maj. Gen. K. B. Wolfe, Maj. Gen. F. O. Carroll, Col. Albert Boyd, Lt. Col. O. B. Johnson, Capt. D. M. Dessert, Lt. F. J. Smith, and Lt. R. A. LeBeuf.

d. The following members voted not to procure the XF-89: Brig. Gen. C. A. Brandt, Col. Bruce K. Holloway, Lt. Col. Gordon D. Timmons, and Major Barney E. Turner.

e. All members concurred in the establishment of new military characteristics to supplant the present all weather fighter military characteristics.

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4. Verbatim notes on the entire conference will be forwarded at an early date for information and future reference.

Maj. Gen. E. B. Wolfe

Maj. Gen. F. O. Carroll

Brig. Gen. C. A. Brandt

Col. Albert Boyd

Col. Bruce K. Holloway

Lt. Col. Gordon D. Timmis

Lt. Col. Otis E. Johnson

Major Barney E. Turner

Capt. D. F. Dessert

1st Lt. F. J. Smith

1st Lt. R. A. LeSeur

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7 October 1948

Following are the minutes of a conference held in the Master Planning Room, MAFB, Muroc, California, on 7 and 8 October 1948, during which time, the below-listed personnel were in attendance:

Maj. Gen. K. P. Wolfe, Hq, AMC
Maj. Gen. F. O. Carroll, Hq, AMC
Brig. Gen. C. A. Brandt, Hq, USAF
Brig. Gen. R. L. Copeland, Hq. USAF
Col. Bruce K. Holloway, Hq. ADC
Col. Albert Boyd, Hq, AMC
Col. Chapman, LAFFO
Lt. Col. Gordon D. Timmons, Hamilton Fld, Calif.
Lt. Col. Orin B. Johnson, Hq, USAF
Maj. Barney B. Turner, Hq. ADC
Maj. Robert L. Cardenas, Flt Tst Div, Hq, AMC
Maj. R. L. Johnson, Flt Tst Div, Hq, AMC
Capt. C. M. Yeager, Flt Tst Div, Hq, AMC
Capt. O. B. Thornton, Eng. Div, Hq, AMC
Capt. H. M. Fletcher, Procurement Div, Hq, AMC
Capt. D. M. Dessert, Eglin AFB
1st Lt. F. J. Smith, APC, Eglin AFB
1st Lt. R. A. LeRouf, Hamilton Fld, Calif
M/Sgt. Mark A. Grissinger, PGC, Eglin AFB
M/Sgt. Chas. S. Soleski, 14th Ftr Grp, Dow AFB
Sgt. C. E. Bowland, ADC, Mitchel AFB, New York
Mr. John M. Herald, XF-89 Project Engineer, AMC
Mr. Robt. V. Coleman, Flt Tst Div., Hq, AMC

Open Discussion of the Curtiss-Wright XF87, Northrop XF88, Douglas XF3D:

M/Sgt. Mark A. Grissinger, 3200 Lt. Bmb Tst Sq, Eglin AFB, Florida was asked to give his opinion.

Sgt. Grissinger: The XF3D was outstanding because of its accessibility to installed components of the engine, and the way the engine was mounted. It was easily accessible through two sections of removable cowling. The fuel, oil, hydraulic, and oxygen service was readily accessible. There are no limitations on the speed with which you could service fuel. As you probably know, the F-80 and F-84, because of separate cells composing each fuel tank have a limited service time because the fuel has to filter from one cell to another. On this airplane, there is no inter-connection between these tanks. There are three tanks, which places no limit on the speed you could service. The fuel system is among the simplest I have seen. The center of gravity is automatically maintained. There are two fuel boost pumps which furnish one or two engines. We didn't get the information we wanted to get about the possibility of using fuel if the boost pumps failed, however, it is easily assumed that you could pull fuel through them, if they are the centrifugal type, which they undoubtedly are. The hydraulic system is easily accessible. Servicing of the hydraulic

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tank is gained through access panels with quickly removable fasteners. The battery was of a similar design. Specific gravity could be checked without removing the battery. This airplane is the only one of the three which has one 24 volt battery. The other two have two 12 volt batteries. The braking system is conventional; similar to the F80 and F84. Emergency gear extension consists of releasing two locks. It was more or less agreed that there had to be a dump valve in the line. Extension was completed by gravity. So far, they say they have experienced no trouble. The aileron boost is one unit which operates both ailerons. Elevator and rudder, I understand, are not boosted, but have spring loaded tabs. Trim tabs are cable operated in the cockpit.

Gen. Brandt: Was there anything you didn't like?

Sgt. Grissinger: The ten-hour inspection on the unit will probably be taken care of later on, but was one of the things that didn't appeal to us. We are not familiar enough with this particular engine to know how much the ten-hour would entail, but we would have to split the compressor case on the ten-hour inspection. The engine, however, is easily accessible. In case of leaks, or damage to the inboard side of the unit, it is very easily accessible. The engine can be swung out away from the airplane far enough to inspect the inboard side.

The F-87 was the next in line for ease of maintenance. The fuel system was particularly bad. The hydraulic system was 3000 lbs, which they have had no trouble with, as yet. One bad thing about the 87 is the intended re-design of the engine installation. We don't know if it will be better or worse. Now, it is a good installation.

Gen. Brandt: How does it compare with the engine on the F-80 or F-84?

Sgt. Grissinger: It should compare more closely with the F-80 than the F-84. I think it is better than the F-84, and a little more difficult than the F-80. One of the outstandingly bad features is no provision for pressurization.

Gen. Brandt: Were there any poor access points?

Sgt. Grissinger: No, sir. Everything was easily accessible; either in the nacelle, or the fuselage, itself. There probably would be a little more maintenance on the fuel system.

The F-89 has high pressure tires which are rather hard to change. It also had an intricate gear mechanism, which, according to the information I have, are always getting out of adjustment. The F-89 engine installation, as I saw it, was very unsatisfactory.

Gen. Brandt: Would you compare it to the F-80?

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Sgt. Grissinger: It doesn't compare with the F-80. The only thing better than the F-84, is that you don't have to remove the aft section to get to the unit. Accessory maintenance is harder after the engine is removed. The manufacturer would have to redesign the auxiliary power tank in order to make it accessible. It wouldn't be an easy job. There is another disadvantage with the aileron control system. It consists of full power control. They have no other positive control over the aileron, rudder, or elevator. This is a design feature that is questionable. It is a possible source of trouble, insofar as maintenance is concerned. The standby system in case of hydraulic failure is not what it should be. It is too sluggish.

From a maintenance point of view, the XF3D is the most desireable. The F-87 is next, and the F-89 is last.

Gen. Brandt: Sgt. Rowland, will you give us your opinion?

Sgt. Bowland: (Sgt. C. E. Bowland, Hq. and Hq. Sq, 52d Air Base, Mitchel Field, ADC, New York) I liked the XF3D the better of the three airplanes. Right after Major Turner came in from his flight -- he had a broken oil line, and they had to take the accessory section out to find the trouble. While they had it off, it was easy to see you could get to the accessory section quite easily. They had it repaired by the time Major Turner was out of the cockpit. Another feature that is good, is the wing construction. It runs all the way through the fuselage section. The landing gear system is free-fall for emergency operation and is very simple. From what I have seen, this is a fool-proof system. The brakes seemed as though they could be readily changed. It has a split two rim wheel on it with low pressure tire. The aileron boost control was a good feature. It was mounted in the center, inside the fusolage, easily accessible. The fuel tanks were very easily serviced from the tops section of the wing. Flaps were hydraulic and there was a switch inside the cockpit which would drive the electrically driven hydraulic motor for lowering flaps. The controls were all easy to get off. You could get to all control surfaces. The battery and voltage regulator were mounted in the nose section and very easy to get to.

I liked the F-87 second best, due to landing gear construction. The F-89 has a high pressure tire which is hard to change. On the F-87, there was a split wheel type. On the small high-pressure tire, you could figure more trouble. The emergency operation of the landing gear system on the 87 was very good. It is a free-fall system. One bad part of the F-87 was the flaps. They are electrically driven, with no emergency. The ailerons were the only things that used boost at all. Rudder and elevators had no boost at all. Emergency operation of the brakes was emergency nitrogen bottle. They also had an automatic fire extinguisher

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system for controlling fire from inside the cockpit. One feature I did not like about the P-37 was the 307 gallon tip tanks. They had an air compressor, electrically driven. You needed an 8 lb. pressure to force fuel from tip tanks to tanks. In comparison to the P-39, I think the P-37 has the best system of tip tanks, however. The batteries were located very easily.

As far as the P-39 goes, I don't think it is a very good designed airplane. One bad thing was that in making an engine change, the whole airplane had to be jacked up for clearance to drop the engine. The hydraulic system is very complicated. Almost the same as on the P-61. On the main gear doors, when the gear is down and locked, the door is closed and they have a sequence valve which operates and allows the gear to go up and the door to close again. From my experience, I figured that would be a very big source of trouble. The access doors were not good. Only one, to the radio equipment, was easy. The rest were Phillips-head screws and a structural member of the airplane. I didn't like the wheels and brakes on the P-39. That's a high-pressure tire. To take the tire off, you have to take a split lock ring off. Those lock rings get wedged down in there and they are very, very hard to get off. With the split type wheel, all you do is take out about eight bolts and the wheel will be in half. That is much better. They couldn't give us an answer about what would happen in case of a blown out tire. I wanted assurance that it wouldn't shimmy when one tire was flat.

Gen. Brandt: Would anyone care to comment on that?

Gen. Carroll: Col. Boyd, how about your experience on that?

Col. Boyd: I have never heard of one of the two failing.

Capt. Thornton: They are called rotating wheels. The wheels are actually locked together. Skidding the outside wheel would straighten the wheel up again. I don't think a shimmy dampener would help if you had one flat tire.

Gen. Brandt: You didn't like the engine accessibility on the P-39, Sergeant? Do you think the contractor could design a satisfactory engine accessibility?

Sgt. Boland: One thing I didn't like was to jack the airplane completely up. They didn't give us anything definite on what we could change on the accessory section. We didn't see any of the cowling off the P-39 where we could form an opinion.

Mr. Herald: On the production airplane, it will not require jacking for engine change. The jacking is a peculiarity of this engine. The future airplanes will be able to drop the engine straight down without lifting the airplane.

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Gen. Brandt: Sergeant, the engine accessory section should be greatly improved then?

Sgt. Rowland: Yes, sir. I will restate again that the XF3D is the number one airplane for accessibility for maintenance, the F-87 is my second choice, and the F-89 is third.

Gen. Brandt: Sgt. Soleski?

Sgt. Soleski: (T/Sgt. Charles S. Soleski, 14th Ftr Grp, Dow AFB, Bagor, Me) These two Sergeants covered the good and bad points of the three airplanes. On the XF3D, I didn't find any bad points at all. I think they missed two good points. The accessibility for removal and installation of the guns and the ammunition. The space in the tail of the airplane and the nose for radar equipment, was another good feature.

The F-87, in my opinion, was the next best. The main bad point is the accessibility to engine accessories. One good feature, especially in cold weather operation, was that everything is inside. At 35 degrees below zero, it is better to work on the inside, and in this airplane, you have everything inside. A bad thing on the F-87 is the two aileron boost cylinders. The good thing is the ample room in the tail and in the nose section for radar and radio equipment. External power rectifier and oxygen are easily accessible. On the F-89, I didn't get too much chance to look at it, but I agree with the two Sergeants, that the main bad point is accessibility to engine accessories. The way I rate them is the Douglas XF3D first, then the F-87 and then the F-89.

Gen. Brandt: What about criticism on starting these airplanes up for a scramble?

Sgt. Soleski: The XF3D is the best.

Lt. Griesinger: On the XF3D and the F-87, the Westinghouse unit requires only one unit for starting. The F-89 would require two C-1[illegible] units to start it. The F-87 and F-89 would require more trouble to get off the ground. One bad feature is that the external power receptacle is in the wheel well.

Sgt. Rowland: They have another system whereby you don't need to put in an external plug to check landing gear.

Gen. Brandt: Can they be started on batteries?

Sgt. Rowland: All of the airplanes electrical systems are designed to allow two starts on the batteries.

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Gen. Brandt: We can start the F-84 that way.

Col. Johnson: The F-86 will not start on the battery.

Gen. Brandt: Is that a vital requirement?

Col. Johnson: Yes, sir, it is. It takes a big battery, but it is a requirement for a quick scramble.

Capt. Dessert: That is the trouble with the F-84.

Sgt. Bowland: We had 50 airplanes at Cleveland for three days, and they were getting battery starts on two hops every day.

Gen. Brandt: Is there anything else that should be discussed on a scramble?

Col. Holloway: The F-87 is definitely inferior because you have twice as much to get going.

Gen. Brandt: Do you have to wait after it gets started, to get the starting unit out of the way or what else would interfere with flagging the pilot on his way?

Sgt. Bowland: No, sir, just pull out the external plug and let him go.

Gen. Brandt: Lt. Smith, what have you to say?

Lt. Smith: (1st Lt. F. J. Smith, Hq. and Hq. Sq., Eglin AFB, Fla, APG) I am Projects Officer in the Weapons Branch. I was able to get a flight in the F-87 and the XF3D. I did not get a ride in the F-89. Therefore, it is difficult for me to evaluate them. The XF3D did have a radio set in it, but I do not believe they contemplate using that for ultimate use. The installation was excellent. Everything was readily accessible. The other radar set controls looked good. Talking cockpits for room, the XF-87 appeared to have the most room. We had to visualize where the sets would go. One thing, it had oxygen controls on the right side. Many times pilots will act up because of improper adjusting on controls. Therefore, it was very simple to get this one adjusted. The oxygen blinker was back in the corner on the F-87, and a little difficult to see. It appeared to have plenty of room in the nose for whatever radar was to be put in there.

Gen. Brandt: How about a discussion from Col. Johnson on the noses?

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Col. Johnson: The two installations were both designed to be interchangeable on the F-87 and the F-89. The noses are identical. The turret by Martin and fixed installation by Hughes, incorporating APG-3 radar, will fit into the nose. There is only one control box, C scope with B scope in the cockpit for the radar observer. I feel there is adequate room in any of the airplanes to install the control box. In the event we bought the Douglas, we would buy the Q-35 Navy system, I here, which is very superior over anything we have. Going further, it appears that there is as much room in the F-89 and F-87 as in the Navy job. We could install Q-35 in any of them. The main problem is the 30" dish which might give trouble, but I don't think so.

Lt. Smith: In the cockpits, it seemed that the F-87 had the most room and the XF3D was next with the F-89 last. I liked the seating arrangement in the F-87 and the 3D better than the F-89, due to the fact that observer and pilot are right together to achieve better coordination. Also, the observers controls are readily available. If the intercom should go out, he's right there to help the pilot.

Gen. Brandt: How important to the all-weather fighter, is the side by side seating arrangement?

Lt. Smith: It is desireable. Many times in the last war, the inter-com would fail. If you are side by side, you could signal, or talk to the pilot. I would not give up a lot of speed, however. Yet, you could help him search and possibly you could help him locate the target. From a mental standpoint, the observer sitting by the pilot knows what is going on. In some cases, I believe he could help the pilot in taking off with switches or helping with the wheels.

Gen. Brandt: I think this is a good opportunity to discuss this point.

Col. Holloway: I agree with the side by side arrangement.

Col. Timmons: I think it is highly desireable, for the same reason.

Capt. Dessert: I agree, also. The idea of team work could be carried out a lot closer. I speak from experience in the war as a night fighter. I used to sit in the back.

Col. Johnson: I would like to say that it is highly desireable, but I do not feel that it is a necessity. If we can get a speed differential of fifty miles, or more, I would say the tandem arrangement could be accepted. The large armor plate back of the pilot, possibly can be removed on the F-89 and visual contact could be made between the radar observer and the pilot, to a limited extent.

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Capt. Thornton: In case of injury, or battle wounds, they could aid each other in the side by side arrangement.

Lt. LeBeau: Also, in case of oxygen failure, they could help each other.

Gen. Brandt: Is it possible to have a compromise between side by side and full tandem? A staggered arrangement such as the A-20?

Col. Johnson: That is not possible in the F-89.

Mr. Hall: Speed differential would be anywhere on the order of 50 mph. Increased drag because of side by side, would be on the order of ten, fifteen or twenty mph.

Lt. Smith: I agree that if the speed differential is too great, we should not have side by side. One thing in the XF3D which is bad, is the oxygen blinker. It is way back, whereas I believe it should be readily accessible to the eyes of the individual. I believe, however, that it is easily remedied. If there is tandem arrangement, I believe a few instruments should be available to the radar observer. Mainly, altimeter, compass, free air temperature, radio compass control and generator voltage adjuster. Many times radar will fail as a result of uneven voltage generator regulation.

Gen. Brandt: Why radio compass for instance?

Lt. Smith: Radio compass for navigation.

Col. Johnson: We propose that we will have a beacon on the ground by the set. We can drop out the radio compass, because we probably will have VOR/TACAN.

Lt. Smith: I would like the F-89 first, the XF3D second, and the F-94 last.

Mr. Brandt: Does radar include navigational search?

Col. Johnson: Yes, sir. We propose that we will have a beacon on the ground by the set. We feel, as I stated, that we will not need radio compass.

Gen. Brandt: What have you to say, Lt. LeBeuf?

Lt. LeBeuf: (Lt. L. A. LeBeuf, 525th Fighter Grp, Hamilton Fld, ADC) I am fully satisfied. I think I can fly in all three aircraft.

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I concur in everything that Lt. Smith had to say, except on some sort of navigational device, other than the radar set. The beacon, that is. Every place you go, you never have the same type of radar as everyone else and cannot use the radar facilities available.

Gen. Brandt: Col. Johnson, will you tell us what electronic navigational means are proposed?

Col. Johnson: AFAN/LA radar compass for VHF range station. You will have VHF command sets; you will have the APG-X radar, which is G3 modified and that is about it. You will be able to use the G-3 as a homing aide to your base, or other night fighter bases. We propose a ground beacon be used and you will home from about 100 miles.

Lt. Smith: 100 miles is hardly enough.

Lt. LeBeuf: I was proposing some type of navigation, such as Loran or Shoran.

Gen. Brandt: That's a broad field. Within the CCI net, we shouldn't have to use such means. I think the set is prohibitive in a fighter.

Col. Holloway: I think you need an AI set, capable of limited search with 10 miles range for intercept purposes. An identification set and a responder beacon. You don't need radio compass or altimeter.

Col. Timmons: One thing, in the past, you have not been able to get instrument clearance because they have no more frequency receivers.

Gen. Brandt: In the future, all will be built to CAA requirements. Directional range will be all over the United States. CAA will have VHF or UHF, rather than low frequency.

Lt. LeBeuf: On cockpit arrangements, I agree with Lt. Smith. The 87 first, the 3D next, and the F-89 last. I prefer tandem to separate compartment. We concurred on the room for the radar equipment, -- the 89 first, 87 and the 3D. We also agreed on the instruments required in these, in case of separate compartment arrangement.

Gen. Brandt: Lt. Smith, do you think if the radar is installed and operates as proposed, that any of these airplanes will be superior all weather fighters to the F-61 or F-82?

Lt. Smith: That's difficult.

Gen. Brandt: Against B-29 type aircraft, or better?

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Lt. Smith: I believe the jet aircraft would be superior against B-29's. Especially against high-flying aircraft, at around 35 or 40 thousand feet, the jet would be superior to the 23 or 61. Down low, at low level attack, then it's dependent on how good the radar would work. I believe the 61 or 23 might be able to get the B-29 there.

Lt. LeBeuf: I believe the F-82 up to 25,000 feet would be almost as good, as any of the jets they have out here.

Gen. Brandt: Is there any reason, or do you have any belief, that any of the three, radar-wise, will not be equivalent or superior to the F-61 or F-23?

Lt. LeBeuf: Yes, sir. ---

Gen. Brandt: That is, could you do the job as well, in these three, as in the 61 and 23?

Lt. LeBeuf: I believe you would have more room than in the F-82, and again, you would be getting to the altitudes much faster.

Gen. Brandt: I mean, they are definitely in the 61 and 23 class or better, from the radar observers' point of view? Are these three airplanes an improvement?

Lt. LeBeuf: Yes, sir. The F-87 is the best, and the 3L is the second, and the third is the F-89.

Lt. Smith: I would prefer the 87, with the 3L next, and the 89 last.

Gen. Brandt: Col. Holloway, what have you to say?

Col. Holloway: (Col. Bruce K. Holloway, Director of Air Defense, Hqs, AMC) I was favorably impressed with the stability of the F-87 up to Indicated Mach .76. From there on, it gets pretty jumpy. It is that way up to Indicated .78 which actually is about .82. At between .76 and .78 indicated, it got pretty jumpy. It seemed like rough air. It developed pitching. Another good thing about it, is the side by side cockpit. It probably had the best cockpit of any, and the best all round visibility, particularly considering their attitudes. At climb, the visibility was better than either of the others. The visibility on the Doubles was bad in climb. The rate of climb was superior to the other two. It has good control action throughout the speed range and in all configurations with the wheels and flaps up or down, and any combination thereof up to Indicated .78. At low altitude -- 10,000 feet -- I did not get it to 76. I had it indicating 500 at 10,000 and it was very stable. I think it would have been, on up to the critical

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Mach number at that altitude. One other thing was that in climbing after leveling off, the plane accelerates well,-- better than the others by far. It's deceleration was very poor, worse than the others, even with the flaps being used on the Douglas. The disadvantages, I think, are worthy of notice, and they are: first, it is too big, I can't see why the space is warranted. According to Major Johnson, it has 1-1/2 hours maximum of fuel at 35,000 feet. I was up for 45 minutes and at 35,000 feet and I had, roughly, 1/3 fuel left. Considering low endurance and the fact that it does not carry any more radar or electronic equipment, I don't understand the justification for the size. It is too complicated to operate. I realize that it is experimental with additional complications, such as two types of longitudinal stability control -- removable stabilizer and additional action that is controlled through the electrical switch on the wheel. That would be cut down. However, of the three, this is much more complicated to operate. It is smaller than the F-89, but not too much. I don't think you could get out if you bailed out. You have a long tail gadget to clear. You couldn't get out unless you used the ejection seat. I believe you could get out of the other two. Also, it takes too long to get it started and ready to take off. Mainly, it is because you have to get four engines going and synchronized. It has a long take-off run, and it seems to take longer for it to get to best climbing speed, than the other two. It has no deceleration devices, which will be taken care of. The brakes could be corrected, but they are too sensitive. It has high landing and approach speed as compared to the other two. It doesn't control well, up to 176 mph.

With respect to the F-89, it has the highest critical mach. number. However, to use an expression which I think describes it well, it feels like you are sitting on top of the universal joints. It pitches, rolls, etc. at critical mach. number. At low altitude it is better. At about 10,000, 500 indicated, it started a motion which seems to be aggravated by fuel in the tanks, I noticed the guages were jumping back and forth. It is smaller than the 87. The best I could figure out was that it would weigh five to seven thousand pounds less. It's operating cost would be less. You could get it into the air quicker. You could bail out of it safer and it is a little bit faster. The bad points are, first, maintenance. I don't need to add to what the crew chiefs said. It accelerates slowly at altitude. It has several types of instability, most of which can probably be corrected. It has tandem crew arrangement, which is not desireable, and long take-off run.

The XF3D has twice the range on internal fuel, which to me, is a very significant feature. It has a good escape feature in that you pull a cord, the seat collapses, and a door opens underneath. At least, as you go out, you don't have anything to run into. Possibly you would tear off a few arms as you left, if you tried it at high speed. It has

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the best deceleration brakes I have ever seen. These really work. I timed it at about 17,000 ft., doing 300 knots indicated. I slowed at 200 in about 14 seconds. It is very simple in operation. It has a lot of good operating features and the maintenance is simple. I believe it would be more simple to keep a maximum number in the air. It has a shorter take-off. It has side by side seating arrangement, except the visibility is not too good in steep climb attitude. It is much smaller and possibly would cost less to operate. It's most obvious disadvange, is its poor performance. It is not as fast, and it doesn't climb as well, but has twice the range. There is no deicing. The acceleration is very slow at altitude. Summing it up, which are the main points I observed, in prefacing my conclusions, I would say that I am thinking of two years away and how long it would take from right now, if we started on something else. I have listed five items. 1st, flying characteristics, 2nd performance, 3rd, ease of maintenance and operation -- I mean simplicity of fuel systems; simplicity and dependability of hydraulic systems and control without boost; brakes and ability to operate out of 5,000 feet fields, such things as that. 4th, ability to keep them in the air, and 5th, ability to do all weather interception. My first conclusion is that none of them will be any good two years from now, but if it will take four years to get what we would like to have, and we are going to buy one of these three airplanes, I would say, buy the Douglas. Between the other two, it is a hard decision to make. I would recommend, first, that we don't decide on buying any, until we look at all the possibilities, such as conversion of the F-88 or the 36D, or any other possibility.

Gen. Brandt: Gen. Wolfe, tomorrow, will probably be able to give us production promises. There are alternate proposals to solve your conclusions that none will be good at two years from now. The TF-80, which is the F80C with longer nose. There are several studies being made now to put the same Navy radar arrangements in the F3D; a proposal with McDonnel to convert the 88 as an all weather fighter. The 36C is being tried at Eglin. We can't promise anything, but Gen. Wolfe will talk production. If we had to buy an interim plane, we have a choice of taking one of the three, or the TF-80, or the F86A. The F-88 is way off. Do you think, from F-80 experience, that the F-80 has equal radar facilities to the 3D?

Col. Holloway: No, sir.

Gen. Brandt: Why?

Col. Holloway: I don't think you would get it to 35,000 feet before you have to come back. If you put the radar on the wing --

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Col. Johnson: The radar would go into the nose.

Col. Holloway: I think either the radar will go on the wing, so that you don't have enough fuel, or you will have some monstrosity.

Gen. Brandt: If the F-7D could do the job, radar-wise, with equal reliability, is its performance up to the three airplanes we are talking about?

Col. Holloway: Yes, sir, it is better than the Douglas, except for the range, which is an important part of performance.

Col. Ford: It will carry tip tanks.

Gen. Brandt: Tell us about the TF-8C.

Col. Lund: It is comparable to the standard F-8C. Excellent climb performance and excellent flight characteristics. The high speed is the same -- maybe slightly faster. On the flight to Cleveland, we took off from Long Beach with 620 gallons on the wing tips. The take-off roll was approximately 4500 feet without any assist, at all.

Gen. Brandt: If there were any possibility of getting more, or equal amounts of the TF-8D and 3D, and convert to a night fighter, which would you prefer?

Col. Boyd: The Navy job, sir. I don't believe the airplane is capable of meeting the requirements. I would have to see the radar and the drawings.

Gen. Brandt: You say, thinking of this interim period, we could get the TF-8C the quickest. Would that change this thing?

Col. Holloway: Yes, sir.

Col. Johnson: To start with, the 3D has a very small battery, and you couldn't start the airplane on the battery. It would need a larger battery or getting one start from the battery. Then, -- I am very poor on electronics, but I do know that the Navy used a different 400 cycle electrical system, while we use a 400, and we would have to supply a number of special inverters for the 3D, if we bought it. That means we would have to carry additional supplies of spare parts and would mean a maintenance problem, going to the Navy to get the stuff. The Navy airplane, strength-wise, is pretty low.

Capt. Thornton: The airplane is built to the same load factor, but they

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Col. Boyd: About 600 lbs. The improvement in performance is in rate of climb, cruising speed at altitude, and acceleration. At 37,000 feet at 92% power, it was indicating 260.

Gen. Brandt: Is it better on fuel consumption?

Col. Boyd: Not very much improved.

Col. Johnson: Actual fuel consumption is the same. You go up in thrust.

Col. Holloway: Cruising at 6/10th is the same.

Col. Boyd: On the flight in the C, from here to Portland, Oregon and back, was 650 nautical miles. We landed with 90 gallons in the tank. That's with the standard 200 tanks.

Col. Holloway: I can't visualize how you could get a radar set and gunsight in the nose. I think we should investigate the possibilities before decision.

Col. Johnson: I don't see how we are going to be able to get APG-3 in the 80C. First, we can't get the APG-3 Hughes is developing, because the first flying article they will have, will be available in March of '49. That's the first prototype. It will be at least a year before we can get the sets in production, that we would want to put into the 80C. I don't think there is anything developed on the 30.

Gen. Brandt: The possibility we were talking about is the Navy APG-1?

Col. Johnson: Which is worthless, in my opinion. It has, at a cone of 20 degrees, a useful range, at best, of three miles.

Gen. Brandt: I thought I read in the Navy report that they got 6 miles.

Col. Johnson: They are able to get up to four miles on the night-flight-fly target, by going up and looking on the target and then backing up. I believe that you read was on the first models. Then the production articles came out. If we are intercepting to pick up a target, we must be closer. The maximum useable range in a 20 degree cone is about three miles, unless they have improved it. They didn't think they could improve until November of 1949 when they come out with the 30 inch dish.

Capt. Lassert: On 79's and 29's -- on a dark night, they could bring us in within two miles, before the blips would show on our screen.

Gen. Brandt: Do you think that this 3-1/2 or 4 miles might get you in?

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Capt. Dussert: It would bring us in to the extent that the pilot wouldn't have to operate. We have to have a scope with a tube leading to it.

Gen. Brandt: In your opinion, can an all-weather man, pilot the aircraft and operate the radar sets that you have of today?

Capt. Dussert: Definitely not, — not without the day-light scope.

Col. Holloway: I agree with that, sir. I would like to add that the Navy, during the latter part of the war, said that they could do it, and pursued the policy. They have now, unofficially, agreed with what Capt. Dussert said. They have had more experience than we have had. I say no, it can't be done.

Gen. Brandt: There are people who say the pilot can do it.

Col. Timmons: It depends on the equipment. With APG-28 in the F-82, the pilot has a scope, and a closure meter. It shows the range of the target on a timer system. With a slight improvement over that, I could do it.

Gen. Brandt: I am talking all-weather fighters. Can you operate that scope and fly any of these airplanes under instrument conditions?

Col. Timmons: As far as instrument flying is concerned, I never look out anyway.

Capt. Dussert: It isn't a case of looking out. You can't ever look at instruments and look into the scope at the same time.

Gen. Brandt: The major reasons these airplanes are big is so they can carry two people. Is it a needless requirement?

Col. Timmons: I believe it is. If the equipment is improved, maybe one man can operate it.

Col. Johnson: I believe it is an absolute necessity to have two individuals in the airplane doing the job. Any equipment that I have ever been able to check on, simply cannot be operated by one man until they can have an presentation of our flight instruments and not just tube [illegible]. If we had a presentation tied into the automatic pilot, then you wouldn't need anybody, but that is ten years away.

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Col. Boyd: I feel as Col. Johnson does.

Col. Timmons: I agree with what Col. Johnson said. Very definitely, I agree.

Gen. Brandt: Is it necessary that a pilot and a radar observer be in an all weather airplane?

Col. Timmons: Yes, sir.

Col. Johnson: Yes, sir.

Gen. Brandt: Is it possible for the pilot to fly and operate present and near foreseeable future radar sets?

Col. Johnson: Extremely doubtful.

Col. Timmons: Agreed.

Col. Holloway: I say no.

Gen. Brandt: Then, again, you want, for immediate procurement, a two-seater all weather fighter?

Col. Johnson: Yes, sir.

Col. Timmons: Yes, sir.

Col. Holloway: Yes, sir.

Col. Johnson: I would like to talk about all three airplanes.

Col. Holloway: I would like to qualify these things. One flight in these planes is not too convincing, but what I gave, is my impression on our flight.

Gen. Boyd: Captain Dessert, will you tell us what you think?

Capt. Dessert: (Capt. D. M. Dessert, 3600th Ftr Test Sq, Eglin AFB, FGC) My job is Operations Officer; right fighter test officer, all-weather. On the F-94, Col. Holloway said that visibility was all right. I question that visibility on that. I don't think it is as good as it should be. As he said, a long take off run for night is bad, and it has the long take-off. Another thing, regarding night fighting that is very, very important, is the radar. All three of these airplanes are unusable

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as far as mounting of radar. The blip should be a good representation, and it would be moving.

Gen. Brandt: Do you mean, at high pass speeds, all three are not stable enough?

Capt. Dessert: Snaking, I believe you call it. Directionally unstable. They are not stable enough to give good presentation to the radar observer. The 87 acceleration and deceleration is very poor. On the 87, over the others, the fuel is too limited even for an interceptor. Considering scramble, it is definitely not suitable. Night fighting in case of a scramble -- is a scramble. That is, interception. It must be an interceptor. With four engines, it would take too long to get set up for take-off. Also, I differ with Col. Holloway on the brakes. I have never flown a better aircraft than the 87, on brakes. For sensitivity, by comparison with every aircraft, it is very good. The 89 would be worse than the 87 on stability for radar. It would be out of the question. The fuel range on the 89 is ideal. The one or 1-1/2 hours is about exactly what we want. It has an edge on the 87 in scramble, but you cannot use those engines. The engines just don't stand it.

Gen. Brandt: Will you give us more detail?

Capt. Dessert: On the Westinghouse engine, it seems they are fine, so far as moving the throttle. In the 89, with the T-49, you must move very slowly on the throttles. On the 87, I have never seen anything operate so nice on the throttles.

Gen. Brandt: Then, one of the three airplanes has unsatisfactory throttling arrangements for night fighting?

Capt. Dessert: Yes, sir. The F-89 is the only one that has unsatisfactory throttle arrangement. Col. Johnson stated that the 89 could not be changed to side by side seating arrangements. I believe it could be changed over. It is just as wide, looking head on, as the 87. Also, this Martin turret will be just as wide as the nose. I can't see why it couldn't be side by side.

Col. Johnson: Because of the wing situation. The wing is higher on the fuselage than on the 87. The 87 fuselage is square across the top, whereas the 89 is oval and they don't have the room on top of the wing.

Mr. Herald: In the preliminary design, they aimed to take advantage of high speed; therefore the tandem arrangement. I think it could be arranged for side by side, though.

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Col. Johnson: I think it is highly impractical.

Mr. Herald: The rear cockpit is not too good now, anyway. Actually side by side could be done, I believe.

Capt. Lessert: The F-89, I believe, is a fighter as compared with the rest. I believe the F-87 is more like a medium bomber. I believe the F-89 is a fighter. I believe I can see more chances for improvement in the 89 than in the 87. The 89 could have much more done to make it a better night fighter. On the XF3D, I want to add to Col. Holloway's statement on the escape. It is an ideal situation as far as getting out of the airplane. They have doors that split the airflow in front of the hatch. Acceleration and deceleration is very good on this aircraft. As far as acceleration, Col. Holloway added that it is slow. Every jet is slow on acceleration. Col. Holloway also stated he though the 3D had too long of a take-off roll. I thought it was very ideal. With a load, I would go so far as to say 5500 feet. That is an improvement over the other two. It is very stable and I believe it would be more closer on stability for radar. It doesn't hunt as much as the 89 and 87 did. I guess it would sound like the 3D is the best, in my opinion, but it is too slow in climb. It won't go fast enough. I will go along with Col. Holloway in saying that I do believe the 3D would be my first choice if we had to make a choice. I would take the 89 as second choice. It is my opinion that the 89 is a fighter; the 87 is a bomber and the 3D is a trainer. The 3D is the lesser of the three evils.

Gen. Brandt: Do you think that the 3D could do the job and bring down B-47's or superior?

Capt. Lessert: I do believe it will bring down a 29.

Gen. Brandt: A B-45?

Capt. Lessert: No, sir.

Gen. Brandt: A B-47?

Capt. Lessert: As far as I am concerned, if there is inclement weather, the heavy bombers will have to slow down for that weather. Radar picks up heavy weather. The best radar today is no good up to a certain extent in weather.

Col. Johnson: Any weather at 35,000 feet won't be so rough.

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Capt. Dessert: The present radar picks up these thunder storms.

Col. Boyd: You don't pick up anything in soupy weather.

Col. Timmons: Most of the weather flying will be taking off and landing. Altitude will clear the weather.

Gen. Brandt: We are looking for a 24-hour fighter. A day fighter, as well.

Col. Boyd: You very seldom hit ice above 37,000.

Col. Holloway: Going back to the fact that they are all experimental, it looks like the Douglas has the most to gain by the engines just around the corner. The 89 gets the closest to its critical mach. number.

Col. Johnson: The engine on the 3D is the 24C-4B or 4C today. The 24C-8 we will have at approximately a year from today. That is the first model. Production models will be a year later. This will meet the schedule for the Northrop, which runs about January, 1950. The C-10 is an after-burner engine which is nothing but paper right now. The performance on the -8 is 433 knots at 35,000 feet.

Gen. Brandt: It seems to me the airplane is laid down for a certain mach. limitation.

Gen. Carroll: I think that's true.

Capt. Thornton: The 37 and the 89 were designed for .85, structurewise.

Capt. Dessert: Have they ever drop-tested the 37 and 89?

Gen. Carroll: No. They usually do that on the first production airplane.

Gen. Brandt: I have been led to believe that these three airplanes had different speeds it was possible to go to. I would like to clear up what speeds they could grow to, with proper plants, within the next two or three years.

Mr. Carroll: They do have three different speeds. On the 89, they have carried it up to .92 in the wind tunnel. I do know the design was based on .9. The same thing applies to the 37. It was designed for .9 and that's about what it is. The 89 can grow more than the 37.

Gen. Brandt: Is there any possibility of growth in the 35?

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Col. Boyd: Additional power will improve the speed some. I don't believe additional power will push it through the air much faster, because of drag. I think the 89 has the greatest possibility for growth. The F3D, I doubt, would go .75.

Capt. Dessert: The 89 is designed for a fighter. The 87 and 3D are out of proportion. They are not clean. They are heavy airplanes.

Gen. Brandt: Do you think that, provided there was no aerodynamic difficulty, it would be possible to improve their performance by lightening them and refining them? Such as doing away with ejection seats, armore plate, etc?

Capt. Dessert: You still have an airplane with too much frontal area. The cleaner the airplane, the faster it should go.

Col. Boyd: You would improve acceleration, deceleration, have more rate of climb, etc.

Gen. Brandt: If we bought any of these three, then we ought to do something about lightening them to improve performance?

Capt. Dessert: Yes, sir.

C.l. Holloway: Yes, sir. The main thing it would do, would give a better rate of climb. The 89 is the fastest airplane without question.

Gen. Brandt: What do you think all these airplanes could consider giving up, weight-wise, to improve performance to the standard you would like to have?

Col. Holloway: Primarily armor plate and considerable amounts of radio equipment. Not the ejection seat, however.

Gen. Brandt: It is my opinion that these airplanes -- the 87 and 89 -- are based on 3000 lbs. of armament. Do you think we could consider giving up some armament -- ammunition and guns, in the interests of performance?

Col. Holloway: Possibly a little ammunition -- not guns.

Gen. Brandt: How about a change in guns? They have 20 mm which is big weight.

Col. Holloway: Yes, sir. I would prefer 50 caliber, but neither one of them are worth a darn.

Gen. Brandt: If you could get rockets or guided missiles, would you prefer those?

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Col. Holloway: Yes, sir, if you could hit with them. We should try and work with them.

Col. Boyd: On the CO, install radar in the nose and rockets in the wing.

Gen. Brandt: Do you believe at the present state of all-weather fighters that we could get in range? What range do you believe you would have to get into to make effective kills?

Col. Timmons: 300 feet.

Capt. Dessert: I will go against Col. Holloway. I will say guns are better.

Gen. Brandt: We are talking about developed rockets with proximity fuses.

Capt. Dessert: For blind firing, they would be better, sir.

Col. Holloway: Whether it is firing blind or any other way, you have to fire at increasingly faster retreating targets. On a 500-mile bomber, a 50 caliber gun is a fine weapon. Conversely, on the fighter, the gun gets very poor results. You would have to get right up behind them to do any damage. It takes a lot to overcome the speed of the retreating target. On a F-80, at two targets, at 20,000 feet, I never put a bullet in one of them.

Gen. Brandt: Do you think you could give up 20 caliber for 50, if there was a weight saving effect?

Capt. Dessert, Col. Holloway, Col. Timmons: Yes, sir.

Col. Johnson: The 20 has a greater range than the 50.

Gen. Copland: The 20 is good for about 1500 yards.

Capt. Dessert: I would rather use the 20 for blind firing and the 50 for visual firing.

Gen. Brandt: Gen. Saville is ready to take any rocket and put it on my airplane.

Gen. Copland: I think we must pick out some type of gun.

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Gen. Brandt: What would you consider, rather than the 50, would be a substitution for the 20?

Col. Johnson: I would rather go to four 20's than go to six 50's.

Gen. Brandt: What does anyone else think?

Col. Timmons: Your advantage in 20's, is the high explosive.

Gen. Coupland: An HE mount has been built for the 50, but that's too small to depend on the high explosive effect. The 50 will wreck an engine. It will do a good job of setting fires to the tanks. The value is that you have a weapon that shoots twelve rounds a minute, against one shooting seven or eight.

Capt. Dessert: Also, on high speed mass frontal attack, you would put more 50's in, because the rate of fire is higher.

Col. Holloway: I favor the 50 over the 20.

Gen. Brandt: If we must increase performance by losing weight, do you recommend consideration be given to the change from 20's to 50's, or to less 20 mm, or do you recommend reduction of mounts now specified for the airplane?

Col. Timmons: How much weight would you save by dropping the 20 and using six 50 calibers.

Gen. Coupland: A great portion of the weight is the radar, and the power to operate the turret. I would say you would save 120 lbs apiece in the 20's to a gun. You would save about half in the ammunition.

Col. Johnson: Time of fire would be cut down considerably with 50's.

Gen. Brandt: As far as time, is 20 seconds of fire an excessive amount, and will you give on that, to make the airplane lighter?

Capt. Dessert: A 6 x 30 target is hard to hit. I don't believe the 80 is that much. We can drift off a few degrees shooting at a B-29. They have a lot of area.

Gen. Brandt: How many seconds do you want to push a trigger?

Capt. Dessert: As long as I can, until I pass it. At a head on pass, it will be a short period.

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Gen. Brandt: Do you think the present airplanes we are talking about have too much or too little?

Capt. Dessert: I am for six 50's with 300 round per gun. That would be 15 seconds.

Col. Holloway: I think that is about right.

Col. Timmons: I don't believe I know.

Col. Johnson: I would say the minimum I would accept would be four 20's.

Gen. Brandt: What about leak-proofing. Do you think consideration can be given to reduction of this leak-proofing if performance can be improved?

Capt. Dessert: Col. Timmons; Col. Holloway, Col. Johnson: Yes, sir.

Gen. Brandt: Is there any minimum leak-proofing absolutely necessary?

Col. Holloway: No.

Col. Johnson: I consider it desireable to have leakproofing on the fuselage cells where it is possible to get to the engines.

Capt. Dessert: Give us one tank that is leakproof that can be used in emergencies.

Gen. Brandt: How about armor plate?

Col. Timmons: No.

Col. Holloway: Leave it in the front.

Gen. Brandt: Behind the pilot?

Col. Holloway: No, sir.

Col. Johnson: I think any armor used for protection of the engine can be released.

Col. Holloway: I agree to that for the all weather fighter.

Capt. Dessert: I don't think it is necessary.

Col. Timmons: I agree.

Gen. Brandt: How about the possibility of weight saving to all aircraft

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by elimination of some of the stainless steel?

Col. Johnson: Yes, around the engines from the fire wall back.

Mr. Herald: They want it all around the engine. That's only about 1/10th of what we have.

Gen. Carroll: Is that a requirement of some of the safety people? I think we must consider that pretty carefully. You must protect the aluminum alloy structure?

Gen. Brant: What's the reason for wanting all this?

Col. Johnson: They claim it will keep the fire in a small area, or isolate it. I think you will burn through the stainless steel anyway.

Gen. Carroll: Does it add considerable weight?

Mr. Herald: Yes, sir, it certainly does. About 500 pounds.

Gen. Brandt: Are those three satisfactory in your opinion, Col. Boyd?

Col. Boyd: I believe so. Let's not reduce the safety factor we have. It appears to be satisfactory as it is.

Gen. Carroll: We should maintain proper structural strength.

Capt. Dessert: They aren't using that for structural strength.

Capt. Thornton: It is used to keep the alloy structure from becoming overheated in case of fire.

Gen. Brandt: Is ther any other possible weight saving to give performance?

Capt. Dessert: Elimination of the ejection seat.

Mr. Herald: It is worth 300 lbs.

Capt. Dessert: It makes the seat unadjustable anyway.

Capt. Thornton: Any weight you can take out in fixed equipment you can eliminate another two lbs. structurally. If you take out one pound of any kind of equipment, for that one pound of equipment, to maintain the same range, you can take out two lbs. in fuel.

Gen. Brandt: You will only get a better rate of climb, etc.

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Capt. Thornton: The ejection seat weighs so much because of stabilization of weight. It isn't strength.

Gen. Brandt: The seats will no doubt get better as time goes on. Are you willing to give up the feature of getting the pilots out?

Col. Boyd: I think there is a good possibility of colliding with the horizontal stabilizer. Several pilots have left the 80's by rolling over and dropping out. We had one out here who broke both legs, however. The 57, it is possible you would go under the stabilizer. Also, the 89. I don't think you could get out at high speed. If you don't have control of the airplane at high speed you would never get out without some means of ejection.

Gen. Brandt: Do you think the pilot has a chance to get out when the airplane breaks up?

Col. Boyd: No. Centrifugal is too great for him to react and use the three steps to eject the seat.

Gen. Brandt: In the fighter aircraft, when you are in trouble, you have g's on you anyway.

Col. Boyd: I think we should keep it. We will lose a couple of boys otherwise.

Col. Timmons: It would be a morale problem if we had no way to get out.

Gen. Brandt: Col. Johnson, do you favor getting rid of the ejection seat at this stage of the game?

Col. Johnson: Until we get an ejection seat that work, yes, sir. I think the principle is good.

Captain Dessert: No, sir.

Col. Timmons: Yes, sir.

Col. Holloway: Yes, sir, definitely.

Capt. Dessert: If it is a side by side seating arrangement, this solid canopy like the F3D, might save some weight.

Col. Holloway: I think radio altimeter, any HF stuff, including the HF compass can go. What we need is a good AI and IFF, responder beacon, and gun laying equipment.

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Col. Johnson: I think we must keep ARF-14 which is equivalent to the radio compass.

Col. Holloway: For the tactical mission, I think that is the limit -- what I have said.

Col. Boyd: How about cock-pit pressurization? Do you need that?

Col. Holloway: I think two hours is a minimum.

Col. Boyd: Above 35,000 feet, we need pressurization.

Gen. Brandt: I think the enemy will be coming in at high altitude. As high as he can. It will be 30,000 feet or above.

Capt. Dessert: I have heard that a man shouldn't go up more than once every three days without pressurization to 30,000.

Gen. Brandt: Is there any other weight we can get rid of?

Col. Johnson: How about releases and switches and circuit breakers? I think they should be thoroughly reviewed.

Gen. Brandt: Major Turner, what do you think of these three airplanes?

Maj. Turner: (Maj. Barney E. Turner, Headquarters, ADC) I flew the 87 first, and I would like to say I don't feel I can thoroughly evaluate them in one flight. I know that all of us are familiar with the requirements that ADC has set up. We were speaking of times to climb. The rapidity of present radar located in most strategic positions, will not permit us to have the time it takes for any of these three fighters to get to 30,000 feet. From working with ADC, I know we have no fields around this country that will handle the take-off and landing run required on these two fighters, except the XF3D which might possibly meet the requirements. The specifications are 5000 feet runways. To extend the runways we need the most, will be impossible. If we carry 800 gallons in the tanks, we won't have time to make the interception. As far as I can see, the 87 won't meet our requirements. The 89, for the same reason, other than range, will not meet requirements. It also is not stable enough. It is impossible to maintain directional control ever. It is unstable in all directions. As far as maintenance is concerned, I think the crews covered that fairly well. As for accepting one of these three airplanes, I definitely think that none will meet the requirements as we have them set up. It goes back to the old story of buying an airplane that still won't do the job. There is no point in buying one that we know right now, won't do the job. In my experience, the X and Y models have been very superior than the production models. There is no reason to say that the jet models won't come out the same way. An interim night fighter is only a trainer. Why worry about

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perfect one, then, and take a trainer. It comes back to the 2D which is a safe airplane to fly, best in inflight, more operational in the field; will operate out of short fields. It is cut and dried as far as I am concerned.

Col. Branch: How about the TF?

Lt. Turner: Let's set up a requirement; we want for an all weather night interceptor. Let's pick a trainer that will train our people to use the plane when it comes out; even in four or five years. We may as well lay something now to train our people to handle the fighter when it does come out.

Col. Boyd: I would like to mention that the F-96 A is our airplane from the conversion to the X model.

Col. Brady: What do you, do you think, by expanding on it, would be the increase of efficiency? Also, which one comes the closest to improving?

Col. Johnson: What about length of runways, Jack?

Gen. Carroll: We prepared a specification on runway length and established that. It was agreed and approved in Washington, that for the sake of interior, they will build runways which are six by nine thousand feet for fighters and bombers. For the trainers, they will be five and eight. That would mean that in the theaters of operation, on other than a standard day, you will have to have some kind of assisted take off. They assume that a certain percentage of take-offs will be made with assist. Not all of them, however, for that would be too expensive. For interim program we will probably use both rockets and liquid engine type jets. We can use solid rockets on fighters and on the F-96. We could have an assisted take off device for the 45's and that type which gives 4,000 lbs. of thrust. That is equivalent to adding two rocket engines on the airplane. As soon as you get off the ground, you drop the unit. Then, the next step, which will take more time, is to build into the airplanes, an assist take-off engine which will use the same fuel as the primary fuel but will have more oomph for a limited amount of flight. It will probably be within data held for additional thrust. That is a long range program. In the case of interior the bombers will have to be built up to six and nine thousand feet.

Lt. Boyd: Gentlemen, may I interject, may I ask, which of these three, in your, in your sight for the best fighter?

Col. Young: I would say that all three. With the range of one, of which is the take-off engine, at most

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weight -- 43,000 lbs -- we can get a top speed of 436 knots at 35,300 as compared to the 87 with 463 without after-burning and 49[illegible] with after-burning. I feel that the 89, being a smaller airplane, gives us almost the same performance without after-burning as we get with the F-87 with after-burning. I feel that we have a pretty good fighter airplane which will gross below 30,000 lbs. and we will have a good fighter as an interim job until 1953 when we get new airplanes in quantities for tactical units. I feel that if we put an effort behind the 89, we can have a good fighter airplane. I think we can clean up a lot of trouble in maintenance difficulties with major effort. As for radar, the first prototype of Hughes will come in March of 1949. The first prototype of the turret is a year from today. To get production on those would be at lease a year from the date of the prototype.

Col. Boyd: The 89 is inferior in control. The 87 is inferior in approach characteristics. The 89 is in the B-45 class. It also has the high pressure wheel and tire.

Gen. Brandt: Still, which of these airplanes can do the job? Which is the best with a view to growth?

Mr. Herald: The 87 has better features as far as new engines are concerned.

(The conference was adjourned until 6 October 1948, when Gen. Wolfe could be present.)

Gen. Wolfe: On the F-89, I give Northrop until November 1949 to get himself cleared on the prototype. That is an optimistic schedule and allowing time for the radar. I give him six months after that before the first production job. The first production model, according to him, is 1 April. That is the F-89 schedule. On the TF-80, July would be the first model. He could do that if he is 90% through on his engineering. I had the Lockheed people check with Hughes on the radar and they feel confident that he can do a good job. I think we have a chance of meeting the TF-80 schedule. Then we could step out on the 87 or the 89. What about the F3D and the radar in that?

Gen. Brandt: The F3D radar isn't ready yet?

Col. Johnson: They don't have a prototype of the radar yet. We could put our radar in the F3D, I believe. It has a 30" dish, whereas we only have an 18" dish. It doesn't look possible to me, to put the 30" dish in the nose of the 80. I just don't see how they can put 03 in

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the 3D. They were supposed to have the drawings on the C-3 in Washington yesterday. I think we should thoroughly look into what he is doing in the TF-3C to put the C-3 in it.

Gen. Wolfe: If you have decided that you want two people, we will have to see what we can do with the TF-3C.

Gen. Brandt: I am convinced that there is no radar offered now that gives the pilot enough presentation to fly and do the job on radar at the same time.

Gen. Wolfe: Then we should consider the Hughes two-man radar and consider only the TF-3C. We must have an interim night-fighter.

Gen. Brandt: I think this is it then -- the TF-3C against the 3D.

Gen. Wolfe: No. Because you won't get the F3D in this interim period.

Col. Johnson: The TF-3C is in a class by itself. Can we take the F-3C and use it as an interim fighter?

Gen. Wolfe: The original consideration was, can we take the F-3C and use one-man radar. No, on that. Can we take the 3C and put two man radar in that? We can do that.

Col. Holloway: How about a one man radar with two men?

Col. Johnson: It is close to the same problem. They have a small repeater scope in the pilot's cockpit.

Gen. Wolfe: It seems to me the only consideration is whether to take the older radar to get better flying performance out of the airplane.

Col. Holloway: Then we don't have the fuel, by having part of the radar on the outside. A while ago we had one man radar in the nose. We could have that in the two place airplane, and have the radar observer work it.

Gen. Wolfe: You would have 200 lbs more sweeps per man.

Col. Holloway: There is one difference as far as scope is concerned on the two-place and one-place radar. If you can put it in the nose and have two men, and have the tank fuel, I think it is a good deal to consider. Otherwise, it isn't worth it.

Col. Johnson: I would like to personally investigate this and look at a mock-up, before we definitely determine to buy it. I'll like to see if they can get that in the F.

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Gen. Wolfe: The Lockheed people got together with Hughes, and they have more information than we have. We take their guarantee on what they can do. We haven't discussed this consideration with them of taking the older radar.

Gen. Carroll: Would you be willing to accept four guns, for more room?

Col. Holloway: Probably we would, if necessary.

Gen. Carroll: It will be mostly point blank ranges, so four should be enough.

Col. Johnson: We will have to get some rate of climb figures on this TF80C.

Gen. Wolfe: Consider this old radar if we can put the scops in the back and carry the second man. That's the APS-19 radar.

Col. Johnson: That radar has about a three-mile range on a 20 degree cone. I wouldn't go up to intercept anybody on that.

Gen. Wolfe: Let's talk about this radar in the TF-80 and the best rate of climb we can get. If we want to take the 80 later, and make it a trainer, we can take the radar out.

Gen. Brandt: Even if we fall off on performance, on the 80, it should be considered if we can intercept at all. You must have enough fuel to make the interception.

Col. Holloway: If we can get tip tank fuel, and radar, and if we can carry two people and put it in 49, with 300 in June of 50, I am interested in it, definitely.

Gen. Brandt: I don't think we have determined that any one of the three airplanes is the one.

Gen. Wolfe: The interim airplane is a single engine fighter. We must buy them now.

Gen. Brandt: To beat the numbers requirements, we must have an interim, and then, the future will be one of the three we have talked about.

Gen. Wolfe: The F-80 is the quickest and cheapest thing we can get under present conditions. I think we should take the 80 and put the new radar in. We can then take the radar out and use them for training.

Col. Johnson: If we put radar in the 80, it should be the new radar.

Gen. Wolfe: We will throw out the APS-19 completely then.

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Col. Johnson: How about the F3D?

Gen. Wolfe: The 3D starts 18 months from now. You get 1,3,5,9,12,14,15 and then whatever quantities we want from then on. Under the 80, I think, by that time, we would have somewhere between 200 and 300 TF-80's. That's by the time we started getting the 3D.

Gen. Brandt: To get these delivery dates, we must take them as Northrop gives them now.

Gen. Wolfe: I can read off the latest performance on the 3D. High speed, wing tanks off -- 439; maximum speed 479 at 15,000 feet; maximum speed at sea level, 477. Combat radius with full internal fuel, no external, is 556. With tip tanks, you get radius of 712. Take-off distance with the tip tanks is 5630. Time to climb to 35,000, combat weight, with the tip tanks -- 12.4. Being loading - internal only, 60.3, With tips, 70.3. Stalling speed of 104.8.

Col. Boyd: That high speed is extremely optimistic.

Col. Johnson: I don't think the airplane performance is good enough.

Gen. Wolfe: That ought to be obvious, because it was designed for the Navy carrier take-off.

Gen. Brandt: Do the 80's coming out today, have leakproofing?

Col. Johnson: Yes, sir, but no armor plate.

Gen. Brandt: Why leakproofing?

Gen. Wolfe: Because of the time element, I imagine. They had the tanks, and used them.

Col. Holloway: I take a dim view of that removal of self-sealing if we use gasoline.

Maj. Turner: If we are out in the field and have to use gasoline, we will need leak proof tanks in any aircraft.

Gen. Wolfe: Let's agree on the TF-80. What do you want in it? How many guns?

Col. Holloway: Minimum of four.

Gen. Wolfe: Two-man radar and all the gas we can get?

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Col. Holloway: Yes, sir.

Gen. Carroll: Are you satisfied with twenty seconds of ammunition?

Col. Holloway: I would accept that to four guns and 15 seconds if necessary, although we could pull the radio compass out of it.

Gen. Wolfe: This is the schedule on times to climb. P-51, 6.6; P-47 to 25,000 - 10.3; P-38 to 25,000 - 10; P-80 to 12.1 to 30,000; P-82 to 25,000 - 7 minutes; F-84, 12 minutes to 30,000; P-84C, 13 minutes to 35,000; P-86A, 6.1 minutes to 25,000; P-86C, 4.5 to 35,000; F-86D, 4.6 to 25,000; F-87, 14.7. The F-89 with TG190A engine is 12.3 and with TG190C is 10.6.

Capt. Thornton: 14.7 minutes and 4.5 with after-burner.

Col. Brandt: If we are considering the F-90 as the only possible solution for interim, we will have to discuss the other three for future use.

Col. Holloway: The F-87 is too big. It is too expensive to operate. After having been here for approximately nine months, the critical mach. is still about 78. It needs the jitters at about 76 indicated. Apparently, it doesn't have too much room for improvement in speed. These are the main objections to it. The cost of running; time to get it started on its mission in scramble; and its apparent lack of speed. The 89 is a faster plane and has the most promise as far as performance goes. I think it is going to be a headache to maintain and keep in the air. It has greatly superior performance. I think between the 89 and the 90 or 87, you could keep 95 in the air to 100 of the others. The 90 would be the easiest to operate and maintain and keep them going without trouble. It has no peculiarities. The main drawback is lack of performance. Probably it would never build up too much better performance than it has right now. My conclusion is that none of the three are suitable in view of requirements that we would specify right now, today. Therefore, the problem is which one, if any, or some other substitute, such as the F-90, can be got, and what can we get like. Any of them would be an interim airplane to accomplish the all weather interceptor mission. The interceptor airplane that accomplishes active duty over the United States must operate 24 hours a day, every day, anywhere in the United States. We consider any of these an interim airplane. We would like to start immediately, on the airplane that will meet characteristics established by 1952 when a new round might come into production.

Gen. Wolfe: This is comparing all airplanes on a comparable basis, both with and without afterburning?

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Col. Holloway: Right, sir.

Gen. Wolfe: What's the main objection to the 89?

Col. Holloway: Maintenance. I think it will be something like the 84 -- hard to keep it going; special parts; and many, many hours of work. Such things as the inverter, the accessory sections or the engine will require engine removal. It has a complicated control system. I think that type will be necessary on all high speed airplanes, but it is complicated and vulnerable. The alternate system is unsatisfactory, which the factory admits. It reminds me of the 84 in that respect. Another objection is its lack of stability at altitude, apparently around all three axis. Possibly that can be improved.

Gen. Wolfe: What about that Col. Boyd?

Col. Boyd: I am not sure that is responsible. We suspect the control system. It isn't that we have an unstable airplane which will always be unstable. I hope it is in the control system.

Gen. Wolfe: Gen. Carroll, how long do you think it is going to take us to get the "X" job out and bring in a new all weather fighter?

Gen. Carroll: Between three and four years.

Col. Johnson: Before the first production?

Gen. Carroll: No, the experimental.

Gen. Wolfe: I have got the best figures from Lockheed on their P-90. Lockheed is pretty good for production and engineering. They have been working on the 90 since 1946, and their most optimistic production figures are December of 1950. They have a conversion of the 90, which puts the second man below the pilot in front, as scope operator.

Col. Johnson: Those airplanes are stalling at 130 some knots. That is the 88 and the 90. The 86C, 90 and 88 all run in the 130 class.

Gen. Wolfe: If you get the characteristics that you want, you will have to follow something similar to this pattern: I would say the best we could do, on high priority, would be four years before production if you lay down a new airplane.

Col. Holloway: I think that will have to be accepted. I don't see what use we will have for any one of these three, in 3-1/2 years.

Gen. Brandt: I think they are all too slow, Gen. Wolfe. That's the worse characteristic.

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Col. Johnson: I heartily agree with that. The top speed on the 89 in clean configuration is 492 knots with the after-burning at 35,000, it runs at 515, I believe. If we get an airplane that will go 500 knots at 35,000, it will catch the majority of aircraft coming over this country, up through 1954, at which time we will be able to bring in a new development. I do feel that airplane will be a fairly satisfactory all weather airplane if they meet those performance figures.

Gen. Pratt: The 89 will do .8 mach. number with tip tanks.

Gen. Wolfe: He gives here -- at 35,000 with the straight -17 engine -- 492.

Col. Holloway: We got 479.

Col. Johnson: In addition, if we go through a weight saving program, I believe we can still further cut the weight, and that will increase rate of climb, and take-off distance.

Gen. Wolfe: He gave me an estimate on the weight program.

Col. Johnson: I believe he is keeping the armor plate in there. We are thinking about serious weight reduction from our standpoint.

Gen. Wolfe: He reduced from 42,000 to 36,000. That doesn't affect top speed, but time of climb to 35,000 goes to 10.2 against 12.3.

Mr. Herald: What we have to do is compare the production figures that we can get. The 87 has slightly better performance on all phases.

Gen. Wolfe: The 87 is not as fast.

Mr. Herald: These are not the production aircraft.

Gen. Wolfe: The question is, are we going to buy the 89, or buy a new airplane. If you feel that way about the 89 being an interim airplane, just consider that the TF-80 would carry you through the interim period until you got this new airplane.

Col. Holloway: I think requirements ought to be this. Climb, 10 minutes to 40,000 feet; speed, mach. 1 with aerodynamic capability of going beyond; endurance, 2-1/2 hours; good deceleration device; and capable of operating at 5000 feet fields. Maximum altitude of 50,000 feet. I think armor is unnecessary in the rear. Self-sealing tanks should be required if there is a change of using gasoline. Considerable electronics equipment can be eliminated. We need anti-icing and better armament. I think we need command set, VHF, or intercept and radar with IFF and responder beacon.

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Gen. Wolfe: [illegible] armament?

Col. Johnson: I mean rocket armament, so we can shoot at the fast bombers before we get into their range.

Gen. Counsell: I think we can get that in four years.

Col Johnson: We don't have anything except a very few who could operate at 35,000 feet.

Col. Holloway: The reason I said .1 and going through, it which we just learned in the U.

Col. Johnson: Speed I'm not particularly at all, but I am talking about 32,000 feet.

Gen. Wolfe: I think the P-80 has a combat ceiling of 53; time to climb [illegible] 40, 40 seconds, 42?; combat speed of 55[illegible] knots. Actually, it should be able to go through mach .1. We have that coming through and flying in January.

Mr. Gerald: It is a single seater.

Gen. Wolfe: It can be made into a double seater. They could start to deliver the conversion of the 80, in December of 1950, assuming, of course, this could be altered to take the equipment. They will fly it in January of 1952. Why not jump over those and go on and get a good one. Why should we lay down this interim one -- this TF-80? Why lay that on down and get into early production?

Col. Johnson: When we get the P80, we will have a ceiling speed of 1[illegible] knots. I am not sure of this. I don't know about that airplane. I think we have thrown off the night fighter too much. It is time we had him on an airplane that will do the job through 1954, 1955 and 1956, which is the 80.

Gen. Everest: I would like to have Captain Bennett say his piece on these three airplanes.

Capt. Bennett: I believe that the F-87 is just about as good as it is going to get. The 80, I know that it is in its early stages, can be improved enough to put it closer to what we want. Also, we are shying away from the idea that we are night fighters. The 87 looks like a bomber rather than a fighter. We will have control to put A/G in [illegible] ratio. We could do the same with the B-45. We would be just as good with the B-45 as with the 87. The 87 is not a fighter.

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Gen. Wolfe: It seems we have no fight fighters. We have the real problem. We're going to be -- with here or five years?

Col. Ford: That is correct.

Col. Talbert: We can do this with the 80 for about five minutes to get through.

Gen. Wolfe: Would you be happy with the 9, going to war in 1950?

Col. Johnson: I would be happy.

Col. Ford: I feel the fighting speed of the F-90 is too high.

Gen. Wolfe: The 90 will be expensive, too. Have you, Captain Deasart, flown the F-90?

Captain Deasart: Yes, sir.

Gen. Wolfe: Would you rather have the 61 or the 90?

Capt. Deasart: I would rather have the 90, sir, or the two-place F-80. I would rather have that, sir.

Gen. Wolfe: I mean fighting the war.

Capt. Deasart: That's hard to say. As an interim fighter, the F-90C with additional power. I would rather have the jet than the 80 or 51.

Gen. Irvine: The 51 will still beat the 9.

Capt. Deasart: We command the 51 with the 9, and the 51 will outclimb it.

Col. Irvine: It seems to me there is no hope of getting any airplanes in '52 with shorter wings and form today. The decision is this. Should we take the TF-90C and one of these airplanes until 1953, or longer, and in 53 or 54, get a complete new one. We have just about settled on the TF-90, six or seven months from now, and then get an improved one.

Gen. Wolfe: Assuming that everybody agreed that the 90 is the one we'll buy, you could not procure it 11 months longer before you could even start with the latest version of an all weather fighter. You couldn't have anything in the meantime that comes near meeting what we need.

Col. Johnson: I feel we must have it here by 1951 or 1952.

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Gen. Wolfe: If you decide to take the C9, you would get it in April of 1950. If he's talking five months, you would get them in August of 1950. We can run the rate up to fifty a month. In July '51, we could have fifty a month. Then, the B-47's out, the C9 is out, and the X-52 will do the job better than the others. Also, you would like to have laid down, a new development to come out in 1953 or 1954.

Col. Holloway: I do not agree on the C9. On the assumption that the C9 is suitable, there is only six months difference in times.

Col. Johnson: I don't think we can assume the C9 will be a satisfactory fighter for all weather.

Col. Holloway: It will be a longer time than that. I agree with performance being pretty good by that time, but I would like to compare it with the C4 and C1. I would take C1's to C4's because you can't get C4's in the air. I am convinced the C9 will be another C4, -- hard to keep in commission. I would rather shoot for something better and take the 6 months difference with the C-52 in the meantime.

Gen. Wolfe: In all these new airplanes, there are still a lot of unknowns. They will all take a longer period. We had difficulty with the C9; and we have had the same thing on the C4. I think we will have the same thing with the C6.

Col. Johnson: How about maintenance difficulties on the C9? I think they will all be difficult to maintain.

Lt. Gen. Brandt: I don't agree that the C9 cannot be fixed, maintenance-wise. The C4 could have been, but wasn't. If we buy the C9, let's fix it now. The troops engineers all agree that if it had accessibility it would be a good airplane. The engines are half accessible, and I believe it could be done. The C7 and C8 are simple to maintain, but I think we could have another C4 in the C9 if we build it for maintenance accessibility. I think it can be done. I don't know whether the wheel can be fixed or not. If we had a split wheel, it would be better. That, perhaps, can still be done.

Col. Holloway: I think, it can be corrected, but it's a problem.

Gen. Thornton: It is a matter of loading on the high pressure tire.

Gen. Wolfe: Assuming we win, now -- if we dropped them all, and rushed the C9 with the flyin in January; whatever changes are made; if he gives us the go-ahead, we will start getting them in December of 1950. That is with the after-burner engine.

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Col. Johnson: I [illegible] will be available then.

Gen. Holle: We will have to take his figures to make a comparison. We have the effect of engine flying now.

Col. Irvine: Col. Holle[illegible] thinks that he ought to have a flyaway with a license.

Gen. Holle: I think it's a development job.

Mr. Irvine: [illegible] a 90 on the 90 in promise of speeding, small; or the 7°C. speed is what we're after.

Gen. Holle: I don't believe we should take the turret on anything at this time. I do not plan to consider the turret at all. I don't believe you should be satisfied with the configuration of the 90.

Mr. Irvine: The F is definitely superior. The F is a little [illegible], to them. But I've noticed the same stalling [illegible].

Gen. Holle: We will [illegible] and Lockheed will have them come up [illegible] to see [illegible], if possible.

Mr. Irvine: I recommend [illegible] any of the three and [illegible] new aluminum [illegible]. Let's evaluate them all with the changes we can [illegible] them.

Gen. Holle: Are we going to get additional development on this, either in performance?

Mr. Gentili: I don't know if there will be any great changes in [illegible].

Mr. Irvine: It's not to be expected. The F, I would [illegible] with speed.

Mr. Wild: I [illegible] The [illegible] is the lighter. It would [illegible] climb - [illegible]. It has [illegible], [illegible] about that.

Col. Albright: I [illegible] with Col. Holle[illegible] on [illegible]. We want to [illegible], see [illegible] them, and [illegible].

Gen. Holle: O[illegible] [illegible], to [illegible] all [illegible].

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Capt. Bassett: I don't [illegible] two or a half hours are necessary [illegible].

Lt. Col. Wolf: We can get -1/2 hours out of the F-87.

Col. Johnson: I certainly attach anything in the 40 or 45 or 60 class [illegible] F-80.

Lt. Col. Irvine: The 80, 86, and 90 are certainly the 45. I will vote, if the F-87 is acceptable to the night-fighters for 50 and 51, but as we buy anything more, for 52, 3, and 4, we'll be evaluating these three under the new evaluations.

Col. Johnson: My recommendation is to keep the F-87 if it is satisfactory, and use it as a night fighter. To both the 52 and buy it for the airplane we will use in 53, 4, or 5, and start over developments as early as possible to meet requirements and not hold production.

Col. Turner: After consideration is given the 52 if we can get the performance we have discussed and tied in the [illegible] aircraft as soon as possible, and not buy the 87.

Capt. Bassett: I agree, to the extent of using the 52 primarily as interim and also, if the 52 cannot be used, to re-build and design a new all weather fighter. Also, I would like to get an LFOX to see how the [illegible] work out. The 52, at altitude, with the tanks, has a bad effect at 35,000 and above. On the Natural area, we have trouble. We need to investigate the radar operator's output and we want to see what this new ability would do to the radar scope.

Lt. Smith: The only thing I could say would be somewhat the same. I think that keeping it here to have [illegible] the F-87 with the new radar, will work. We don't have too much so this will be involved [illegible]. I believe this pilot-operated radar ought to be investigated. It seems like we could get a good scope with the proper [illegible]. We should watch the weight that is going into the F-87. We broke ours, I have found are much larger, and I've more and it. Also, we will be able [illegible]. I would like to see more research in this and thing of the sort.
Another thing is that I am very much in favor of carrier [illegible] look on.

Col. Irvine: [illegible]

Lt. Col. Wolf: Would we [illegible] [illegible]

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Gen. Welch: I don't think so. The following people are called upon and I will run and it: Capt. Bassett, Lt. Smith, Major Turner, Col. Timmons, Col. Holloway, Gen. Brandt, Gen. Carroll, [illegible], Col. Tegtmeier and Col. Johnson. The problem is: 1--The [illegible] 2--Certification of a vessel of whether we procure the TF, [illegible]. 3--Taking any one of the three we recommend a new development which would mean an entry on which the TF-39, or whether single engine fighter alternate would get the ideal fighter. What do you all think?

Lt. Smith: The TF

Major Turner: If [illegible] TFXX -----

Gen. Welch: Although [illegible] buy the TF-XX and put him, do you recommend that we buy two of the three or if none, then [illegible] a new all weather fighter?

Col. Tegtmeier: The [illegible] we have to buy.

Lt. Smith: The T.

Major Turner: Yes.

Col. Timmons: I would [illegible]

Col. Holloway: I think [illegible] one of the three [illegible] the two-[illegible] I would be [illegible].

Gen. Brandt: Did you buy any of the three? Then you [illegible] and the F-[illegible].

Gen. Carroll: The F-[illegible].

Lt. Col. [illegible]: The [illegible], sir.

Col. [illegible]: The TF-[illegible] is the [illegible]; the F-[illegible], and [illegible] the [illegible] would be a [illegible], [illegible].

Col. Johnson: The [illegible].

Gen. Welch: [illegible]

The [illegible] Chief of Staff, Washington, D. C., [illegible] in the [illegible] Air Force, [illegible].

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AFMDC-1A/Gen Powers/kmp-2128 14 Oct 48

OUT

14 Oct 48

1948 OCT 14 PM 5 00

CONFIDENTIAL

AIR [illegible] FOR THE DEPUTY CHIEF OF STAFF, MATERIEL

SUBJECT: Production of Fighter Aircraft

1. The following decisions have been made by the Secretary of the Air Force and the Chief of Staff, and your office should take implementing action:

a. Further production of the F-47 is to be discontinued immediately. Submit recommendations regarding termination of experimental contracts.

b. The XP-79 is to be removed from future aircraft production schedules.

c. The all weather fighter version of the XP-67 will be put into production at an interim measure.

d. The F-89 is to be put into production on an expedited basis.

e. The production distribution between the XP-67 and the F-89 to be determined within funds made available from termination of the F-47, based on production possibilities and requirements.

f. A design competition should be set up, within FY 1949 funds that may be made available, based on new military characteristics to be prepared covering the mission to be performed by the all weather interceptor.

Copies furnished
Gen Barcus
Gen Kenney
Gen Partridge

FAIRCHILD

001-0

General, U.S. Air Force
Vice Chief of Staff

MAJ T-S. FAIRCHILD -

OFFICE SYMBOL	AFMDC-1A				
GRADE AND SURNAME OF COORDINATING OFFICERS		CONFIDENTIAL			

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14 October 1948

SUBJECT: Procurement Directive - 48-17 - (RF-87 Aircraft)

TO: Commanding General
Air Materiel Command
Wright-Patterson AFB
Dayton, Ohio

1. Reference is made to letter from this headquarters dated 1 June 1948, subject: "Procurement Directive 48-12 - (RF-87 Aircraft)", wherein authority was granted to procure thirty (30) RF-87 aircraft.

2. It is directed that immediate action be taken to terminate subject procurement.

BY COMMAND OF THE CHIEF OF STAFF:

K. B. POWERS
Major General, USAF
Asst Deputy Chief of Staff,
Materiel

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452.1 Jet Prop Aircraft, Oct 2, 1948

AF HQ-11
3 Dec 1947

AFMPD/Mr.E.C.Barber/hia/4869
Prepared 15 October 1948

30

15 Oct 1948

SUBJECT: Procurement Directive - 49-19 - (F-87 Aircraft)

TO: Commanding General
Air Materiel Command
Wright-Patterson AFB
Dayton, Ohio

1. Reference is made to letter from this headquarters dated 1 June 1948, subject: "Procurement Directive 49-15 - (F-87 Aircraft)", wherein authority was granted to procure fifty-eight (58) F-87 aircraft.

2. It is directed that immediate action be taken to terminate subject procurement.

BY COMMAND OF THE CHIEF OF STAFF:

E. M. P[illegible]
Major General, USAF
Asst. Deputy Chief of Staff, Materiel

P13511

OFFICE SYMBOL	1. AFMPD	2. AFMPP	3. AFMDC	4.	5.
GRADE AND SURNAME OF COORDINATING OFFICERS	Mr. E.C. Barber	Gen Kessler	Gen Powers		

CONFIDENTIAL

19—30543-2 U. S. GOVERNMENT PRINTING OFFICE

Fldr. Bk. File No. 3
Flt Test DATA

1

File

PROGRESS REPORT XF-87 45-59600 for Bi-Weekly Period Ending 11 October 1948

Officer In Charge
Curtiss-Wright Corp.
Airplane Div.
Columbus, Ohio

AF Officer In Charge, [illegible] October 1948
Muroc Sub-Office

cc: Chief, Aircraft Projects Section, [illegible]
Chief, Inspection Branch, WS PPO
Supervisor of Projects, Muroc
File

The following work is in progress and/or has been accomplished since last reporting period on subject airplane:

1. Installed borrowed governor and pump for #2 engine. Engine tested satisfactorily. Preflighted airplane. Took off Flight #69 30 September 1948 at 1503, landed [illegible] ([illegible] minutes). Flight was for purpose of performance climb to 25,000 ft. and [illegible] stability. Results only partially satisfactory due to radio difficulties. Removed [illegible] motor, cleaned clutch and reinstalled.

2. Completed checkout of radio equipment. Preflighted airplane. Took off Flight #70 1 October 1948 at 0842, landed 0956. Flight was for purpose of obtaining dynamic and static longitudinal stability at 25,000 ft. including stalls and windup turns. Results satisfactory but radio again malfunctioned and left landing gear position indicator did not indicate locked down for landing. Checked radio and found loose [illegible] at quick disconnect at rear of control wheel. Jacked ship and adjusted landing gear micro switch that was set too close a tolerance. Preflighted airplane. Took off Flight #71 1 October 1948 at 1305, landed 1352 (0:47 minutes). Flight was for purpose of obtaining airspeed calibration with F-84 airplane and rate of roll tests at 25,000 ft. Results satisfactory. Installed wing tip tanks and ran fuel transfer tests.

3. Removed engine tail cones from all four engines for military power turbine inspection. Reinstalled tail cones without finding any difficulties.

4. Preflighted airplane. Took off Flight #72 2 October 1948 at 0742, landed Main Base 0753. Flight was for purpose of ferrying airplane from North Base to Main Base with wing tip tanks empty in order to run measured takeoff and landing tests from Main Base runway. Refueled airplane filling all fuselage tanks and 350 gallons in each tip tank. Took off Flight #73 at 0932, landed 0936. Flight was for purpose of measuring intermediate gross weight takeoff and landing with 350 gallons of fuel in each wing tip tank. Completely fueled all tanks. Preflighted airplane. Took off Flight #74 2 October 1948 at 1015, landed 1108. Flight was for purpose of measuring maximum weight takeoff distances and sawtooth climbs at maximum weight at 10,000 ft. Results satisfactory. Landing also measured at reduced weight. Refueled all tanks. Took off Flight #75 at 1225, landed at North Base 1328. Flight was for purpose of measuring maximum weight takeoff distance and performance climb at maximum weight to 25,000 ft. Also, level flight performance at [illegible]000 ft. Results satisfactory. This completed Phase II testing. Phase II consisted of 19 flights for total flight time of 12:58 hours and was accomplished in 11 days since turning airplane over to Army.

5. Removed all four engine tail cones for military power turbine inspection.

(over)

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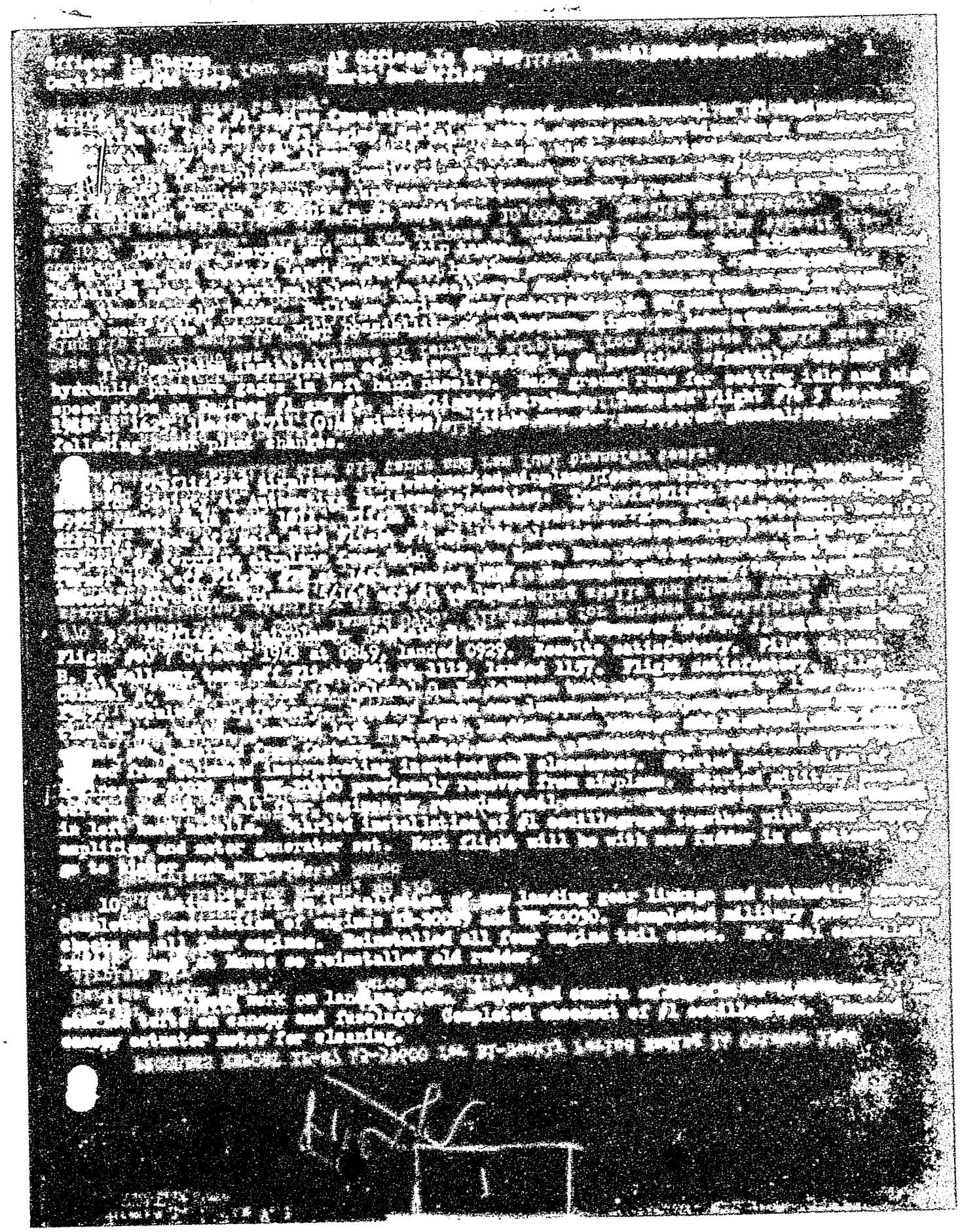

PROGRESS REPORT XF-87 45-59600 for Bi-Weekly Period Ending 14 October 1948

Officer In Charge
Curtiss-Wright Corp.

AF Officer In Charge
Muroc Sub-Office

151500 October 1948 1

12. Completed installation of landing gear links and retracting struts and completed checkout of landing gear function. Completed reinstallation and checkout of cabin pressure motor. Completed installation of old rudder. Preflighted airplane. Took off Flight #83 10 October 1948 at 1355, landed 1430. Flight was for purpose of obtaining high speed number photographs of cabin tufts. Airplane is now being prepared for ferry to Columbus. Installation of wing tip tanks and swinging of compasses. Pilot will make one or more shakedown flights as necessary to insure proper functioning of all items.

13. Removed fin spacers and supports. Installed new limit micro switches on canopy. Reshimmed #2 and #4 engine tailpipes to improve tailpipe temperatures. Installed new canopy actuating motor. Trimmed #1 tailpipe for temperature limits. Installed tip tanks and ran flow checks. Preflighted airplane. Took off Flight #84 11 October 1948 at 1537, landed 1545. Purpose of flight was to ferry airplane to Main Base for maximum weight takeoff.

14. Preflighted airplane. Took off Flight #85 12 October 1948 at 0750, landed 0900. Flight was for purpose of shaking down airplane with tip tanks installed and full. Flight included check of various navigational instruments and general airplane performance with tanks installed. Results satisfactory. Ran military turbine inspection on all four engines. Repaired two loose second stage turbine buckets on #1 engine. Filled all fuselage fuel tanks. Airplane now ready for ferry tomorrow, to Columbus.

15. Completed preflight. Took off Flight #86 13 October 1948 at 0705 at 49,500 gross weight and full fuel including tip tanks. Landed Tinker Field, Oklahoma 1006. (3 hours) Flight was for purpose of ferrying airplane to Patterson Field, Ohio. Temperature at Tinker Field 80° and winds variable. Decision made to stay overnight at Tinker Field and make early morning takeoff for ferry flight to Patterson Field. Remaining personnel started packing equipment for return to Columbus.

16. Total number of flights - 86. Total airplane time - 66:34 hours.

J. H. BRIDGES
AF Officer In Charge
Muroc Sub-Office

DFM/ajb/Muroc

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AMC Form No. 10-7
(Rev 1 Apr 48)

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PERSONNEL & ADM.

RESEARCH & DEV.*
OB Thornton for MCREOA-4

INTELLIGENCE

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OTHER

MCREOA-4/OBT/hw
18 October 1948

MCRRCA(MCREOA-4)

SUBJECT: Contract W33-038-AC-19637, XRF-87 Airplane, Change of Model Designation

TO: Curtiss-Wright Corporation
Airplane Division—Columbus Plant
4300 East Fifth Avenue
Columbus 16, Ohio

Inasmuch as recent decisions have been made by the AMC to incorporate an enlarged wing and the J-33-29 engine in the subject airplane, a change in model designation is required. The XRF-87 airplane with the big wing and the engine change will be referred to as the XRF-87C. In order to avoid confusion, any future correspondence concerning this airplane should reference the XRF-87C.

AGO-NO43

FOR THE COMMANDING GENERAL:

for Paul B. Smith

A. T. GULBERTSON
Colonel, USAF
Acting Chief, Aircraft Projects Section
Engineering Division

Cys to:
C-W, Dayton
AF CMC, C-W
Dayton AF PPO
MCPPXA

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON

Office of the Air Inspector
Headquarters, First Region
Langley Air Force Base
Langley Field, Va.

18 October 1948

333.3 (Report of Inspection, Dayton AF PFO, 13-24 September 1948)

SUBJECT: Case Report No. 2, Report of Procurement Inspection, Dayton AF Procurement Field Office, Wright-Patterson AF Base, Dayton, Ohio - Contracts for XF-87, F-87C and RF-87C Airplanes

THRU: Chief, Dayton AF Procurement Field Office
Wright-Patterson AF Base
Dayton, Ohio
And Command Channels

TO: Chief of Staff, U. S. Air Force
Attention: Chief, Procurement Division
Office of The Air Inspector
c/o Inspector General, First Region
Langley AF Base, Langley Field, Virginia

I. INSPECTION

1. An inspection of the Curtiss-Wright Corporation, Airplane Division, Columbus, Ohio, was conducted during the period 20-22 September 1948, by personnel of the Office of The Air Inspector, Hq USAF, Washington 25, D. C.

II. DEFICIENCY

2. At the time of this inspection the Curtiss-Wright Corporation had a very involved set of related contracts which are discussed as follows:

a. (1) On 28 April 1945, Curtiss-Wright Corporation, Airplane Division, obtained CPFF contract W33-038 ac-6266 calling for engineering services, mock-up, wind tunnel models, and data with respect to the ZL-43 Airplane at an estimated cost of $352,984.00, plus a fixed fee of $13,807.00. This work was on contractor's Design No. 100, Attack-Bomber Airplane, dated 1944. The amount of this contract was increased to $2,919,865.52 by ATSC Letter Supplement dated 22 May 1945.

(2) On 13 March 1947 this contract was changed to a Fixed Price contract, with a face value of $9,530,461.48, which called for two XF-87 Airplanes. One of these airplanes is being tested at Muroc, California. The second airplane reported to be approximately 90 per cent complete.

(3) On 22 January 1948 the contractor was awarded Fixed Price Contract W33-038 ac-19837 for the modification of one of these airplanes at a cost of $588,000.00. This modification provided for changing from a four-engine to a two-engine airplane, and increasing the wing area from 600 sq ft to 740 sq ft.

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Basic: CR No. 2, Rpt of Proc Insp, Dayton AF PFO, Dayton, Ohio - Contracts for XF-87, F-87C and RF-87C Airplanes, dtd 18 Oct 48

(3) (a) Change Order No. 1, dated 25 February 1948, to Contract W33-038 ac-19837 provided for the fabrication and installation of a simulated turret at a cost of $66,508.87.

(b) Change Order No. 3, dated 8 April 1948, to Contract W33-038 ac-19837 provided for the modification of the second XF-87 airplane into a two-engine photo reconnaissance airplane. This Change Order brought the face value of the contract up to $919,892.31. This modification is approximately 25 per cent complete.

(4) On 29 March 1948 the contractor received Letter Contract W33-038 ac-20450, with authority to expend $1,500,000, calling for production studies for twenty-eight (28) F-87A and fifteen (15) RF-87A airplanes.

(5) Total costs of the foregoing are:

Contract No. W33-038 ac-6266		$9,530,461.48
" " W33-038 ac-19837 (as amended)		919,892.31
" " W33-038 ac-20450		1,500,000.00
Total		$11,950,353.79

b. Since the original contract, dated 1945, was made, the following major and costly changes have occurred:

(1) Called for by Supplemental Agreement No. 1 (S-17981), dated 13 March 1947, at a cost of $9,530,461.48:

Changed from an Attack-Bomber with bomb-bay and tail turret to an All-Weather Fighter, without bomb-bay and tail turrett. The following are some of the principal differences between the XA-43 and the XF-87 airplanes:

	GROSS DESIGN WEIGHT	WING SECTION	WING AREA
XA-43	65,575 lbs	NACA 66-111	750 sq ft
XF-87	37,500 lbs	NACA 65-111	600 sq ft

(From this table it is apparent that the XF-87 is practically a new plane.)

(2) Called for by Contract No. W33-038 ac-19837, dated 22 January 1948, and subsequently amended, at a cost of $919,892.31:

(a) Changed from four-engine to two-engine airplane.

(b) Install removable nacelles for the J-33 engines.

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Basis: GR No. 2, Rpt of Proc Insp, Dayton AF PPO, Dayton, Ohio - Contracts for XP-87, F-87C, and RF-87C Airplanes, dtd 18 Oct 48

b. (2) (c) Install new landing gear doors and landing gear strut doors.

(d) Install new landing gear door actuation mechanism.

(e) Install new nacelle tail cones.

(f) Install water injection system.

(g) Install simulated turret (Change Order No. 1).

(h) Second plane changed to photo reconnaissance (Change Order No. 3).

(3) Called for by Amendment No. 3, dated 26 July 1948, to Letter Contract No. W33-038 ac-20450;

(a) The wing area shall be increased from 600 square feet to 740 square feet, with an aspect ratio change from 6 to 7, and an upper surface split flap type aileron shall be provided to supplement the normal aileron.

(b) Provision shall be made for automatic half flap setting for use in approach and maneuvering at lower altitudes and speed ranges.

(c) A permanent liquid rocket installation shall be provided with droppable alcohol and liquid oxygen tanks.

c. The first XF-87 airplane No. AF 45-49600 was shipped to Muroc Lake 6 November 1947. Flight tests showed that the wing loading of this airplane was excessive and on 26 July 1948 Air Material Command issued Amendment No. 3 to Letter Contract W33-038 ac-20450 (Incl 1). It is to be noted that one of the major changes of this Amendment calls for increasing the wing area from 600 to 740 square feet or over 23 per cent.

d. Inclosure 2 shows that a production order has been placed for a total of eighty-eight (88) F-87C and RF-87C airplanes, which are modifications of the XF-87 airplane discussed in preceding paragraphs. This action has been taken although the production model will have extensive variations from the prototype including an increase in wing area of over 23 per cent and will have 2 engines instead of 4. There is no assurance that the production model will be satisfactory and will not have many faults caused by the modifications. In short, it is not considered good business to place a production order until a satisfactory prototype has been delivered.

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Ref: (a) CR No. 2, Hqt AF Proj Insp, Evaluation of Proj Inspection [illegible]
XB-37, XB-38, and XB-39 Airplanes, dtd 31 Oct 45

a. According to information furnished by Curtiss-Wright, [illegible] actual cost to the Government for [illegible] (2) [illegible] $55,433,891.00. The cost of the [illegible] (89) [illegible] adding to this amount the costs [illegible] (2) [illegible] while refiguring has been done by [illegible] (See Incl 3.) Attention is invited to [illegible] Wright volunteers to take a loss of $[illegible] Curtiss-Wright are:

Contract W33-038 ac-6066, Incl 4	[illegible]	$[illegible]
Contract W33-038 ac-20450	[illegible]	$[illegible]
Contract W33-038 ac-19837, Incl 5	[illegible]	$[illegible]
Contract W33-038 ac-19837, Incl 5	[illegible]	$[illegible]
Contract W33-038 ac-19837, Incl 5	[illegible]	$[illegible]
Total		$65,559,410.83

This represents the total estimated price of the two (2) experimental planes plus the eight-eight (88) production aircraft. Curtiss-Wright is asking for [illegible] containing price change and redetermination articles to cure [illegible] labor, etc. Dividing the total estimated price by ninety (90) [illegible] cost to the government per airplane of $729,549.09. Considering the fact that one (1) of these is known to be unsatisfactory and the performance of the remaining eighty-nine (89) is problematical, it is the opinion of the inspecting officers it would be unwise to accomplish the production order until at least one satisfactory prototype is delivered.

III. RECOMMENDATIONS

3. a. That, if such action is consistent with the military urgency, the production order for eighty-eight (88) B-37C and XB-37C airplanes be suspended until the No. 2 prototype is modified to include the larger wing and two (2) engines, and satisfactorily flight tested.

b. That the practice of placing production orders in peacetime before a satisfactory prototype has been delivered be discontinued.

IV. INSTRUCTIONS

4. This Case Report will be reviewed by all Commanders, through whom it passes, and action taken, recommendations, or other comments, will be stated by indorsements, each of which will be prepared in sufficient copies to insure the original and two carbons, including inclosures, reaching the Chief of Staff, U.S. Air Force, Attention: Chief, Procurement Division, Office of The Air Inspector, c/o Inspector General, First Region, Langley AF Base, Langley Field, Virginia. Reference AF Regulation 123-1.

RAYMOND P. OATES
Colonel, USAF
Field Air Inspector, Hq USAF

5 Incls.
1. Amendment No. 3, Contract 20450
2. TWX Production Order
3. Ltr Contract 19837, Price Reduction
4. Summary, Contract 6066
5. Summary, Contract 19837

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Basic ltr dtd 10/18/48 fr FAI, First Region, Langley AF Base, Langley Fld., Va., thru Ch, Dayton PFO and Command Channels, subj: Case Report No. 2, Report of Procurement Inspection, Dayton AF Procurement Field Office, Wright-Patterson AF Base, Dayton, Ohio - Contracts for XF-87, F-87C and RF-87C Airplanes.

1st Ind. MCPFXY/LHP/tfl

Office of the Chief, Dayton AF Procurement Field Office, Wright-Patterson AF Base, Dayton, Ohio. 26 October 1948

TO THRU: Commanding General, Headquarters, Air Material Command, Wright-Patterson AF Base, Dayton, Ohio Attn: MCPAXC3

TO: Chief of Staff, U. S. Air Force, Attention: Chief, Procurement Division, Office of The Air Inspector, C/o Inspector General, First Region, Langley AF Base, Langley Field, Virginia. Reference AF Regulation 123-1

1. The following reply applies to recommendations contained in subject report, basic communication, using the same paragraph numbers as were used in basic communication.

III. RECOMMENDATIONS

3a and b. This is a policy matter considered beyond the jurisdiction of the Dayton Procurement Field Office.

LAWRENCE H. PRUCH
Major, USAF
Chief, Dayton AF
Procurement Field Office

Incls.
n/c

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452.1 Pursuit - 1948 - Vol I
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CONFIDENTIAL 27

HEADQUARTERS
AIR PROVING GROUND
Eglin Air Force Base, Florida

31:WLL/bls

SUBJECT: Military Characteristics for Penetration and All-Weather Type Fighter Aircraft

19 OCT 1948

TO: Chief of Staff
United States Air Force
Washington 25, D.C.

ATTENTION: DCS/O, AFOMO

1. The attached military characteristics for penetration and all-weather fighter aircraft have been reviewed as requested in a letter from Headquarters, USAF to this command, dated 9 July 1948, subject as above. The following recommendations and comments are offered for review. Paragraph numbers listed reference those in the attached military characteristics copies. Paragraphs not listed are concurred in.

2. Penetration Fighter.

Par. 1 a. The classifications of "high performance" and "all purpose" are considered incompatible. Also the designation "day" fighter does not indicate any weather flying ability. It is suggested that this airplane be classed as a high performance escort fighter, capable of flying through weather.

Par. 1 b. Rather than the dual purpose specified, it is suggested that the primary mission be limited to the escort of high speed bombardment aircraft at long range. The destruction of tactical targets is not believed to be an applicable additional primary mission and should not be considered.

Par. 1 c (1) (a) & (b). If the penetration fighter is required to protect bombers against very high performance interceptor aircraft, every effort should be made to obtain escort fighter performance which is as near comparable as possible to the performance of the interceptor. The following increased performance requirements are suggested:

High speed from sea level to 30,000 feet - 650 to 700 kts.
Limiting Mach No. - 1.5
Maximum rate of climb at 30,000 feet - 1,000 ft/min.

TO CENTRAL FILES - Classified
10 - The [illegible] to altitude and combat radius of action requirements (1 c (1) (c) and (d)) are concurred in.

(Date)

(Name) (Rank)

(Office)

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CONFIDENTIAL 28

SUBJ: Ltr fr Hq AMC to C/S USAF subj: "Military Characteristics for Penetration and All-Weather Type Fighter Aircraft."

The basis for combat radius of action requirement is concurred in with one exception. It is believed that the use of external fuel tanks on very high performance fighter aircraft is not desirable, and that additional fuel necessary to realize the combat radius of action should be carried internally. Non-self-sealing tanks equipped for purging could be used for this over-load fuel. If over-load fuel for maximum radius of action is carried internally, speed and climb requirements should be met with only the fuel load required for combat and return from the radius of action (combat gross weight).

Par. 1 c (2). It is felt that more specific armament requirements might be made for this airplane. Fixed guns with a minimum rate of fire of 3,000 rounds per minute and a minimum muzzle velocity of 3,000 f.p.s. are suggested as suitable. The airplane should, if possible, be built around the armament installation and not adapted to the airplane after it is built.

Par. 1 c (3) (b). Provisions for blind firing do not appear to be applicable or desirable for the primary mission. Consideration should be given, however, to the installation of minimum airborne interception presentation as an aid in target search and location.

Par. 1 c (4). Any provision for ground attack installations on this airplane should be considered only as a later modification to be made when the airplane is not urgently required for its primary mission. Any inherent design features required for ground attack installations must not compromise the performance for the primary mission.

Par. 1 c (5). If air-to-air guided missiles are to be considered as the primary armament system, then the aircraft should be built around this system. Provision for the installation of ground-to-air missiles should be placed in the same category as other ground attack installations.

Par. 1 c (6). Armor protection should be kept to a minimum for performance reasons. Integral type armor to protect the pilot only, and only from rear fire, is suggested.

Par. 1 c (7). It is believed that all fuel should be carried internally to avoid the difficulties encountered with external loads on very high speed aircraft. The necessary fuel required to climb to altitude from take-off and to cruise to target could be contained in non-self-sealing tanks, with provisions for purging to avoid fire hazard.

Par. 1 c (9) (a). In addition to automatic pressurization, adequate cabin heating, cooling and defrosting should be provided.

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BRIEF: Ltr fr Hq AFC to C/S USAF subj: "Military Characteristics for Penetration and All-Weather Type Fighter Aircraft."

Par. 1 c (9) (b). The automatic pilot provided should be a simple, light-weight type, designed to relieve the human pilot for brief periods. A maneuvering automatic pilot is not believed to be necessary.

Par. 1 c (9) (c). In conjunction with oxygen system design, consideration should be given to the development of a greatly improved method of feeding oxygen to the pilot. Present oxygen masks constitute a major factor in pilot discomfort and fatigue.

Par. 1 c (9) (d) 1. The installation of a canopy sunshade is not considered necessary. The usual fighter pilot's headgear should give adequate protection. In addition to the pilot comfort requirement enumerated, a requirement should be specified for a maximum comfort pilot's seat. This seat should make it unnecessary for the pilot to sit on his parachute, life raft, or other uncomfortable surfaces.

Par. 1 c (9) (e). If the air-to-air homing or the IFF equipment does not provide a beacon suitable for cooperation with GCI radars, then consideration should be given to the installation of such a beacon.

Par. 1 c (9) (e) 2. In place of both long and short range navigational equipment, it is believed that only automatic direction finding equipment (including air-to-air rendezvous equipment) should be provided as an aid to short range navigation.

Par. 1 c (9) (e) 5. In an airplane of this type, it appears that Ground Controlled Approach procedures or simplified Instrument Landing Systems should be relied upon rather than requiring a blind landing system installed in the airplane.

Par. 1 c (9) (e) 6. The last sentence in this paragraph does not seem applicable to the penetration fighter. GCI equipment could be used only for short range interception purposes.

Par. 1 c (9) (f). It would be advantageous if a gun camera were provided which would photograph the target through the gunsight reticle. This would allow better analysis of fighter gunnery and fighter "kill" claims.

Par. 1 c (9) (g). Adequate instruments for weather flying should be provided. The nature of the primary mission will require frequent flying through weather.

Par. 1 c (10) (a). Visibility over the nose should not be less than 20°. Successful deflection shooting at high speed targets requires large deflection angles and correspondingly large visibility angles over the nose.

Par. 1 c (10) (c). Engine fire-extinguishing installations should be required on multi-engine aircraft only.

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3.

BRIEF: Ltr fr Hq AFC to C/S USAF subj: "Military Characteristics for Penetration and All-Weather Type Fighter Aircraft."

3. All-Weather Fighter.

Par. 1 b. It is believed that the primary mission of this airplane should be limited to the interception and destruction of enemy aircraft during all conditions of weather or visibility. The use of the airplane against tactical targets should not be a design consideration.

Par. 1 c (1) (a) (b) (c). If the all-weather fighter's mission is to destroy enemy bomber aircraft, the required fighter performance should be based on the bomber's performance. To be effective, it is believed that the fighter should have a speed advantage over the bomber of at least 100 knots. It is further believed that the fighter should be capable of climbing to 50,000 feet in 10 minutes in order to be effective with limited early warning.

Par. 1 c (1) (d). Again considering the mission of bomber interception, it is suggested that cruising performance requirements should be based on patrol endurance, rather than radius of action. A patrol endurance of three hours at 35,000 feet is suggested, based on climb to altitude at maximum continuous power and three hours patrol cruise at speed for best range, followed by 30 minutes operation at combat power. Reserve fuel should be sufficient for 30 minutes operation at minimum consumption at 10,000 feet altitude. External fuel should be limited to that required for the climb to altitude and for one hour patrol cruise.

Par. 1 c (1) (e). It is thought that priorities for additional performance should be based on (1) speed (2) rate of climb (3) altitude (4) endurance, in that order.

Par. 1 c (1) (f). In addition to controllability and maneuverability requirements, emphasis should be placed on obtaining very good instrument flying characteristics and landing characteristics.

Par. 1 c (2) (a). Armament requirements should be stated more specifically if possible. It is suggested that a top or forward hemisphere turret with unrestricted coverage and with high velocity, high rate of fire weapons be specified. The turret should have provisions for indexing forward for fixed-firing use. Automatic gun laying radar with unobstructed top or forward hemisphere coverage and moving target indicator provisions is further suggested.

Par. 1 c (3). With automatic gun laying, only a simple fixed gunsight with windshield-projected reticle would be required for any air-to-air visual firing.

Par. 1 c (4). It is felt that provision for ground attack installation should be considered only as secondary to the aircraft primary mission.

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31 OTR

BRIEF: Ltr fr Hq AFC to C/S USAF subj: "Military Characteristics for Penetration and All-Weather Type Fighter Aircraft."

Par. 1 c (5). Provision should be made only for suitable air-to-air guided missiles.

Par. 1 c (6). Armor protection from fragmentation from the front and rear should be provided for the pilot and radar observer, but is not believed necessary for power plant protection.

Par. 1 c (8) (b). It is suggested that external fuel requirements should be limited to that necessary for climbing to 35,000 feet from take-off and for one hour of patrol cruise.

Par. 1 c (9) (e). If the other radio equipment installed in this airplane does not provide a suitable beacon as an aid to GCI radars, then such a beacon is required. It is strongly recommended that the AGI and AI radar equipment be so designed that a pilot alone can operate it, thereby making unnecessary the requirement for a radar observer and his station.

Par. 1 c (9) (e) 2. It is not believed that long range navigational equipment is necessary in this airplane. In conjunction with the warning, interception and short range navigational equipment, range, elevation, and azimuth presentation should be provided on the pilot's scope or indicators.

Par. 1 c (9) (f). A radar scope camera does not appear to be a requirement.

Par. 1 c (9) (g). Windscreen projection of flight instruments is not believed to be desirable.

Par. 1 c (9) (i). An added provision to the flight brake requirement should be that the use will not cause aircraft trim changes that are detrimental to gunnery.

Par. 1 c (10) (a). Visibility over the nose in an airplane with armament and laying equipment should be considered only from the standpoint of visibility for landing. It is thought that a minimum of 15 degrees visibility over the nose is desired for this purpose in this type of airplane.

FOR THE COMMANDING GENERAL

2 Incls
1. Mil Char for A/C (Penetration Fighter Type)
2. Mil Char for A/C (All-Weather Fighter Type)

Harry Sutherland
Major, AC
Asst Adjt Gen

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-8

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OCT 19, 1948

MEMORANDUM FOR: Deputy Chief of Staff, Operations
Deputy Chief of Staff, Material
The Comptroller

Subject: Aircraft Procurement Program

1. The Secretary of the Air Force has this date approved for implementation the following proposals submitted by the Chief of Staff concerning the Aircraft Procurement Program:

a. Plans will be made to hold a design competition on a new all-weather fighter under revised military characteristics. The funds for this competition will be made available from FY 1949 authorizations.

b. One hundred (100 F-84's recently certificated will not be placed on contract. This will reduce F-84 procurement with FY 1949 funds to 409 articles. No plans will be made for the procurement of F-84's with FY 1950 funds.

c. No procurement of DC-6's or additional Constellations (C-121's) is contemplated at this time.

d. The Air Force will not buy American Airlines C-54's, Capital Airlines C-54's, or Northwest Airlines Boeing Strato-Cruisers.

e. The Air Force will procure enough Fairchild MQ's as a primary-basic trainer to establish a production line which may be followed with FY 1950 funds. This is estimated to be approximately 150 articles costing approximately 9 or 10 million dollars.

f. With any savings resulting from the actions indicated above, the Air Force will plan to procure a few C-97's by increasing the present contracts. These C-97's are required to offset the present situation in Europe and are required to provide additional strategic lift to the Air Force.

2. The Secretary of the Air Force gave formal confirmation to previous verbal decisions made by him and the Chief of Staff as follows:

a. The existing contracts relating to the procurement of the F-87 will be terminated immediately. No further plans will be made for the production of this aircraft. The development and test of the experimental articles will continue as in existing contract unless undue costs are involved.

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b. Procurement of the F-89 and the TF-80C will be accelerated to provide an interim all-weather fighter. These aircraft will be equipped with the APG3 radar, and production will be in the numbers dictated by the availability of radar equipment and funds made available by termination of F-87 procurement. The proportion of each aircraft will be determined by balancing production capabilities against requirements.

c. No further plans will be made for procuring the Douglas F3D.

3. The Deputy Chief of Staff, Materiel will obtain from the Commanding General, Air Materiel Command, a new aircraft production schedule based on the decisions outlined above for the procurement with FY 1949 funds. When the FY 1950 budget limitation is known this will permit an accurate base for estimation of the FY 1950 aircraft procurement. This production schedule will be submitted at the earliest practicable date.

4. Staff agencies concerned will take action to implement the decisions outlined above within the fields of their responsibility to include any new certifications required to the Secretary of Defense.

signed
MUIR S. FAIRCHILD
General, U.S.Air Force
Vice Chief of Staff

Copies to:
Mr. Barrows
Gen. Smith
Gen. McNaughton
Gen Powers
Col. Brooks

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15

PRIORITY

T E L E G R A M

Official Business-Government Rates

TO: CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION)
COLUMBUS 16, OHIO

FROM: AMC
Mr. R. W. Logan
MCPPXR2:wmc Ext. 39226
Docket No. 30095
19 October 1948

JOHN E. NEWKIRK
MAJOR, USAF
CHIEF, READJUSTMENT SECTION
PROCUREMENT DIVISION

MCPPXR-2-10-53 . . . . YOUR LETTER CONTRACT NO. W33-038 AC-20450 DATED 29 MARCH 1948 INCLUDING ALL AMENDMENTS THERETO, AND THE WORK AUTHORIZED BY THE GOVERNMENT'S TELETYPE MCPPXA41-9-2 TO YOU DATED 7 SEPTEMBER 1948 ARE HEREBY TERMINATED IN THEIR ENTIRETY FOR THE CONVENIENCE OF THE GOVERNMENT, EFFECTIVE IMMEDIATELY. YOU ARE INSTRUCTED TO IMMEDIATELY STOP ALL WORK, TERMINATE SUBCONTRACTS AND PURCHASE ORDERS, AND PLACE NO FURTHER ORDERS IN CONNECTION THEREWITH EXCEPT TO THE EXTENT THAT YOU OR A SUBCONTRACTOR OR SUPPLIER WISH TO RETAIN AND CONTINUE FOR YOUR ACCOUNT ANY WORK IN PROCESS OR OTHER MATERIALS. TELEGRAPH SIMILAR INSTRUCTIONS TO ALL SUBCONTRACTORS AND SUPPLIERS. THIS NOTICE IS NOT APPLICABLE TO ITEMS PREVIOUSLY SHIPPED AND NO SHIPMENTS OF THE TERMINATED ITEMS SHALL BE MADE AFTER THE RECEIPT OF THIS NOTICE. SHIPPING INSTRUCTIONS FOR COMPLETED ITEMS THAT ARE TERMINATED WILL BE FURNISHED BY YOUR CONTRACTING OFFICER. LETTER AND INSTRUCTIONS FOLLOW. REQUEST YOU CONTACT CHIEF, DAYTON USAF PROCUREMENT FIELD OFFICE, ATTENTION TERMINATION OFFICER, WRIGHT-PATTERSON AIR FORCE BASE, DAYTON, OHIO FOR ANY INFORMATION IN CONNECTION HEREWITH. WRIGHT FIELD DOCKET NO. 30095.

SIGNED ROBERT W. LOGAN, CONTRACTING OFFICER.

COORDINATION: Robert W. Logan

CONTRACT FILES
MCPPXR-2-10-53

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1948 OCT 20 22 42

Stamped: "Handle as confidential correspondence per Paragraph 51l and 60a(4), AR 380-5"
Also stamped:
"PRIORITY
CONFIDENTIAL"

BQAll

PP JEQAB

FM JEQ 430/HQ USAF WASH D C 2017182

TO JEQAB/COMGENWRIC WRIGHT PAT AFB OHIO

AF GENC

//C O N F I D E N T I A L// FROM AFMPI 52499

THE FOLLOWING DIRECTIVE CMA SUBJECT AIRCRAFT PROCUREMENT PROGRAM CLA FROM THE VICE CHIEF OF STAFF CMA DATED NINTEEN OCTOBER FORTY EIGHT CMA FORWARDED FOR YOUR INFORMATION AND APPROPRIATE ACTION CLN QUOTE ONE PD THE SECRETARY OF THE AIR FORCE HAS THIS DATE APPROVED FOR IMPLEMENTATION THE FOLLOWING PROPOSALS SUBMITTED BY THE CHIEF OF STAFF CONCERNING THE AIRCRAFT PROCUREMENT PROGRAM CLN PAREN ABLE PAREN CLAIM WILL BE MADE TO HOLD ABLE DESIGN COMPETITION OF ABLE NEW ALL WEATHER FIGHTER UNDER REVISED MILITARY CHARACTERISTICS PD THE FUNDS FOR THIS COMPETITION WILL BE MADE AVAILABLE FROM FISCAL YEAR FORTY NINE AUTHORIZATIONS PD PAREN BAKER PAREN ONE HUNDRED FOX EIGHTY FOURS RECENTLY CERTIFICATED WILL NOT BE PLACED ON CONTRACT PD THIS WILL REDUCE FOX EIGHTY FOUR PROCUREMENT OF FOX EIGHTY FOURS WITH FISCAL YEAR FIFTY FUNDS PD PAREN CHARLIE PAREN NO PROCUREMENT OF DOG CHARLIE BIRDS OR ADDITIONAL MODIFICATIONS PAREN CHARLIE ONE TWENTY ONES PAREN IS CONTEMPLATED AT THIS TIME PD PAREN BAKER PAREN THE AIRFORCE WILL NOT BUY THE AMERICAN AIRLINES CHARLIE FIFTY FOURS CLA CAPITAL AIRLINES CHARLIE FIFTY FOURS CMA OR NORTHEAST AIRLINES BOEING STRATO DASH CRUISERS PD PAREN EASY PAREN THE AIR FORCE WILL PROCURE TWENTY FIVE MILLION ALASKAN ARMY DASH BASIC TRAINER TO

22 Oct 48- Dist by MCP4:
CC: General Wolfe MCP
General Shepard MCFP
Colonel Coupland MCPO
Colonel Schaetzel MCPPXA
General Crawford MCMC
W.E. Donnelly File MCP4

Orig of this msg has been fwded to MCCO for issuance of formal directive. In the meantime, this copy is distributed for information and planning pending receipt of the

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52 (2/3)

GC DY

ESTABLISH ABLE PRODUCTION LINE WHICH MAY BE FOLLOWED WITH FISCAL YEAR FIFTY FUNDS PD THIS IS ESTIMATED TO BE APPROXIMATELY [illegible] HUNDRED FIFTY ARTICLES COSTING APPROXIMATELY NINE OR TEN MILLION DOLLARS PD PARA FOX PARA [illegible] ANY SAVINGS RESULTING FROM THE ACTIONS INDICATED ABOVE SHALL BE APPLIED TO PROVIDE ABLE FEW CHARLIE NINETY SEVENS BY INCREASING THE PRESENT CONTRACTS PD THESE CHARLIE NINETY SEVENS ARE REQUIRED TO OFFSET THE PRESENT SITUATION IN EUROPE AND ARE REQUIRED TO PROVIDE ADDITIONAL STRATEGIC LIFT TO THE AIR FORCE PD PARA THE SECRETARY OF THE AIR FORCE GAVE FORMAL CONFIRMATION TO PREVIOUS VERBAL DIRECTIVES MADE BY HIM AND THE CHIEF OF STAFF AS FOLLOWS ONE PARA (ALL) PARA THE EXISTING CONTRACT RELATING TO THE PROCUREMENT OF THE FOX EIGHTY SEVEN (F 87) WILL BE TERMINATED IMMEDIATELY PD NO FURTHER PLANS WILL BE MADE FOR THE PRODUCTION OF THIS AIRCRAFT PD THE DEVELOPMENT AND TEST OF THE EXPERIMENTAL ARTICLES WILL CONTINUE AS [illegible] CONTRACT FUNDS, UNDUE COSTS ARE INVOLVED PD PARA TWO PARA PROCUREMENT OF THE FOX EIGHTY NINE AND THE TAKE FOX EIGHTY CHARLIE WILL BE ACCELERATED TO PROVIDE AN INTERIM ALL WEATHER FIGHTER PD THESE AIRCRAFT WILL BE EQUIPPED WITH THE A [illegible] TER GEORGE THREE RADAR GFA AND PRODUCTION WILL BE IN THE NUMBERS DICTATED BY THE AVAILABILITY OF RADAR EQUIPMENT AND FUNDS MADE AVAILABLE BY TERMINATION OF FOX EIGHTY SEVEN PROCUREMENT PD.

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53 (3/3)

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PAGE THREE JBQ 430

THE PROPORTION OF EACH AIRCRAFT WILL BE DETERMINED BY BALANCING PRODUCTION CAPABILITIES AGAINST REQUIREMENTS PD PAREN CHARLIE PAREN NO FURTHER PLANS WILL BE MADE FOR PROCURING THE DOUGLAS FOX THREE DOG PD PARE THREE THE DEPUTY CHIEF OF STAFF, CMA MATERIEL WILL OBTAIN FROM THE COMMANDING GENERAL CMA AIR MATERIEL COMMAND A NEW AIRCRAFT PRODUCTION SCHEDULE BASED ON THE DECISIONS OUTLINED ABOVE FOR THE PROCUREMENTS WITH FISCAL YEAR FORTY NINE FUNDS PD WHEN THE FISCAL YEAR FIFTY BUDGET LIMITATION IS KNOWN THIS WILL PERMIT AN ACCURATE BASE FOR ESTIMATION OF THE FISCAL YEAR FIFTY AIRCRAFT PROCUREMENT PD THIS PRODUCTION SCHEDULE WILL BE SUBMITTED AT THE EARLIEST PRACTICABLE DATE PD PARE FOUR STAFF AGENCIES CONCERNED WILL TAKE ACTION TO IMPLEMENT THE DECISIONS OUTLINED ABOVE WITHIN THE FIELDS OF THEIR RESPONSIBILITY TO INCLUDE ANY NEW CERTIFICATIONS REQUIRED TO THE SECRETARY OF DEFENSE PD UNQUOTE IT SHOULD BE NOTED THAT NO DECISION WAS REACHED ON THE FOX EIGHTY SIX CHARLIE PD IMMEDIATE ADVICE REQUESTED WHETHER THIS DIRECTIVE WILL CAUSE ANY CHANGE IN PROPOSED AIRCRAFT PRODUCTION SCHEDULE PHONED TO THIS OFFICE MONDAY NIGHT BY COLONEL COPELAND PD //CONFIDENTIAL//

CNF 52499
26/2626Z OCT

1-MCOO - Action
2-MCPP - Info
3-MCOO Info

T-68633

T-68633

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AMC Form No. 10-3
(Revised 47)

3207 57 (13)

ROUTING AND RECORD SHEET

MATERIEL COMMAND

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Place initials of dictator and typist, telephone number and location to right of signature.

Number all comments consecutively.

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Use width of sheet, both sides.

Separate comments by horizontal lines across page.

SUBJECT: XP-87 Airplane — Contracts W33-038-AC-6266 and W33-038-AC-19837

TO	FROM	DATE	COMMENT NO
MCRAS	MCREGA (MCREGA-4)	21 October 1948	1

1. Following are the comments and recommendations with respect to paragraph 1a of the attached memo from the Vice Chief of Staff dated 14 October 1948, which reads as follows:

"Further production of the P-87 is to be discontinued immediately. Submit recommendations regarding termination of experimental contracts."

2. The experimental phase of the P-87 development program involves 2 contracts, namely W33-038-AC-6266 and W33-038-AC-19837.

3. Under Contract AC-6266 we are obtaining (2) XP-87 airplanes. This contract is practically complete. No. 1 airplane has been through Phase I and II of the flight test program and is ready for acceptance. No. 2 airplane will be acceptable following 10 hours of climb down flying which will be accomplished as soon as sufficient engines are returned from the Europe overhaul line to provide a complete complement of engines. There is no apparent monetary advantage to termination of this contract at this time since termination costs would probably involve as much or possibly more than the cost of completing the small amount of work remaining. It is, therefore, recommended that this contract be completed in the normal manner, thus giving the USAF (2) airplanes that will be useful in the development of the flexible turret as well as available for the all weather research program being conducted by the All Weather Flying Division at Clinton County Air Base.

4. Under Contract AC-19837 the following modifications and improvements are untested for, or in process:

a. Development of a simulated turret to supply answers to the aerodynamic problems which would be encountered in the production fighter version in regards to trim changes and compensation during the operation of the flexible turret.
Cost (All funds F.Y. 1948) ——————————$88,000

b. Development of provisions to carry demolition bombs and 5 in. HVAR rockets in the production fighter version.
Cost (All funds F.Y. 1949) ——————————$86,000

c. Modification of No. 2 airplane to serve as a photo reconnaissance prototype.
Cost (All funds F.Y. 1948) ——————————$250,000

d. Redesign of wing to increase area and thereby reduce wing loading and at the same time change from (4) J-34 to (2) J-33 engines with afterburning.
Cost, Engine Change (All funds F.Y. 1948) ——$590,000
Cost, Larger Wing (180 funds F.Y. 1949) ——$1,000,000

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AMC Form No. 10-3
(Rev. Aug 47)

Feb 9 55 (2/3)

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SUBJECT: XF-87 Airplane — Contracts W33-038-ac-6266 and W33-038-ac-19537

TO	FROM	DATE	COMMENT NO
MCREE	MCREDA(MCREDA-4)	21 October 1948	1

Page 2.

5. If there is to be no production fighter version of this airplane, items a and b above should be terminated immediately. Since work on the simulated turret is approximately 30% complete the savings will be about $60,000 of F.Y. 1948, 611 funds. Work on the bomb and rocket modification has not been started, so the entire amount of $86,000 of F.Y. 1949 611 funds will be available for other new work in the current F.Y.

6. If this airplane is to receive no further consideration as a photo reconnaissance version the remaining items c and d obviously should likewise be terminated immediately. Considerable engineering and some shop work already has been accomplished under the photo reconnaissance modification including the larger wing and engine change and these funds plus termination costs could not be recovered. If items c and d are cancelled it is estimated that approximately $1,000,000 will be saved. Of this amount approximately $300,000 is 611, F.Y. 1948 funds and $700,000 is 180, F.Y. 1949 funds.

7. Recapitulation. If contract AC-6266 is completed and contract AC-19537 is terminated the following approximate savings will be effected:

	Funds	F.Y.	Amount
a. Simulated turret	611	1948	$ 60,000
b. Bomb & Rocket Inst.	611	1949	86,000
c. Photo Recon. Mod.	611	1948	160,000
d. Large wing & engine change	611	1948	300,000
	180	1949	700,000
			$1,306,000

8. It is pointed out that from the above saving only $86,000 is F.Y. 1949 project 611 funds which could be utilized towards development of a new all weather interceptor such as referred to in para. f of the attached memorandum.

Incl
Memo fr Vice Ch of Staff
dtd 14 Oct 48

A. T. GUSTAFSON
Colonel, USAF
Acting Chief, Aircraft Projects Section
Engineering Division

FGC/GPT/hm
2-9256

WF-O-38 APR 48 2400 M

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F&F 56 (3/3)

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DEPARTMENT OF THE AIR FORCE
Office of the Vice Chief of Staff
United States Air Force
Washington, D. C.

C
O
P
Y

14 October 1948

MEMORANDUM FOR THE DEPUTY CHIEF OF STAFF, MATERIEL

SUBJECT: Production of Fighter Aircraft

1. The following decisions have been made by the Secretary of the Air Force and the Chief of Staff, and your office should take implementing action:

a. Further production of the F-87 is to be discontinued immediately. Submit recommendations regarding termination of experimental contracts.

b. The XF-3D is to be removed from future aircraft production schedules.

c. The all weather fighter version of the TF-80 will be put into production as an interim measure.

d. The F-80 is to be put into production on an expedited basis.

e. The production distribution between the TF-80 and the F-89 to be determined within funds made available from termination of the F-87, based on production possibilities and requirements.

f. A design competition should be set up, within F. Y. 1949 funds that may be made available, based on new military characteristics to be prepared covering the mission to be performed by the all weather interceptor.

MUIR S. FAIRCHILD
General, U. S. Air Force
Vice Chief of Staff

CONFIDENTIAL

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TSCAD Form No. 6 (4 APR 47)

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MCGOXT/6-2333

HEADQUARTERS
AIR MATERIEL COMMAND

Wright-Patterson
Air Force Base
Dayton, Ohio
27 October 1948

TECHNICAL INSTRUCTIONS

9

SERIAL NO: TI-2249, Addendum No. 3

SUBJECT: "O" Program FY 1949, Amendment to

TO: Directorate, Procurement and Industrial Planning

NOTE: This TI amends the basic TI 2249 (17 June 1948) TI 2249, Addendum No. 1 (4 August 1948) and TI 2249, Addendum No. 2 (12 October 1948) to cancel the requirements of Procurement Directives 49-12 and 49-15.

1. Problem Presented:

a. To immediately terminate the procurement of thirty (30) RF-87 aircraft under Procurement Directive 49-17 and fifty-eight (58) F-87 aircraft under Procurement Directive 49-19.

2. Authority:

a. DCS/M, Hq USAF by letter dated 15 October 1948, subject: "Procurement Directive 49-17 (RF-87 Aircraft)" and letter dated 15 October 1948, subject: "Procurement Directive 49-19 (F-87 Aircraft)."

3. Action Desired:

a. Directorate, Procurement and Industrial Planning will accomplish that which is outlined under "Problem Presented."

BY COMMAND OF GENERAL McNARNEY:

OFFICIAL:

BRYAN L. DAVIS
Colonel, USAF
Adjutant General

BRYAN L. DAVIS
Colonel, USAF
Adjutant General

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CONFIDENTIAL

Fighter Back File No. 8
Flt Test Data

4

PROGRESS REPORT XP-87 45-596000 for Bi-Weekly Period Ending 28 October 1948

Officer In Charge
Curtiss-Wright Corp.
Airplane Div.
Columbus, Ohio

AF Officer In Charge
Muroc Sub-Office

281440 October 1948

1

cc: Chief, Aircraft Projects Section, MCREMA
Chief, Inspection Branch, WD PFO
Supervisor of Projects, Muroc
File

The following work is in progress and/or has been accomplished since last reporting period on subject airplane:

1. Took off Flight #87 Tinker Field, Oklahoma on 14 October 1948 at 0605 (Muroc time) and landed at Wright-Patterson Field, Dayton, Ohio at 0815 (Muroc time). Total time on airplane - 68:44 hours. Curtiss personnel spent remainder of the day packing equipment for shipment to Muroc.

2. C-47 airplane, Serial 22910, belonging to Wright Field Flight Test Division, left Muroc at 0700 15 October 1948 loaded with Curtiss equipment. Curtiss personnel are preceding boring CF7 and Curtiss equipment.

3. Loaded remaining equipment on to trucks 22 October 1948. All incompleted work, open discrepancies, are contained in the contractor's inspection records, which have been screened for correctness and found to be satisfactory. Only those items properly identified and stamped have been accomplished at the Muroc Activity.

4. Any further information that may be furnished by this office in regard to operation or maintenance of the airplane at this activity will be forwarded if requested.

J. E. BRIDGES
AF Officer In Charge
Muroc Sub-Office

EFW/ajh/Muroc

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SUBJECT: Cancellation of Contract W33-038-AC-19837 — TA-30112

TO: PR-53776- Cancelled — FROM: MCREOA(MCREOA-4) — DATE: 28 Oct. 1948 — COMMENT NO. 1

1841

Received 1 Nov 48

1. Inasmuch as the production contract for F-87 and RF-87 airplanes has been terminated, the modification work called for under the subject contract and change orders thereto, is no longer required.

2. It is requested, therefore, that action be immediately taken to cancel the subject contract and change orders thereto. Work items to be effected by this cancellation are as follows:

On Basic Contract page 7
a. Installation of J-33 engines.

C.O. No. 23, 28 Apr 48
b. Photo reconnaissance modifications.

C.O. No. 1, 7 Jan 48
c. Simulated turret design, fabrication, and installation.

} TERMINATED T.A. 30112

P.R. 53788
d. Bombay modifications including bomb and rocket installations.

P.R. 53776
e. Photographic wide angle direct vision view finder.

3. Action should also be taken by Procurement Division to cancel the 740 sq. ft. wing being fabricated for the No. 2 "X" airplane for the reasons as stated above.

P.R. 46628

Cancelled by P.R. #1148

For A. T. CULBERTSON — Dwight A. Griffith Jr Lt Col USAF
Colonel, USAF
Acting Chief, Aircraft Projects Section
Engineering Division

OBT/hw
2-9256

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29 October 1948

MEMORANDUM FOR MR. FORRESTAL:

SUBJECT: Revised Authorization for Procurement of Aircraft

Completion of the flight tests of the XF-87 and the XF-89 indicate the F-89 is a superior airplane and the F-87 would require major redesign to make it operationally acceptable. Procurement of the F-87 and the RF-87 aircraft has been cancelled.

To fulfill the urgent requirement for an All Weather Fighter, we plan to place the F-89 in production on an accelerated basis and, as an interim measure, to procure a quantity of F-94's, which is a modified all weather version of the two-place F-80C.

A review of the Air Force flight training program and the evaluation of the Navy developed XNQ trainer, indicate that the utilization of the Fairchild NQ trainer in the first 130 hours of flight training and the T-28 in the succeeding 135 hours in lieu of the entire time on the T-28 will result in major economies in initial investment, maintenance, upkeep, and gasoline consumption. To effect these economies, we plan to procure a quantity of the Fairchild NQ trainer.

To initiate the program outlined in paragraph 2 and 3 above, we propose to procure the following:

48 F-89's	(Northrop All Weather Fighter)	$66,530,154
110 F-94's	(Lockheed All Weather Fighter)	34,428,346
100 NQ's	(Fairchild Trainer)	8,261,500
	Total	109,220,000

In order to make funds available for the above, it is proposed to use the monies resulting from the cancellation of the following:

58 F-87's 30 RF-87's	(previously approved by the President on 23 May 1948 in the release of $1,345,165,000 for 2201 aircraft)	$ 80,220,000
100 F-84's	(previously approved by the President on 16 Sept. 1948 in the release of $103,630,000 for 213 aircraft) These were never procured.	29,000,000
	Total	$109,220,000

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Memo for Mr. Forrestal

I hereby certify that the contracts to be let are necessary in the interests of the national defense, and that the contract specifications will insure the maximum utilization of improvements in the aircraft and equipment consistent with the defense needs of the United States.

/s/

W. STUART SYMINGTON

APPROVED
/s/
A.S.BARROWS
Under Secretary of the
Air Force

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453.1 Jet Prop. Aircraft, Jul 20-1948

APRs 44(4 Mar 47)

29

AFMRD/Col Sessums/fs/71885

29 October 1948

MEMORANDUM FOR MR. BARROWS

SUBJECT: Justification for Procurement of F-89 Aircraft

1. In an effort to obtain an all-weather fighter as soon as possible utilizing jet aircraft performance and capable of carrying the necessary electronic and armament equipment, the Air Force embarked upon a production program to produce the Curtis F-87 airplane.

2. Early flight test with this plane proved it to be a very poor weapon from a performance standpoint and that it had many deficiencies aerodynamically. After experiencing flutter difficulties at relatively low speeds and after careful evaluation, it was determined that the F-87 would require a new wing costing about $300,000. Predicted performance of the F-87 with the new wing still did not compare favorably with that of new aircraft becoming available.

3. In view of this unsatisfactory development in the F-87, a board of senior USAF officers convened at Muroc Air Force Base, Muroc, Calif., on 6 October 1948 to compare the F-87 with two other aircraft which became available for flight subsequent to the F-87. These planes were the F-88 and the F-89.

4. As a result of the Board's evaluation, Headquarters, U.S. Air Force made the decision to stop production of the F-87 and procure the F-88 aircraft.

5. The latest estimated cost comparison between the F-87 and F-89 aircraft is as follows:

a. F-87 - For a quantity of 58 the unit cost would be $1,402,182. (The original estimate was $300,000 per article).

b. F-89 - For a quantity of 48, the unit cost would be $1,386,041.

6. Attached is a comparative performance chart of the three aircraft showing the superior performance of the F-89.

OFFICE SYMBOL	AFMRD			
GRADE AND SURNAME OF COORDINATING OFFICERS	Harth Gen	[illegible]	[illegible] U.S. Air Force [illegible]	

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PRIORITY

T E L E G R A M

Official Business-Government Rates

TO: CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION
COLUMBUS 16, OHIO

FROM: AMC
Mr. R. W. Logan
MCPPXR2:eem Ext. 39228
Docket No. 30112
3 November 1948

W. F. Babcock
JOHN E. NEWKIRK
MAJOR, USAF
CHIEF, READJUSTMENT SECTION
PROCUREMENT DIVISION

MCPHX8-1-11-3. . . . YOUR CONTRACT NO. W 33-038 AC-19837 IS HEREBY TERMINATED IN ITS ENTIRETY FOR THE CONVENIENCE OF THE GOVERNMENT, EFFECTIVE IMMEDIATELY. YOU ARE INSTRUCTED TO IMMEDIATELY STOP ALL WORK, TERMINATE SUBCONTRACTS AND PURCHASE ORDERS, AND PLACE NO FURTHER ORDERS IN CONNECTION WITH THE TERMINATED PORTION OF THE CONTRACT, EXCEPT TO THE EXTENT THAT YOU OR A SUBCONTRACTOR MAY BE REQUIRED TO MAKE A LIMITED AMOUNT OF PURCHASE FOR YOUR ACCOUNT ANY WORK IN PROCESS OR OTHER MATERIALS. FURNISH SIMILAR INSTRUCTIONS TO ALL SUBCONTRACTORS OR SUPPLIERS. THIS NOTICE IS NOT APPLICABLE TO ITEMS PREVIOUSLY SHIPPED. NO SHIPMENTS OF THE TERMINATED ITEMS SHALL BE MADE AFTER THE DATE OF THIS NOTICE. SHIPPING INSTRUCTIONS FOR COMPLETED ITEMS THAT ARE TERMINATED WILL BE FURNISHED BY YOUR CONTRACTING OFFICER. LETTER AND INSTRUCTIONS FOLLOW. ADDRESS ALL INVOICES, ATTN USAF PROCUREMENT FIELD (WPAFB), ATTENTION TERMINATION OFFICER, WRIGHT-PATTERSON AIR FORCE BASE, DAYTON, OHIO FOR ANY INFORMATION IN CONNECTION HEREWITH. WRIGHT FIELD DOCKET NO. 30112. SIGNED ROBERT W. LOGAN, CONTRACTING OFFICER.

CONTRACT FILES

W. F. Babcock

MCPPIS-32 216

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3

CURTISS-WRIGHT CORPORATION

AIRPLANE DIVISION

COLUMBUS 16, OHIO

3 November 1948

Ref: af-327

Subject: Contract W 33-038 ac-6846
Proposed Program

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio
Attention: MCREOA-24

Thru: AF Inspector in Charge
Curtiss-Wright Corporation
Columbus 16, Ohio

Thru: Chief, Dayton AF Procurement Field Office
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio
Attention: MCPPXV-2638

Enclosure: (A) Price Breakdown

1. As a result of discussions with Air Materiel Command personnel on 27 October and 2 November, it is understood that since no production plans exist for the XF-88 type airplanes it is the desire of the Air Materiel Command to close out subject contract at the earliest possible date and in the most economical manner. Accordingly, the Contractor submits herewith the following proposal stating status, action to be taken and price adjustment, if any, applicable to each of the various items under the contract as amended:

Items 1 through 4:
Completed.

- CCN #12 (N 54528) dated 28 Oct 1948

Item 5 - Airplane No. 1:
The Contractor proposes that the airplane be accepted in an as is condition at Wright-Patterson Air Force Base in accordance with CCN No. 13 at a reduction in price of $[illegible]," which reduction in price covers all work and tests still to be accomplished on subject airplane. Upon acceptance of the airplane and reduction of the price, the Contractor shall be relieved of all further work, tests, liability or obligations. A breakdown of the above-quoted price reduction is attached hereto as Enclosure (A).

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[illegible]-21/HWTC/grs

[illegible] Attn:

[illegible] proposal dated
[illegible] was prepared.
[illegible] the Government
[illegible] in the same manner
[illegible] consistently in preparing
[illegible] Officer of the items making
[illegible] Contracting Officer, the
[illegible].

[illegible] overhead on the price
[illegible] than the 8% which is reg-
[illegible] factor, in making up his estimate
[illegible] "right testing", charged the G & A sep-
[illegible] of the items in building up the
[illegible] credit.

[illegible] been withdrawn from the lump
[illegible] ring in the same amount as the original
[illegible], thus [illegible] in effect [illegible] rates, which on testing were
[illegible] properly applied. Similarly, the
[illegible] than the 15% regularly and otherwise charged,
[illegible] upon the 15% for Columbus operations
[illegible] performed elsewhere than Columbus, such as Muroc
[illegible] Field.

b. This Contracting Officer recommends, as fair and reasonable, the reduction in [illegible] for Item 1, with the understanding that the contractor will [illegible] the Number of Airplanes in stock for a period of [illegible].

[illegible]
W. H. M. [illegible]
Contracting Officer

[illegible]

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ASC-251-D
(15-10-43)

A. G. P.	
PRIORITY	PRIORITY
ROUTINE	
MULTIPLE ADDRESS	

TELETYPE MESSAGE

AIR SERVICE COMMAND TELETYPE NETWORK

MCPPIA41/PAO/ASR/GSB/P-Cont.

GEORGE E. SCHATZEL, Colonel, USAF
Chief, Aircraft & Missiles Section,
Procurement Division
NAME, RANK AND TITLE OF AUTHENTICATING OFFICER

FROM: WPAFB, AMC DATE: 5 NOV 46

TO: CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION
COLUMBUS 16, OHIO

~~CLASS~~:

THRU: AF OFFICER IN CHARGE

MCPPIA41-11-3 . . . . . CONTRACT W33-038 AC-6866, . . EFFECTIVE IMMEDIATELY, CONTRACTOR IS REQUESTED TO STOP ALL WORK ON THE NUMBER TWO YB-87 AIRPLANE SERIAL NUMBER 46-522. REQUEST ACKNOWLEDGMENT THIS TWX BY RETURN WIRE. SIGNED: B. A. DAVIS, LT. COLONEL, USAF, CONTRACTING OFFICER.

COORDINATION

C. O. OR C. O.	CONTROL OFFICE	MAINTENANCE	P & T	SUPPLY	BUDGET & FISCAL	OTHERS
						Esbaugh
						219

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2

AAF Form No. 19-7
(Rev 1 Apr 46)

INSERT OFFICE SYMBOL AND FULL SIGNATURE IN APPROPRIATE BLOCK

CG, CC OR DEPUTY

AIR INSPECTOR

MCR-(MERSCH-4)

PUBLIC INF. OFFICE

COMPTROLLER

PERSONNEL & ADM.

RESEARCH & DEV.

SUPPLY AND MAINT.

PROC. & MIL. MOB. PLNG.*

CONFIDENTIAL

8 OCT 1946

220

SUBJECT: Disposition of Experimental Contracts W33-038-AC-19837 and W33-038-AC-6266 (XF-87 Airplanes)

ac 6266 MS
300.6 - Carroll

TO: Chief of Staff
United States Air Force
Washington 25, D. C.
ATTN: Deputy Chief of Staff, Material

Orig - Gen McGee
To file later date

1. Reference is made to Hdq. USAF letter dated 15 October 1946, subject: "Production of Fighter Aircraft", and Teletype AFMPI 52499 dated 20 October 1946, subject: "Aircraft Procurement Program".

2. In view of the fact no further plans are to be made for the production of F-87 airplanes as stated in the above referenced teletype, this Command has initiated action to terminate Contract AC-19837 in its entirety. This contract involved the modifications necessary for the direct support of the production program for the F-87 and XF-87 airplanes.

3. With respect to paragraph 3 of the letter of 15 October 1946, number one XF-87 airplane, Serial No. 45-59600, is now in the process of final inspection and acceptance at the Wright-Patterson Air Force Base. Regarding number two airplane, Serial No. 46-522, it is recommended that this airplane be accepted in its existing condition for use as a spare parts stock pile to maintain No. 1 airplane on flying status inasmuch as there is an apparent requirement for this airplane in the research program being conducted by the All-Weather Flying Division at Clinton County Air Force Base. No. 1 airplane would be retained on flight status only so long as substantial maintenance could be accomplished with the available spares.

4. Approval of the above recommendation regarding the disposition of No. 2 airplane is requested at an early date.

FOR THE COMMANDING GENERAL:

(S) [illegible]

Cy to:
MCR

CONFIDENTIAL

*AREA COMMANDER WILL LIST OUT ORGANIZATIONAL TITLES NOT APPLICABLE WHEN ADDITIONAL SPACE IS NEEDED IN COORDINATION BLOCK	GEN. FILE COPIES TO RECORDS SEC. AGO HQ. AR. ☐ LAB. AR. ☑	INITIALS OBT	EXTRA COPY RETAINED	OFF. SYMBOL MCR-4 AC-19837 AC-6266	INITIALS OBT

AAF-1-28 APR 46 SUPS

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6

6266

W3[illegible] FILED

mc pp

[illegible] 1940 NOV 10 AM 11:06

[illegible] AGENT

U S A F ATTN: HQMPTY 41 MISSILE PROGRAMS AT [illegible] AIR DEPOT, OKLA.

CONTRACTOR ACTIVITIES AND LOCATIONS RESPECT OF HEAT WITH
NOA(ORA)41-11-S DATED 6 NOVEMBER, INCLUDING TEST STORAGE
OF HE IN 2 MP-27 MAGAZINE. SUCH HE STORAGE HAS BEEN ASSOCI-
ATED AS IT [illegible]

[illegible]

[illegible] '1-11-S [illegible]

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90 71 06 9 NOV 1940

Grant
area
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ISBCONT Form No. 7G
(11 Aug 45)

Letter and FP
Total – Partial
PN – Uniform – VJ

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO ATTENTION OF FOLLOWING OFFICE SYMBOL:
MCPPXR-2

HEADQUARTERS
Materiel
AIR ~~[illegible]~~ COMMAND
Wright-Patterson Air Force Base

MCPPXR-2; RWL; wmc
~~[illegible]~~ DAYTON, OHIO
12 November 1948

Subject: Letter Termination Notice
Contract No. W33-038 AC-19837
Docket No. 30112
Class No. 02-A

To: Curtiss-Wright Corporation
Airplane Division
Columbus 16, Ohio

1. This letter will confirm the [illegible] contained MCPPXR-2-11-3 to you dated 3 November 1948 from Robert W. Logan, Contracting Officer, terminating in its entirety [illegible] Contract No. W33-038 AC-19837 for the convenience of the Government, effective immediately.

2. The effective date of [illegible] is specified in paragraph 1 hereof. Reference telegram first requires you [illegible] reduce or stop performance under said contract.

3. Attention is directed to instructions on the reverse side of this page. The office named below will be in charge of the settlement of this contract and should be notified of any matters not covered by this letter or the instructions.

Chief, Dayton USAFPFO
Attn: Termination Officer
Wright-Patterson Air Force Base
Dayton, Ohio

Robert W. Logan
ROBERT W. LOGAN
Contracting Officer

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TSS Form No. 71-74-501
(19 Dec 46)

INSTRUCTIONS

If you wish to waive any termination claim against the Government, please immediately notify the office in charge of the settlement of your claim, and the appropriate form of agreement will be submitted for execution.

Enclosed herewith is a statement entitled "Instructions to Prime Contractors", which outlines certain of your principal rights and obligations. Prompt settlement of your claim depends in large measure on your thorough cooperation in following the procedure outlined in these Instructions. Your attention is called particularly to Section 2 of such Instructions which sets forth your duties in regard to stopping work and giving notice to your subcontractors.

You are authorized and urged to retain or dispose of all termination inventory in accordance with Section 4 of the Instructions to Prime Contractors, copy of which is enclosed, except for the property as to which you are otherwise instructed by the Contracting Officer handling settlement of your claim, or property as to which special instructions may be enclosed herewith.

In connection with final settlement of your claim (other than a "no-cost" settlement), it will be necessary to establish that all your termination inventory and that of your subcontractors has been properly accounted for, as provided in the Joint Termination Regulation of the War and Navy Departments, paragraph 446.1. You should, therefore, advise each of your immediate subcontractors that, in connection with his settlement with you (other than a "no-cost" settlement, or a settlement based on a properly submitted Standard Form 1a of the Office of Contract Settlement) he should furnish you a certificate in substantially the form prescribed in the Joint Termination Regulation, paragraph 973.

The Government desires to settle your termination claim by negotiation and on such terms as will speedily and fairly compensate you therefor. To assist you in prompt submission of your settlement proposal, there is enclosed one set of the Standard Forms of the Office of Contract Settlement.

All complete articles accepted and delivered after the effective date of termination, in accordance with directions of the Contracting Officer assigned to settle your claim, will be treated as articles delivered under the Contract. They should, therefore, be invoiced in the usual way and not included in your termination claim.

Your rights and duties in settling the claims of your immediate subcontractors are outlined in Section 6 of the "Instructions to Prime Contractors". In the event you have not been authorized to settle claims of your immediate subcontractors of $10,000 or less and to make partial payments, you should immediately request such authorization from your Contracting Officer. Its use will facilitate settlements

In order to speed up final settlements with your fixed price subcontractors, you should send to each either with, or as soon as possible after, the notice of termination—(1) a set of the Standard Forms of the Office of Contract Settlement for use by all fixed price war supply contractors in submitting settlement proposals and (2) a copy of a "No-Cost Subcontract Settlement Agreement" for use by a subcontractor who wishes to waive any termination claim against you (Joint Termination Regulation, paragraph 987.2). If you do not already have copies of these documents, they will, upon request be promptly furnished by the office to which your case is assigned for settlement. In no event should the sending of the notice of termination be delayed.

Your attention is also called to the provisions (if any) of the Contract requiring you to make a disclosure of, and to deliver to the Government instruments of license or assignment respecting, all inventions, discoveries and patent applications made by you in the performance of the Contract. You are urged to forward such disclosures and instruments of license or assignment to the Contracting Officer promptly, inasmuch as these contractual obligations should be complied with before execution of the final settlement agreement.

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2

Form No. 71-34A
Jan 48

flp:rjw

Execute in triplicate
C— 49-352
Class— 01-C

CHANGE ORDER

UNITED STATES AIR FORCE
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Date 22 November 1948
Change Order No. 18 to
Contract No. W 33-038 ac-6266
as amended

To: Curtiss-Wright Corporation (Airplane Division), Columbus 16, Ohio

SUBJECT: Miscellaneous Changes

1. Contract W 33-038 ac-6266, as amended, is hereby further amended as follows:

(a) The XF-87 airplane, Serial No. 45-59600, called for under Item 5 of Article 15(a) shall be accepted in an "as is" condition at Wright-Patterson Air Force Base, following removal of CFE instrumentation by the Contractor. Upon acceptance of the airplane at the reduced price the Contractor is relieved of further work, tests, liability or obligations.
Total decrease in contract price . . . . . $ 87,990.79

(b) As directed by TWX dated 5 November 1948, the Contractor shall stop all work on XF-87 airplane, Serial No. 46-522, called for under Item 6 of Article 15(a), and shall immediately terminate all sub-contracts, work orders and other commitments. Said airplane shall be accepted by the Government in an "as is" condition at a reduced price, which action will relieve the Contractor of further work, tests, liability, or obligations relative to this airplane. Following acceptance of this article the airplane shall be disassembled by the Contractor and stored for a period of one year for use as a spare parts stock pile for XF-87 airplane, Serial No. 45-59600 at no additional expense to the Government. Total decrease in contract price as a result of the above changes to Item 6 . . . . . $112,941.33

(c) The balance of the spare parts for XF-87 airplanes, Serial Nos. 45-59600 and 46-522, not previously accepted shall be accepted in an "as is" condition and stored by the Contractor for a period of one year at no change in contract price.

2. Notwithstanding the provisions of the supplies contract as to the contrary the parties hereby agree that there will be no revision of prices under any article of the supplies contract relative to price revision.

3. This Change Order is pursuant to the Contract Settlement Act of 1944, and the Contractor expressly waives any claim under this agreement or under the Act to storage charges for the period during which such inventory, or any part thereof, remains on its premises under the terms of this agreement.

Copy of executed Supplement Forms have been sent to Contractor for execution
This instrument
DOCUMENTS FISCAL DIVISION

By [signature] 3 DEC 1948

This change order has been (~~authorized~~ negotiated pursuant to) Public Law 703, 76th Congress, as amended by Public Law 528, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 7 December 1941.

Sheet 1

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Supply Agmt. No. 71-502
(21 June 48)

3

Total [redacted] decrease in [redacted] fixed price [redacted]

$ 200,932.12

$

$ 200,932.12

Except as hereby amended, all terms and conditions of the Contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

THE UNITED STATES OF AMERICA

12-8-48
(Date)

BY: [signature]
(Contracting Officer)
W. A. DAVIS, Colonel, USAF

1ST INDORSEMENT

TO: CONTRACTING OFFICER:

Columbus 16, Ohio (Place) 6 December 1948 (Date)

1. Contractor hereby accepts the above Change Order.

CURTISS-WRIGHT CORPORATION
(AIRPLANE DIVISION) (SEAL)
(Contractor)

BY: [signature]
(Signature of Official with Office Title)

Edwin J Ducayet - Representative

PR No. 53818

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover cost thereof:

Credit: 212/60705, 662-2000 P 611-09 S 33-038 - $200,932.12

Change Order No. 18 to Contract No. W 33-038 ac-6266

2c

Sheet 2

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11/8/48

Basic Comm: Ltr Fr Hq, AMC to OSAF dtd 8 Nov 48, subj: "Disposition of Experimental Contracts W33-038-AC-19837 and W33-038-AC-6266 (XF-87 Airplanes)

12-426

AFTEN-1C 1st Ind

Headquarters, United States Air Force, Washington 25, D.C., 7 December 48

TO: Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio

1. This Headquarters concurs in your recommendation as outlined in paragraph 3 of basic correspondence. Your command is authorized to accept XF-87, Serial No. 56-522, in its existing condition.

2. The above aircraft will be used as a spare parts stock pile to maintain the No. 1 airplane.

BY COMMAND OF THE CHIEF OF STAFF:

ALFRED A. KESSLER, JR.
Brig. General, USAF
Acting Asst. Deputy Chief of Staff, Materiel

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HQ SR LIB SR	
[illegible]	micron-4
[illegible]	ac-6266

USE OF PAPER - CHECK ONE
PERMANENT NON RECORD

for basic
ac file copy
8 Nov 48

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CONFIDENTIAL 6

C O P Y

Basic rpt FAI 18 Oct 48 subj: Case Rpt #2 Rpt of Proc Insp Dayton AF PTO W-Patterson AF Base Dayton, Ohio - Contracts for XP-87, F-87C and RF-87C Airplanes

AMC 333.1 (18 Oct 48) 2nd Ind. MCOA/MCD/jfm

HQ AMC Wright Patterson AF Base, Dayton, Ohio 17 December 1948

TO: Chief of Staff, United States Air Force, Washington 25, D. C.
Attn: The Inspector General

1. Recommendation 3a: This recommendation is no longer applicable as Contract W33-038 ac-20450 for F-87 aircraft was terminated by the Government on 19 October 1948.

2. Recommendation 3b: This is a matter pertaining to Hq. USAF. Placing of production contracts prior to delivery of a satisfactory prototype is an Air Force not an Air Material Command policy and was established with full knowledge of the difficulties involved. All aircraft procurements are made by direction of Headquarters USAF. Because of the rapid advances in aeronautical technical progress, and due to the long development program, an aircraft would become obsolescent or even obsolete prior to reaching its production stage unless production laps the development program to a reasonable degree. Therefore, in order to meet military requirements it is necessary in most instances to place production contracts prior to delivery of the prototype aircraft.

FOR THE COMMANDING GENERAL:

M. B. EARHOLD
Brigadier General, USAF
Inspector General, Hq AMC

Incls.
n/c

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Source: Dayton Procurement Field Office, H. W. T. Collins, 27 June 1949.

CURTISS-WRIGHT CORPORATION
Airplane Division
Columbus 16, Ohio

EXHIBIT "A"

December 20, 1948

CONTRACT W33-038-ac-[illegible] - TWO XF-87 AIRPLANES

Items Billed	Description	Amount
1 - 4 Inc.	Buffalo	$ [illegible]
7	Mock up of #1 XF-87	[illegible]
8	Wind Tunnel Model #1 XF-87	[illegible]
10	Spare Parts	[illegible]
Change Order 3	Item F - Simulated Fuselage #1 XF-87	[illegible]
	Total Billed Through 11-30-48	$ [illegible]
Items To Be Billed		
[illegible]	1 XF-87 Airplane, AAF Serial Number [illegible]	[illegible]
[illegible]	1 XF-87 Airplane, AAF Serial Number [illegible]	2,666,727.00
9	Data in accordance with Report No. 30Z-1	(Included in Item 5)
Change Order 2		[illegible]
[illegible]		[illegible]
[illegible]		[illegible]
[illegible]		[illegible]
[illegible]		[illegible]
11		[illegible]
[illegible]		[illegible]
[illegible]		[illegible]
[illegible]		[illegible]
[illegible]	Price Reduction #1 Airplane	([illegible])
[illegible]	Price Reduction #2 Airplane	([illegible])
	Total	[illegible]
Item 10	Spare Parts	[illegible]
	Total Amount To Be Invoiced	[illegible]
	Total Amount Invoiced	[illegible]
	Total Contract Price	[illegible]

Change Orders 1, [illegible], 4, 5, 6
No cost participation values.
Change Order No. 4 extended delivery date.

Change Order #[illegible] covers material credit of $33,[illegible].04 which is not a part of above Total Contract Value

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AMC Form No. 10-3
(Rev 29 Jul 47)

ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

Use this form for inter-office correspondence within headquarters.

Use authorized office symbols to designate addressor and addressee.

Place initials of dictator and typist, telephone number and location to right of signature.

Number all comments consecutively.

Note warning signal at lower left of form. Remaining space is sufficient only for proper spacing of typewritten signature.

Use entire width of sheet, both sides.

Separate comments by horizontal lines across page.

SUBJECT: Disposition of XF-87 airplane.

TO: MCLA B-4

FROM: MCLSOA(2) (Lt Col [illegible]-4)

DATE: 4 Feb 49

COMMENT NO. 1

1. Reference is made to change order number 18 dated 18 November 1948 to Contract [illegible]-038 AC-6266 from which the following is quoted:

Paragraph 1 (b) "As directed by TWX dated 5 November 1948, the Contractor shall stop all work on XF-87 airplane, serial no. 46-522 called for under Item 6 of article 15 (a), and shall immediately terminate all sub-contracts, work orders, and other commitments. Said airplane shall be accepted by the government in an "as is" condition at a reduced price, which action will relieve the contractor of further work, tests, liability, or obligations relative to this airplane. Following acceptance of this article the airplane shall be disassembled by the contractor and stored for a period of one year for use as a spare parts stock pile for XF-87 airplane, serial no. 45-59600 at no additional expense to the government. Total decrease in contract price as a result of the above change to Item 6 - - - - - $114,941.73".

2. The acceptance of the No. 2 airplane (46-522) was effected on 14 December 1948 and at the present time the airplane is being disassembled and stored by authority of the above quoted change order.

3. Based on the above this office is of the opinion that XF-87 airplane serial no. 46-522 should be dropped from accountability records as a complete airplane inasmuch as the article has never existed nor will it ever exist as such.

[illegible]T/rs
Colonel, [illegible]
[illegible]/14
Engineering Division

[illegible]:

WF-1-24 OCT 47 1500M

CONTINUE ON OTHER SIDE

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AAC Form No. 88-344-2 (Sep 47)

CONFIDENTIAL

TITLE SHEET

HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, DAYTON, OHIO

MEMORANDUM REPORT ON

MCRFTP/RVC/ks
Date 15 February 1949

SUBJECT: Performance Flight Tests on the XF-87 Airplane, USAF No. 45-59600

OFFICE MCRFTP Contract or Order No.

SERIAL No. MCRFT-2183 Expenditure Order No.

A. PURPOSE:

1. To report the results obtained during the Air Force Phase II flight tests of the Curtiss-Wright XF-87 airplane, USAF No. 45-59600.

B. FACTUAL DATA:

2. Introduction:

Flight tests necessary to obtain limited performance data and pilot's comments on the XF-87 were requested by the Chief, Aircraft Projects Section, Engineering Division, on Expenditure Order No. 430-256 dated 28 November 1947. All flights were completed in a period of nine days from 24 September 1948, to 2 October 1948. A total of 19 flights was made with 13 hours and 20 minutes flying time. The program was conducted at Muroc Air Force Base, Muroc, California.

3. Description of Aircraft:

The XF-87 is a two-place, side-by-side, mid-wing aircraft designed as a night and all-weather fighter. The airplane is propelled by four J-34-WE-22 jet units which are located in two nacelles underneath the wings. The airplane is made distinctive in appearance by the empennage which has the horizontal stabilizer located midway up the vertical fin and the cone-shaped "stinger" which protrudes aft from this intersection. The landing gear is of conventional tricycle type with all three gear assemblies retracting forward; the main gear into the engine nacelles and the nose gear into the forward section of the fuselage. External, jettisonable, fuel tanks, of 760 gallons capacity each, may be attached underneath the wing tips. Leading edge slots and dive brakes are incorporated in the wing but were inoperable for all flights. A photo panel was installed in the nose of the aircraft in the space intended for armament and radar installations. The airplane is painted black, the finish being smooth, but not glossy. The principal dimensions, photographs, and other particulars of the airplane are included in Appendix II.

WP-L-24 MAR 48 1000

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4. Weight and Balance:

The airplane was weighed by use of an electric weighing kit by the contractor and witnessed by Air Force personnel. The normal gross weight of the airplane, with full internal fuel load, was 39,200 pounds and with full tip tanks attached, was 49,200 pounds. The CG position was 19.8% M.A.C. for the normal condition and 20.8% M.A.C. with tip tanks attached. The loading included 1278 gallons of internal fuel, 19.5 gallons of oil, and 400 pounds crew weight.

5. Cockpit Description:

The following is a brief description of the distinctive features of the cockpit. Entrance to the cockpit is accomplished by the use of a special detachable ladder which could be plugged into the fuselage on the pilot's side of the airplane. With the side-by-side seating arrangement, it is necessary for the observer to board the airplane first. The ladder is convenient to use but requires ground crew man to remove it after entrance and to install it on arrival at destination. The horizontal stabilizer is controllable by use of a toggle-switch which is mounted on the right side of the control wheel hub. The adjustable stabilizer is operated manually as a high-speed trimming device and is used only in the high-speed range of the aircraft; i.e., at speeds in excess of 0.72 Mach number. The landing gear control is a shielded toggle-switch and the flap control is a small toggle-lever, both mounted on the rear of the center pedestal. Both controls are operated with the right hand and are conveniently located, but could easily be confused and lead to inadvertent operation of the gear or flaps. The four throttles are located on the center pedestal and are so far forward that they are a little difficult to operate. They are also short which makes accurate adjustment difficult. The throttles do not synchronize for any predetermined power setting, and are, therefore, widely spaced in fore and aft positions to maintain the same rpm on all four engines. The four fuel selector switches are of the rotary type and are on the left hand console. However, they are placed so far forward that difficulty is encountered in reaching them. From a standpoint of comfort, the ejection seat installation is very satisfactory. Both horizontal and vertical adjustments are adequate and the positioning levers are conveniently placed. The only controls which are on the observer's side of the cockpit and cannot be conveniently reached by the pilot, are the starter switches and voltage regulator controls.

6. Field of Vision:

Field of vision from the aircraft as compared to other jet fighters was poor because the pilot's position on the left side of a very wide cockpit restricts his view to the right. Taxiing without an observer in the right seat is not recommended. The pilot's field of vision to the left and back was restricted by the seat installation to an angle of 45°

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aft from the cockpit. However, visibility was considered adequate for night or all-weather fighter type of aircraft.

7. Noise and Vibration:

The noise and vibration level was considered lower than that of the average jet fighter. A cabin pressurization unit was not installed, which may have been a factor in the low noise level. The most noticeable high speed noise was a sarill whistle that occurred at an indicated Mach number of approximately .6 and increased in pitch until it faded out at approximately .62 Mach number. Vibrations were not considered objectionable during any phase of flight except in the maximum speed range. The engines were difficult to synchronize and when out of synchronization, caused or contributed to the only vibration which was considered objectionable.

8. Taxiing and Ground handling:

Control of the airplane during taxiing was satisfactory and was easily accomplished by use of the brakes which required only light pressure on the pedals. Because of a peculiarity of the engine installation, it was necessary to maintain a minimum of 8000 rpm per engine for proper ground cooling. This rpm setting was satisfactory for taxiing. Asymmetric power was ineffective for directional control while taxiing.

9. Take-off and Initial Climb:

Take-off characteristics were satisfactory with the exception of the long run required. Initial directional control was maintained by use of the brakes until an indicated air speed of 50 knots (58 mph) was attained when rudder control became effective. Rudder forces during take-off were high and especially noticeable during cross-wind take-offs. The horizontal stabilizer was synchronized with the flaps to reduce trim changes which occurred with changing flap position. The flaps were set full down for take-off, and the elevator trim tab (for longitudinal trim in addition to the adjustable horizontal stabilizer) was normally set at neutral, as were all other trim tabs for a normal take-off. Nose down trim of 3° resulted in an estimated pull force of 75 pounds to raise the nose wheel for take-off. The take-off run was noticeably shorter with full flaps. During normal take-offs the nose wheel was raised off the ground at 85 knots (98 mph) IAS and the airplane was allowed to fly off at 115 knots IAS, which appeared to be the best take-off speed at 39,000 pounds gross weight. Take-off tests were conducted at the Muroc main base on a concrete runway. Four take-offs were measured, by use of a grid camera, with the airplane at a gross weight of 39,000 pounds and three take-offs were measured, by use of theodolite sighting bars, with the airplane at a gross weight of 49,000 pounds, tip tanks attached. All

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take-offs were made with 12,500 rpm and flaps full down. The results corrected to standard atmospheric, sea level, no wind conditions are:

Gross Weight lb	Total distance required to clear a 50-ft obstacle ft	Ground roll ft	Indicated air speed knots at take-off	Indicated air speed knots at 50 ft	True air speed knots at take-off	True air speed knots at 50 ft
39,000	3750	2750	113	121	116	123
49,000	6600	5000	126	135	129	137

Guaranteed take-off distance over a 50-foot obstacle was 6000 feet at a gross weight of 49,000 pounds. The shortest take-off at 49,000 pounds required 6300 feet to clear a 50-foot obstacle.

10. Climb Performance:

Maximum rpm (12,500) climbs were flown at two initial gross weights; 39,200 pounds and 49,200 pounds with tip tanks attached. Sawtooth climbs were flown at a pressure altitude of 10,000 feet for both gross weights and at a pressure altitude of 30,000 feet for the lighter weight only. These sawtooth climbs were flown to check the manufacturer's recommended best climbing speeds which were used on all check climbs. For the lighter weight climbs this speed was 342 knots (394 mph) at sea level and decreases approximately 5 knots, indicated air speed, per thousand feet of altitude. For the heavier weight climbs, best climbing speed was 288 knots (332 mph) at sea level and decreased approximately 2.5 knots, indicated air speed, per thousand feet of altitude. No climb data were obtained above 35,000 feet because of engine limitations imposed by the contractor. Stability and control were found to be satisfactory during the climbs and trim changes were slight. In each case the elevator trim tab was used and found adequate. The climb performance, corrected to standard atmospheric conditions, is plotted in Figure 1, Appendix 1, and is summarized in the following table:

Altitude ft	Rate of Climb ft/min no tip tanks	Rate of Climb ft/min tip tanks	Time to Climb min no tip tanks	Time to Climb min tip tanks	Fuel Used gal no tip tanks	Fuel Used gal tip tanks
S.L.	5500	3450	0	0	180	210
10,000	4300	2600	2.1	3.4	240	330
20,000	3150	1750	4.6	7.8	300	500
30,000	2000	950	8.4	16.0	380	630
35,000	1400	500	11.2	21.6	430	-

The contractor's guaranteed time to climb is 13.15 minutes to 35,000 feet with a take-off gross weight of 37,025 pounds (no tip tanks).

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11. Level Flight Performance:

Speed versus power calibrations were obtained at pressure altitudes of 5000, 15,000, 25,000, and 35,000 feet. At every altitude, during the maximum power tests and at approximately 10 knots indicated air speed before the maximum speed was attained, a directional oscillation became apparent. This oscillation was characterized by a change of rudder position, indicated by a movement of the rudder pedals and occurring, at inception, approximately three times per second. "Snaking" is the term commonly used to describe the condition as it existed at that stage. The rapidity of the oscillation increased with increase in air speed until "rudder buffet" would more nearly describe the condition. At the time the rudder buffet became apparent as such, the whole aircraft began to shake. Because this condition began with the rudder movement, there was a tendency to describe the shake as a "tail-shake". However, there was no instrumentation installed to determine the origin or cause of the shake. It is this condition which places a restriction on the maximum level flight speed of the airplane at approximately 0.77 Mach number. The level flight data obtained have been corrected to standard atmospheric conditions and are plotted in Figures 2, 3, 4, and 5 in Appendix I. The results are summarized in the following table:

Altitude ft	Gross weight lb (39,200 at start)	Maximum True air speed (limited by buffet) knots	mph	Maximum Range Nautical air miles per gallon	RPM	True air speed knots	mph
5,000	37,930	501	576	.32	10,700	364	419
15,000	37,400	482	554	.43	10,850	392	451
25,000	36,800	463	532	.53	11,100	420	484
35,000	36,175	444	511	.59	11,500	437	503

Maximum speed of the airplane, at 12,500 rpm, at a gross weight of 39,200 pounds, was 507 knots (584 mph) at sea level. The contractor's guarantee is a maximum speed of 521 knots (600 mph) at a gross weight of 37,000 pounds.

Speed and fuel consumption tests were also run at 25,000 feet with one, and then two, engines windmilling and also with four engines operating and tip tanks attached. The performance of the airplane in these configurations is plotted in Appendix I and summarized in the following table:

Engines	Gross Weight lb	Maximum Speed knots	Maximum Range Nautical Air Miles/gallon	RPM	True Air Speed knots
Four	36,800	476	.525	11,100	420
Four	46,630	455	.48	11,300	396
Three (1,3,&4)	36,800	435	.555	11,600	388
Two (1 & 4)	36,800	320	.575	12,500	320

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12. Stability and Control:

a. A qualitative stability and control investigation was conducted at one CG position. The maximum movement of the CG position owing to fuel consumed during normal flight, was only 2.4% and did not result in any extensive trim changes. Abrupt elevator and rudder deflections were made when the airplane was trimmed in level flight for an indicated air speed of 296 knots (340 mph) and both oscillations were effectively damped within one cycle.

b. Maneuvering stability was investigated at one air speed (296 knots, indicated air speed) and the results have been plotted in Figure 10, Appendix I. This plot shows a maximum stick force of 39 pounds at 4.0 g where an accelerated stall occurred. The stick force per g gradient was 11 pounds per g at 2 g and 4 pounds per g at 4 g. The longitudinal trim is accomplished, as mentioned, by the movable horizontal stabilizer and elevator trim tab. The elevator trim provided adequate trim at speeds up to 0.72 Mach number, above which the horizontal stabilizer trim was used effectively to the maximum level flight speed of the airplane. The rate of change of horizontal stabilizer position was considered too rapid for a satisfactory trimming device. A reduction of the rate by from 30 to 50% would be satisfactory. Static longitudinal control forces were investigated with the airplane trimmed for level flight at an indicated air speed of 300 knots (345 mph). A plot of stick force versus calibrated air speed appears in Figure 10, Appendix I.

c. The ailerons were operated through a hydraulic boost system which was superior in "feel" and performance to that of any previously used. A maximum value for pb/2V of .082 was obtained at 298 knots (343 mph) indicated air speed, which was better than the minimum of .070 required by U.S. Air Force Specification No. R-1815-A, dated 7 April 1945. Aileron control power was adequate at any speed in all configurations and the forces required were satisfactory. When the boost was shut off, ample control was still available and the forces, although high, could easily be overcome.

13. Stalls and Stall Warning:

Stalls were accomplished in several configurations at both 1 and 2 g. In all cases stall warning was evidenced by a mild elevator buffet which occurred approximately 4 to 6 knots above the complete stall.

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Stall warning was not considered adequate. A table of the stalling speeds follows:

Altitude ft	Flap	Gear	Gross Weight lb	Average RPM	Acceleration g	Warning IAS knots	Stall IAS knots
25,000	Up	Up	36,760	11,800	1	126	122
11,950	Up	Up	35,840	12,450	1	-	123
31,020	Up	Up	35,340	12,450	1	-	124
10,040	Up	Up	tip tanks 40,000	12,450	1	146	142
25,000	Down	Down	36,620	idle 10,600	1	113	108
25,000	Down	Down	36,560	11,600	1	110	108
17,000	Up	Up	36,360	12,000	2	-	195
22,000	Up	Up	36,140	idle 10,300	2	150	143
25,000	Up	Up	34,370	11,800	4	-	316

14. Maneuverability and Aerobatics:

The appearance of the airplane is not suggestive of easily accomplished aerobatics. However, rolls and half-rolls were accomplished with an ease and smoothness comparable to some single-engine, jet fighters. Loops, cuban eights, and immelmans were accomplished in a conventional manner. During the aerobatics a buffet condition was noticed. When acceleration loads were imposed on the airplane when in a vertical attitude, a throbbing or a steady jar was felt throughout the airframe. This condition was of a fixed period and increased in amplitude with an increase in g load. No cause for this condition could be determined.

15. Approach and Landing:

A total of 22 landings was accomplished during the course of the tests. Two landings at gross weights of approximately 36,600 pounds were measured on a concrete runway. The data, obtained by use of grid camera and corrected to standard sea level, no-wind conditions, show an average total distance over a 50-foot obstacle of 5000 feet and an average ground roll of 4000 feet. Indicated air speed at 50 feet was 125 knots (144 mph) and at touch down was 110 knots (126 mph) with true speeds of 130 knots (150 mph) at 50 feet and 118 knots (136 mph) at touch down. An approach speed of 125 to 143 knots (144 to 165 mph) was found to be most satisfactory at light and medium weights with power off, while an addition of power and 5 knots, indicated air speed, for maximum weight landings was advisable. A characteristic high rate of descent at speeds close to the stall was the reason for the rather high approach speeds. All controls were adequate during the final approach. After the touchdown, the nose was easily held off the ground until the speed decreased to approximately [illegible] knots (70 mph). At lower speeds the force increased rapidly until approximately 100 pounds of stick force was required by the time the airplane had decelerated to approximately 55 knots (63 mph). The airplane

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did not decelerate rapidly of its own accord. The brakes were powerful, sensitive, and adequate. Directional control was good, and was accomplished by use of the rudder down to an air speed of 32 knots (60 m.p.h) and by use of the brakes thereafter. Go-around characteristics were fair and comparable to that of a medium bomber.

16. General Mechanical Functioning:

All of the airplane systems and equipment functioned satisfactorily with the exception of the engine governors which were not considered satisfactory even when functioning normally. Engine idling speeds were considered excessive at altitude resulting in difficulty in descent and power settings too high for maximum range cruising at 35,000 feet. Governor failures resulted in the only delays in the program. Several governors required replacement and this necessitated the removal of the engine each time.

17. Emergency System:

The ejection seat procedure is considered cumbersome for the pilot. Preparation for ejection demands removal of the control wheel and in event of serious emergency, this operation may be fatal. The tip tank release is located at the extreme bottom of the center pedestal. The release lever is located between the parking brake and the auto-pilot control and this could easily lead to confusion. The 60 pounds of force required for operation is considered excessive. A "free-fall" emergency gear lowering device is provided. The "free-fall" is accomplished by turning a miniature landing wheel mounted on the center pedestal and pulling aft until the gear has fallen free. The gear is then locked in the down position by the force of the air stream.

V. CONCLUSIONS:

18. It is concluded that:

a. For the range of CG tested the handling characteristics and stability are considered satisfactory except at maximum speeds.

b. The results of these tests show that the climb performance exceeded that guaranteed by the contractor; the maximum speed and take-off performance was marginal.

VI. RECOMMENDATIONS:

19. None

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Memorandum Report No. MCRFT-2183
15 February 1949

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Memorandum Report No. MCMFT-2183
15 February 1949

APPENDIX I
XF-87 Flight Test Data

Reduced to Standard Conditions

1. Discussion

2. Curves

Figure 1	Climb Performance
Figure 2	Speed versus Altitude
Figure 3	Air Miles per Gallon
Figure 4	Speed versus RPM - Four Engines
Figure 5	Mach Number versus RPM - Four Engines
Figure 6	Fuel Consumption
Figure 7	Air Miles per Gallon - Four, Three, and Two Engines, Tip Tanks
Figure 8	Speed versus RPM - Four, Three, and Two Engines, Tip Tanks
Figure 9	Mach Number versus RPM - Four, Three, and Two Engines, Tip Tanks
Figure 10	F_s versus α for Static Longitudinal Stability
Figure 11	Air-speed Calibration
Figure 12	Altimeter Correction
Figure 13	Ground Static Thrust Calibration

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Memorandum Report No. MCITI-2183
15 February 1949

XP-67 Flight Test Data
Reduced to Standard Conditions

1. The performance data obtained on these flights have been corrected to standard atmospheric conditions and are presented in the figures included in this appendix. Level flight speed versus rpm data points were flown at pressure altitudes of 5,000, 15,000, 25,000, and 35,000 feet. Each point was corrected to standard conditions by the procedure. The observed rpm is that rpm which would have been required to give the same indicated air speed at the same pressure altitude with standard air temperature and a gross weight equal to 49,200 pounds (this figure is for tanks attached) or the weight of the fuel used in climb to altitude.

Std rpm = Observed rpm x $\sqrt{T_s / T_t}$ x N_w

where T_s = Absolute air temperature at test pressure altitude on a standard day.

T_t = Observed absolute air temperature

N_w = rpm increment required to add the thrust necessary to offset the change in drag due to the difference between the test weight and the standard weight. The corrected rpm has been plotted against the observed speeds in figure 4. Speed corrections have been applied at several rpm values throughout the speeds, and plotted against pressure altitude in figure 1. The maximum speed was 407 knots (469 mph) at sea level.

2. Speed versus rpm data obtained at pressure altitude of 25,000 feet for two [illegible] tank configuration (figures [illegible]).

3. The observed [illegible] plotted in rpm in figure [illegible] corrected [illegible] gallon values in figure [illegible]. Values of [illegible] all static test tire [illegible] operating values [illegible] are [illegible] on data. [illegible] obtained, at 6,170 pounds, [illegible] (no [illegible] or [illegible] at 11,560 pounds (5,5 [illegible] used.

4. [illegible] multiple [illegible] on values [illegible] figure 7 [illegible] the operation [illegible] tank position.

5. On flight No. 1 [illegible] calibrated by use of the Flight Test [illegible] aircraft, [illegible] No. [illegible]. The air-speed [illegible] have been plotted on figure 1 [illegible] correction is plotted [illegible] figure 2. [illegible] for [illegible] approximately -3 knots [illegible] the curve is [illegible] knots indicated [illegible] speed [illegible] correction [illegible] approximately +1 knot [illegible] speed.

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The correction in the high speed range increased to a value of +10 knots. Four speed points were also [illegible] and flaps down in this [illegible] a shift of [illegible] to [illegible] correction at stalling [illegible].

4. Four J-34 engines were installed in pairs in two nacelles, one under each wing. A ground static thrust check was made on the nacelle installation and a total of thrust, pounds, [illegible], all [illegible] to [illegible], a [illegible] correction in figure 13. The thrust runs were made with the nacelle-right thrust stand located [illegible] Air Force [illegible]. The thrust stand consisted of three [illegible] platforms [illegible] leaving [illegible] aircraft were placed and securely locked. Two links, each [illegible] with a [illegible], were attached to each platform sustaining a [illegible] and an [illegible] [illegible] of each platform. [illegible] turnbuckle [illegible] links. [illegible], readings [illegible] were [illegible] converted to [illegible]. The links were [illegible] only to [illegible]. [illegible] [illegible] [illegible]

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Memorandum Report No. MCRFT-2183
15 February 1949

1. General Dimensions

The following dimensions and design data were obtained from Curtiss-Wright Report 29Y-6 dated 10 February 1947.

Fuselage - Length	65.5 ft
Empennage - Height	20.5 ft
Wing - Gross Area	600 sq ft
Span	60 ft
Aspect Ratio	6.0
Root Chord	14.82 ft
Tip Chord	5.185 ft
Airfoil Section	65 (112)-111, a= 1.0 MTS
Mean Aerodynamic Chord	10.708 ft
Dihedral	1° - 00'
Incidence	1° - 00'
Design Surface Movements	
Ailerons	20° up and down
Elevators	25° up and 10° down
Rudders	20° right and left
Center of Gravity Locations	
Wheels up (G.W. 37,026 lb)	17.7% M.A.C.
Wheels down (G.W. = 37.026 lb)	19.5% M.A.C.
Limit Load Factors	
Positive	5.67
Negative	2.33

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AMC Form No. 71-85
(25 Mar 48)

Contract File

UNITED STATES AIR FORCE
AIR MATERIEL COMMAND
Wright-Patterson Air Force Base
Dayton, Ohio

CHANGE ORDER

Date: 23 February 1949 flp
Serial No.: C-49-939
Change Order No.: 19
Contract No.: W33-038 ac-6266 As Amended
PR No.: none
Class: 01-C

TO:

Curtiss-Wright Corporation
(Airplane Division)
Columbus 16, Ohio

INCREASE	Fixed Price	nothing
DECREASE	[illegible]	
	[illegible]	
	[illegible]	

SUBJECT: CCN No. 12

1. the performance of Contract W 33-038 ac-6266, as amended, the Model XF-87 airplane, Serial No. 45-59600, shall be inspected and accepted by the Government at Wright-Patterson Air Force Base, Dayton, Ohio, in lieu of at the Contractor's plant, Columbus, Ohio, as specified in paragraph (b) of Article 17 as directed by Contract Change Notification No. 12(N-54528) at no further change in contract price.

2. Nothing herein contained shall be deemed to require the Contractor to manufacture, furnish or deliver any articles, supplies, or to perform any work as to which a Notice of Termination is in effect at the effective date hereof, nor to require the Government to accept any such articles, supplies or work; and any such Notice of Termination shall be applicable, to the extent stated therein, to any articles, supplies or work called for hereby or otherwise referred to herein.

This Change Order has been negotiated pursuant to Public Law 703, 76th Congress, as amended, by Public Law 580, 77th Congress, Section 13, Title II of the First War Powers Act, 1941, and Executive Order No. 9001, 27 December, 1941. Except as hereby amended, all terms and conditions of the contract affected, as heretofore amended or modified, shall remain unmodified and in full force and effect and shall also apply in carrying out the provisions of this Change Order.

1st Indorsement

TO: Contracting Officer

1. Contractor hereby accepts the above Change Order.

[illegible], Ohio — 3/22/49
Place — Date

CURTISS-WRIGHT CORPORATION (Airplane Division)
Contractor

[signature]
Signature of Officer with Title

[illegible]

APPLIED CORPORATE SEAL 1929

THE UNITED STATES OF AMERICA

By [signature]

STEPHEN LOVAS
Contracting Officer

Date: 5 April, 1949

The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in, and are chargeable to allotments below enumerated, the available balances of which are sufficient to cover the cost thereof.

[illegible]

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[illegible]

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5. [illegible] cancelled [illegible] the following:

[illegible] No.	DESCRIPTION
1	Modification of XB-47 Airplane
2	Spare Parts
3	Simulated Turret
4	Further Modification of XB-47 Airplane

6. The items cancelled were:

Item No.	Total Quantity Ordered	Quantity Shipped To Date	Number Terminated	Unit Price	CPFF
1	1	0	1	$72,347.77	$72,347.77
2	Spares	0	All	15,652.23	15,652.23
3	1	0	1	83,506.67	83,506.67
4	1	0	1	245,365.44	245,365.44
				Total CPFF	$419,872.31

7. This is a total termination of subject contract.

8. The effective date of termination was 5 November 1948.

9. There were no amendments or changes to original Notice of Termination.

10. The termination was for the convenience of the Government.

11. The contractor stopped work promptly and notified subcontractors to do likewise.

12. The dollar value of the contract, as amended, is $419,872.31.

13. Provision for negotiated settlement is found in Uniform Article No. 10.

III - Summary of Settlement

14. Contractor's proposal for settlement was prepared on a total cost basis.

15. The aggregate of amounts allowed under ASR 551.2(d), (e), (f), (g), and (h) do not exceed the amount which would have been available from withheld profit to cover these items, if the contract had been completed, after considering all other costs which would have been required to complete it.

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b. The type of accounting review made was a [illegible] review, accomplished by E. J. Hedrick, Acting Resident Cost Supervisor, Navy Department, Bureau of Supplies & Accounts, Contract Area, by Wright-Wright Corporation, Columbus, Ohio.

15. A summary of the prime contractor's claim, auditor's recommendations, and Contracting Officer's recommendations for settlement, is shown on Tabular Summary annexed as Exhibit "A" hereof.

16. Discussion of Tabular Summary.

a. Item 1 - Contractor's Costs

(1) The following steps were taken to check the allocability of the prime contractor's own costs: An accounting review has been made of the contractor's own costs as listed in the settlement proposal, and the quantities, quality and allocability of the inventory were reviewed by the Plant Clearance Officer.

(2) Certification was secured from the contractor that materials for which claim is made are allocable to the terminated portion of the contract.

(3) The following adjustments were made to costs in contractor's claim in arriving at the proposed settlement:

a. Direct material of $8,803.54 is recommended for non-acceptance owing to Contractor's errors on material requisitions, cash discounts, and credit requisitions. In addition, contractor continued shop orders 77529 and 77530 subsequent to termination of W33-038-ac-20450 and the costs thereof were charged to W33-038-ac-19837. Since such costs are not allocable to subject contract same are disallowed.

b. Direct labor subsequent to effective date of termination and labor costs on shop orders 77529 and 77530 are recommended for non-acceptance in an amount of $3,657.11.

c. Indirect factory expense, including overhead adjustment for 1947 and 1948, on labor costs after termination and shop orders 77539 and 77530 is recommended for non-acceptance in an amount of $6,667.35.

d. Tooling labor costs subsequent to termination, overhead on such costs and adjustment of overhead rate on tooling labor for 1948 results in a recommendation of $1,163.87 for non-acceptance.

e. G & A expense in an amount of $16,190.96 is recommended for non-acceptance based on overhead adjustments by the Resident Cost Inspector and expense applicable to costs recommended for non-acceptance.

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[illegible] shop order 77526 provided for incorporation of the J-33-A-27 engines and an enlarged wing in the No. 2 XF-87 plane. Subject contract was terminated prior to incorporation of amendment authorizing work under shop order 77526. Investigation revealed that verbal authority by Air Force personnel had been given for the work stated approximately 11 August 1948. Actual contract coverage is provided for costs incurred on the J-33-A-27 engines in the basic contract; however, due to the close relationship of the enlarged wing and the engine work, such costs after 11 August 1948 were combined under shop order 77526. The approximation is $233,000 for the wing and $124,000 for the J-33-A-27 engine.

The contractor incurred engineering costs prior to date of contract in an amount of $33,618.68, claiming such costs as related to the Simulated Turret. Change Order No. 1 to subject contract provides $65,508.67 for the design, fabrication and installation of a simulated turret. Contractor's records disclosed expenditure of $62,655.79 against Change Order No. 1, including the amount of $33,618.68.

g. In final negotiation it was agreed, per ASR 522.1, to consider an overall settlement of $695,000, such settlement to include as follows:

1.	Costs Recommended by Audit	$559,614.26
2.	Costs in Further Consideration	368,344.16
3.	Subs Claims	1,640.54
4.	Waiver of Settlement Expenses subsequent to Audit	
5.	Waiver of Interest and Profit	

h. All charges recommended for acceptance by the Auditors were allowed in the negotiations.

(i) Allocability of all subcontractor charges has been certified to by the prime contractor.

b. Item 2 - Data concerning profit on terminated portion

(1) The contractor made no claim for profit.

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c. Item 4 - Termination expenses

(1) Settlement Expenses in an amount of $14.00 for services pertaining to shop order 7752 is recommended for non-acceptance.

(2) The contractor's claim for termination expenses does not include any charges or credits which arose subsequent to the accounting review, as Contractor waived such charges in negotiation.

d. Item 5 - Interest on prime Contract's claim

(1) The contractor waived any claim for interest due under the Act.

(2) There are no deductions of waived interest, as provided for in JTR 572.4.

e. Item 7 - Subcontractor claims presented for review by this Board Review.

(1) No claims of subcontractors are presented in connection with this main claim, which are themselves subject to review by this Settlement Review Board.

f. Item 9 - Settlements of claims of subcontractors not subject to review by this Settlement Review Board.

(1) A selective review of all claims of Subcontractors has been made by the Contracting Officer.

Breakdown	No. of Claims	Amount of Settlement
Approved by Contracting Officer	3	$ 426.60
Approved by Contractor under 1,000 (JTR 643.1)	5	1,191.94
NO COST SETTLEMENTS	35	-0-
TOTAL	43	$1,620.54

NAMES OF SUB-CONTRACTORS	AMOUNT CLAIMED	AMOUNT OF SETTLEMENT
Love Machine & Tool Co.	3.26	3.26
Tubular Weaving Co.	64.61	64.61
Thompson Products, Inc.	72.21	72.00
Chicago Aerial Survey	941.37	941.37

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[illegible]	[illegible]	[illegible]
Titeflex, Inc.	[illegible]	[illegible]
ALCOA	139.42	93.70
Cook Electric Co.	57.10	57.10
Barber-Coleman	263.30	263.30
Aero Equip. (2 claims)	-0-	-0-
Aircraft Fitting	-0-	-0-
Airsearch Mfg.	-0-	-0-
ALCOA (4 claims)	-0-	-0-
Barber-Coleman	-0-	-0-
Cherry Rivet Co.	-0-	-0-
Cook Electric Co.	-0-	-0-
Diamond Chain Co.	-0-	-0-
Dow Chemical (2 claims)	-0-	-0-
Titeflex, Inc.	-0-	-0-
Durham Aircraft	-0-	-0-
Torrington	-0-	-0-
Eclipse Pioneer	-0-	-0-
Goodyear Aircraft	-0-	-0-
Weatherhead Co.	-0-	-0-
Lang, S. A., Co.	-0-	-0-
Soukon-Galamba Corp.	-0-	-0-
Parker Appliance, Inc.	-0-	-0-
Strahs Aluminum Co.	-0-	-0-
Pitts Plate Glass	-0-	-0-
Thompson Products	-0-	-0-
Pheall Mfg. Co.	-0-	-0-
H. I. Thompson	-0-	-0-
Reed & Prince (2 claims)	-0-	-0-
Rocke-Bostos Corp.	-0-	-0-
Savel Corporation	-0-	-0-
Scintilla Magneto (2 claims)	-0-	-0-
Smith Bearing Co.	-0-	-0-
Snap-On-Tool Co.	-0-	-0-

3. Item 10 - Total amount claimed by prime contractor.

(1) Comparison of Gross Settlement with Contract Price.

GROSS SETTLEMENT: $295,000.00

Less: Post Termination Expense 10,714.35

Interest -0-

Compensable Amount $284,285.65

TOTAL CONTRACT PRICE (As Amended) $949,499.31

Less: Completed units shipped and invoiced or shipped and to be invoiced -0-

$949,499.31

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(1) All Plant Clearance matters which were required to be submitted to Plant Clearance Board's were so submitted. A summary of all Plant Clearance Action is presented herewith in Exhibit "D" attached.

(2) The Government has no claim for defective pricing or for other credits under the terminated contract, and all possible Government offsets have been duly credited.

(3) The contractor has accounted for Government-Furnished property, other than tools covered by special contracts.

(4) The settlement includes in amounts payable to the contractor, all amounts allocable to or payable in respect of property which was destroyed, lost, stolen, or damaged, so as to become undeliverable, prior to the transfer of title to the Government or to a buyer, or prior to the 60th day after delivery to the Government of an inventory covering such property, whichever shall have occurred first.

IV - Special Provisions

17. There are no special provisions to be inserted in the termination settlement agreement:

a. There were uniformalized CCN's outstanding at the time of termination.

(1) All outstanding, uniformalized CCN's were considered and disposed of in the negotiations of this settlement.

V - Special Tooling and Special Facilities

18. No special facilities were involved in subject termination. Tooling was disposed of by screening through MCPFR-52 with the result that said tooling was no longer required. By action of the Dayton AF Procurement Field Office Plant Clearance Board on 4 May 1949, tooling was declared scrap and eventually disposed of by competitive bid in accordance with Paragraph 5a of letter dated 16 March 1949, subject "Disposition of Excess and Surplus Property", from Headquarters, AMC, MCPFR-3.

VI - Assignees, Sureties, Guarantors

19. None were involved.

VII - Recommendation for Board Action

20. The amount of the proposed negotiated gross settlement is $695,000 and the Contracting Officer recommends this settlement as fair and reasonable to the Government and the Contractor, and recommends that the Settlement Review Board approve such proposed settlement.

[illegible] L. [illegible]
Contracting Officer

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LOCKET NO. 30312

ITEMS CLAIMED	AMOUNT CLAIMED (by Contractor)	AUDITOR'S RECOMMENDATIONS FOR: ACCEPTANCE	AUDITOR'S RECOMMENDATIONS FOR: NOT ACCEPT.	AUDITOR'S RECOMMENDATIONS FOR: FURTHER CONSIDER.	CONTRACTING OFFICER'S DETERMINATION AS TO: SETTLEMENT
(1) Contractor's Own Costs					
Direct Material	16,322.39	33,502.74	8,803.54	1,016.11	
Direct Labor	256,379.84	152,444.34	3,657.11	100,278.39	
Indirect Factory Expense	323,533.18	192,745.55	6,667.35	124,120.58	
Dies, Jigs, etc.	234,782.91	103,224.67	1,163.87	130,394.37	
Other Costs	24.35	24.35			
General & Administrative	87,179.93	40,954.26	16,190.96	30,034.71	
(2) Profit	-0-				
(3) Termination Expenses	10,733.35	10,715.35	18.00		
(4) Total of 1, 2 & 3	958,959.25	X	X	X	
a. Completed items at contract price invoiced and to be invoiced	-0-	X	X	X	
b. Total to be considered in determining whether review of prime's claim is necessary (4 less 4a)	958,959.25	X	X	X	
(5) Interest on prime's claim	-0-				
(6) Related	-				
(7) Subcontractor claims subject to review	-0-	X	X	X	
(8) Total claim (Add 4,5,6 & 7)	958,959.25	X	X	X	
(9) Subcontractor claims not subject to review	1,620.54	X	X	X	
(10) Gross Settlement (Add 8 & 9)	960,579.79	X	X	X	957,958.
(11) Partial Payments	426,868.06				-494,672.84
(12) Net Settlement	533,711.73				463,285.16
(13) Disposal Credits					5,846.39
(14) Final Settlement					462,285.55

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[redacted]
AIR MATERIEL COMMAND
[redacted]
Wright-Patterson Air Force Base
Dayton, Ohio

MCPTC-2

21 June 1949

SUBJECT: Plant Clearance Activity - Final Report
Contractor: Curtiss Wright Corporation
Columbus 16, Ohio
Contract No. W33-038-ac-19637
Docket No. 50112
Dayton Case No. 14916

TO: Dayton AF Procurement Field Office
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: Marvin L. Rubin
Contracting Officer

1. Reference letter from Marvin L. Rubin, Termination Contracting Officer, Dayton AF Procurement Field Office, dated 5 November 1948, inventory of subject contractor has been disposed of pursuant to the authority delegated by the Termination Contracting Officer.

2. Inventories, acceptable as to form, were received as follows:

13 December	1948	GFP*	
4 January	1949	4,500.00 Est.	(Form 2c)
18 December	1948	4,900.00 Est.	(Form 2c)
4 January	1949	CFP*	
24 February	1949	223,959.00	(Form 2d)
17 March	1949	18,500.00	(Form 2c)
28 March	1949	715,000.00	(Form 2c)
11 April	1949	10,791.76	(Form 2b)
11 April	1949	4,712.40	(Form 2a)
17 May	1949	CFP*	

* Costs not available.

Form 2a	$ 4,712.40
Form 2b	10,791.76
Form 2c	740,900.00
Form 2d	223,959.00

a. Total Contractor-Owned $980,363.16

b. Government-Owned Costs not available

** Contractor-owned - costs as submitted by contractor.

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Plant Clearance Officer - Lieut. Roy W. Taylor, Dayton Ordnance Corp., Contract No. W33-038-ac-14(00); Lic. #4218; Dayton Date Night. 28 June 1946.

3. Satisfactory physical checks of the inventories were made as necessary on various dates and no exceptions were noted.

4. Regional Procedures and Clearances:

a. Classifications: Pursuant to provisions of ASS Reg. 711-20, declassification of spoilage as to its salability furnished by the contractor and the Plant Clearance Officer was obtained herein.

b. AR's, AIB: Exemptions were secured by Lt., AIC, TOPPER, Management Section, Procurement Division, as received from the contractor; salvaging instructions were received on various dates from 17 January 1946 to 28 June 1946.

c. Plant Clearance Review Board: Determination of scrap approved by the Dayton AF Procurement Field Office Plant Clearance Review Board on 4 May 1946, Case No. 95, for items of inventory on DSS Forms designated as 1937-EL, 1937-SE and 1937-SS.

5. Approval to abandon granted by the Dayton AF Procurement Field Office Plant Clearance Review Board on 6 April 1946, Case No. 87, for items of inventory on DSS Forms designated as 1937-L.

Approval to abandon granted on 6 April 1946, Case No. 92, for items of inventory on DSS Forms designated as 1937-S, and on 4 May 1946, Case No. 97, for items of inventory designated as 1937-E. Also on 23 June 1946, Case No. 7?, for items of inventory on "Schedule A", "List of Missing Items", with cover letter dated 31 December 1945 from contractor.

6. All Government-owned property furnished to the contractor under subject contract has been accounted for after coordination with the Accountable Property Officers.

7. The Accountable Accountable Property Officer is: Maj. H. Taylor, Dayton AF Procurement Field Office, Wright Patterson AFB, Dayton, Ohio.

8. Summary of Inventory Disposal: Attached hereto and made a part hereof is Schedule "A" which contains a detailed report of the disposal activity.

9. Items of Value in the Plant Clearance area still covering [illegible] Procurement has taken title and covering Government-owned material [illegible] from the contractor's plant.

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Plant Clearance Activity - Final Report; Curtiss Wright Corp., Contract No. W33-038-ac-19837; Dist. 30112; Dayton Case 14916. 24 June 1949.

10. In the Plant Clearance case file are:

a. Credit Memoranda totalling $5,846.39, representing disposal credits.

b. Scrap warranties and plant clearance certificate.

For the Chief, Dayton AF Procurement Field Office:

Roy H. Degler

ROY H. DEGLER
Property & Supply Officer

Incls.
Schedule "A"
Statements of
Allocability

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SCHEDULE "A"

DISPOSITION OF INVENTORY 24 June 1949

Contractor: Curtiss Wright Corporation
Contract No. W33-038-ac-19037
Project No. 30112
Termination Case No. 71g14

Final Disposition - Case Closed

	Proceeds	Cost		Proceeds	Cost
CONTRACTOR ACTION	XXXXXXX	XXXXXXXX	WAR DEPARTMENT ACTION	XXXXXXX	XXXXXXXX
Retained for own use	767.10	767.10	Storage Agreement	XXXXXXX	
Small lots sold or ret.			To AF Depots	XXXXXXX	5,745.57 and
Small inv. sold or ret.			To other WD Tech. Services	XXXXXXX	GFP
Unserviceable sold	XXXXXXX	XXXXXXXX	TOTAL	XXXXXXX	
by competitive bids	4,164.25	224,903.36)	TRANSFERRED	XXXXXXX	XXXXXXXX
by negotiated sale	2.00	GFP)	Without reimbursement	XXXXXXX	XXXXXXXX
Serviceable sold	XXXXXXX	XXXXXXXX	to Navy	XXXXXXX	
to user buyers	913.04	5,047.11	to Veterans' Adminis.	XXXXXXX	
to others			donated	XXXXXXX	713,000.00 Est. &
Destroyed or abandoned		27,900.00	others	XXXXXXX	GFP
TOTAL CONTRACTOR ACTION	5,846.39	261,617.59	TOTAL	XXXXXXX	
			GRAND TOTAL	5,846.39	979,363.16
			DISCREPANCIES	-	606.00
			CORRECTED GRAND TOTAL	5,846.39	979,363.16

Total proceeds paid to contractor (Disposal Credits) $ 5,846.39

Amount Scrapped: $ 27,900.00 Total Sc Inventory: $ 740,900.00

NOTE: NO COSTS AVAILABLE ON GFP.

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DAYTON AF PROCUREMENT FIELD OFFICE
Wright Patterson Air Force Base
Dayton, Ohio

MCFFO-2

24 June 1949

SUBJECT: Statement of Allocability
Curtiss Wright Corporation
Columbus, Ohio
Contract W33-038-ac-19837
Docket No. 30112
Dayton Case No. 11916

TO: Dayton AF Procurement Field Office
Wright-Patterson Air Force Base
Dayton, Ohio
ATTN: Contracting Officer

1. Termination inventory and special tooling included in the settlement proposal submitted in connection with the above-designated terminated contract and as described in the following schedules have been examined pursuant to my request.

Schedule No.	No. of Pages	Total Amount Per Schedule
2a	17	$ 4,712.40
2b	28	10,791.76
2c	59	740,900.00
2d	89	223,959.00

2. Except as hereinafter noted, the raw materials, purchased parts, special tooling, finished components, and work in process listed on the above schedules, are in my opinion:

a. Properly allocable to the terminated contract.

b. Correctly stated as to physical count and completion.

c. In conformance with technical requirements of the contract.

d. Not reasonably able to have been diverted to any other work of the contractor.

3. This statement of allocability, insofar as the quantitative requirements are concerned, is based wholly upon the contractor's statement of allocability.

For the Chief, Dayton AF Procurement Field Office:

ROY H. MILLER
Property & Supply Officer

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CONFIDENTIAL

AF TECHNICAL REPORT NO.

Final Report on the Procurement, Inspection, Testing, and Acceptance of the Curtiss-Wright Aircraft Corporation XF-87, XF-87A, XRF-87 and XRF-87C.

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O. B. Thornton, Captain, USAF

June 1949

Published by
United States Air Force
Air Materiel Command

Wright-Patterson Air Force Base, Dayton, Ohio

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ABSTRACT

The object of the development of the XF-87 was to produce a jet fighter airplane capable of offensive operation in all weather conditions, in compliance with the "Military Characteristics for an All-Weather Fighter", dated 23 November 1945, as revised 8 October 1946. The prime consideration leading to the adoption of the above Military Characteristics was the prevention of a recurrence of the "Battle of the Bulge", during which tactical air support for ground troops was lost due to weather conditions. The XF-87 was therefore conceived as an offensive fighter capable of seeking out and destroying enemy aircraft and ground targets in all weather conditions day or night.

The XF-87 airplane was a result of the combined efforts of the Air Materiel Command USAF and the Curtiss-Wright Corporation, Airplane Division. The project became active in December 1945, after an agreement between Curtiss-Wright and Air Materiel Command for the construction of one XF-87 airplane and the submission of technical data and reports pertaining thereto, utilizing the unspent funds remaining on the XA-43 contract. The XA-43 was to have been a ground attack airplane, however shortly after the project was started new information regarding the proposed power plants resulted in the disclosure that the airplane would not meet the range requirements for this type. Work on the XA-43 was therefore halted and the unspent funds remaining were diverted to the construction of the new XF-87. The fact that the XF-87's were built under the original XA-43 contract (33-038-AC-6266) gave rise to the erroneous opinion of many that the XF-87 was in fact the XA-43 with a new model designation. Actually the two airplanes were entirely dissimilar in size, equipment, and mission.

During the course of the preliminary design of the airplane clarification of the mission of the All-Weather Fighter was obtained from Headquarters, USAF. Originally the mission as contained in the military characteristics upon which the design of the airplane was based, specified operation in "All-Weather" conditions which was interpreted to mean good as well as bad weather. Upon clarification however the intent of the statement "All-Weather Conditions", was determined to infer night and/or inclement weather conditions only. This fact allowed the removal of the tail turret and sighting mechanism which had been contemplated as defensive weapons to meet the attack of enemy interceptors in clear weather and which had been included in the basic airplane design.

In general the project progressed at a slower rate than had been expected by the contractor, the first airplane being completed in September 1947, rather than in March of that year, as was the schedule. The delay in completing the first airplane is contributed primarily to the lengthy negotiations that proved necessary to produce a workable contractual arrangement.

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ABSTRACT (cont'd)

The first airplane was flight tested at Muroc, California, during the period March 1948, through October 1948. At the time of the completion of the Air Materiel Command phase II, this airplane along with other models was compared on the basis of interceptor requirements which, during the course of the time required to build the XF-87, had become the paramount consideration of the tactical units which would operate these airplanes. The XF-87 proved inferior to another model as far as the new requirements for an All-Weather Interceptor were concerned and consideration for production quantities was therefore dropped.

The No. one airplane was then ferried to Wright-Patterson Air Force Base where it was accepted and assigned to Flight Test Division Air Materiel Command for further disposition. The No. two airplane was accepted in an unfinished condition and disassembled for use as spare parts in accordance with Headquarters USAF, 1st indorsement, subject, "Disposition of Experimental Contract W33-038-AC-19837 and W33-038-AC-6266 (XF-87 Airplanes), dated 7 December 1948.

Prior to the time of the decision regarding future production of this type, arrangements had been completed with the contractor for additional work on both airplanes following their acceptance as basic specification airplanes. The No. one article was to be equipped with two J-33-29 engines in lieu of four J34 engines and redesignated the XP-87A. The No. two airplane was to be modified into a photo reconnaissance type and was to incorporate a wing of 140 sq. ft. additional area to permit greater maneuverability and slower landing speeds. This article was to carry the designation XRF-87C. The modifications to both airplanes were to be accomplished under separate contract W33-038-AC-19837 which was terminated immediately following the above mentioned decision.

PUBLICATION APPROVAL

FOR THE COMMANDING GENERAL:

GEORGE F. SMITH
Colonel, USAF
Chief, Aircraft Projects Section
Engineering Division
Air Materiel Command

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FOREWORD

This report was prepared by the Aircraft Projects Section, Engineering Division, under E. O. 430-256. The resulting Contract No. W33-038-AC-6266 was initiated under Research and Development Program P. I. 1945, and was administered under the direction of the Chief, Aircraft Projects Section, with Captain O. B. Thornton acting as project engineer.

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SECTION I

DEVELOPMENT

In October 1945, the Curtiss-Wright Corporation submitted a proposal to the Air Materiel Command outlining an airplane which would meet the then proposed military characteristics for an All-Weather Fighter. The proposed airplane as described by Curtiss-Wright preliminary Specification 9500, dated 15 September 1945, was reviewed by Air Materiel Command and appeared to comply with the latest All-Weather requirements with the exception of radius of action at 10,000 feet. The radius of action at 35,000 feet (1,000 miles) was met but, by the nature of the power plants employed, the required radius at 10,000 feet could not be met without greatly increasing the amount of internal fuel carried and, thus increasing the airplane weight and size. After evaluation of this proposal and due to the fact that it was evident at this time that continuation of the XA-43 project was no longer desirable, the Air Materiel Command initiated a request to Headquarters USAF to allow diversion of the funds obligated on the XA-43 contract for the purpose of building the new proposed All-Weather Fighter. This request was approved by Headquarters USAF wire dated 27 December 1945. Meanwhile the Curtiss-Wright Corporation had agreed to undertake the construction of the new airplane now designated XF-87 utilizing the funds remaining on Contract W33-038-AC-6266. Accordingly Amendment No. 6, dated 4 January 1946, to the above contract was executed for the purpose of changing the airplane to be provided under contract W33-038-AC-6266 from the XA-43 to the XF-87.

Detailed laboratory comments on the airplane model specification were then accumulated and forwarded to the contractor on 14 January 1946 for incorporation into a detailed model specification. This action resulted in revision "A" to contractor's report No 9566, dated 1 November 1946, "Model Specification for the XF-87 Airplane", upon which the design of the airplane was based.

Consistent with the policy of providing two or more experimental articles in case of loss of one during flight testing, the Air Materiel Command requested authority to produce the second XF-87 airplane on 16 January 1946. This approval was granted by Headquarters USAF first indorsement dated 31 January 1946. Contractual arrangements were then made by the Air Materiel Command for the fabrication of the second flight article.

During the period of time between the start of the project and the mock-up inspection numerous conferences were held in the laboratories of Air Materiel Command between Curtiss-Wright engineers,

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the Air Materiel Command project officer, and laboratory personnel on detail design problems relating to the airplane. In the course of one of these meetings, held for the purpose of discussing airplane armament, the question of correct interpretation of the military characteristics was advanced. Inasmuch as the military characteristics defined the mission of this airplane as being the destruction of enemy aircraft and ground targets during all weather conditions, it seemed mandatory to install defensive as well as offensive armament in order to successfully carry out a mission against enemy interceptor opposition in clear weather. This defensive armament consisted of a two gun tail turret remotely controlled by a periscopic gun sight operated by the radar observer. Unsuccessful attempts were made by the contractor to work out a suitable installation of the periscopic sight, during which time the project office requested clarification of the intent of the wording of the military characteristics from Headquarters USAF. On June 18, 1946 a wire was received from Headquarters USAF, stating that the military characteristics were being revised to limit the mission of the All-Weather Fighter to periods of darkness and/or inclement weather. This clarification allowed the elimination of the originally proposed tail turret and the associated visual sighting equipment.

In another conference regarding the engines and fuel system for the airplane it was decided that, inasmuch as the Air Force was to standardize on J.P.-2 fuel for all jet aircraft, the design of the XF-87 fuel system should be based on the use of the standard fuel. The Westinghouse 24C engines to be used in the airplane were gasoline engines however, therefore it was necessary to accept temporarily the reduced range of the airplane using gasoline for fuel. The range reduction was brought about by the fact that JP-2 was to be a heavier fuel than gasoline, thus more fuel weight could be contained in a given tank volume.

Other conferences held during this period resulted in defining the radio and radar requirements, instruments and equipment lists, and obtaining laboratory approval on numerous detail design items.

In May 1946 it became apparent that the requirements for .50 caliber armor protection for the crew members was resulting in excessive weight being carried for that purpose. This high weight was due to the fact that the side-by-side seating arrangement employed in the XF-87 required roughly twice as much area protection (front and rear) as did a single place or tandem fighter. Headquarters USAF was apprised of this situation and requested to reconsider the basic requirement for .50 caliber protection for the crew members. Authorization was later received to reduce the amount of armor protection to an extent comparable to the protection employed in World War II fighters.

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This approval allowed the reduction of the front armor glass from 2 1/2 inch thick to 1 1/2 inch, and a corresponding reduction in thickness of armor plate from 3/4 inch to 5/8 inch, and in some cases 3/8 inch. A total weight saving of approximately 300 pounds was effected by this change.

Inasmuch as the entire fire control system for this airplane was to be Government furnished, negotiations were begun in May 1946, with the Glenn L. Martin Corporation, for the system design and manufacture. The fire control system consisted of a four gun 20 mm nose turret controlled either manually or through a modified AN/APG-3 gun laying radar. The mounting dimensions for the turret were to be such that its installation on other night and inclement weather fighters could be effected. Although at the time of negotiation for the fire control system it was evident that delivery would not coincide with the airplanes it was proposed to utilize one of the XF-87 airplanes at a later date as a test bed to work out the prototype fire control system installation. The development of the fire control system was in no way affected by the cancellation of production planning for the XF-87 and is continuing as a separate project with the Martin Company for application to other airplanes.

Early in June 1946 arrangements were made with the NACA to conduct certain wind tunnel tests on XF-87 models. At the same time the contractor was authorized to conduct other model tests at the Massachusetts Institute of Technology. In general the results of these tests indicated sound basic design and are discussed in detail under "Wind Tunnel Testing".

On 29 May 1946 a conference was held at the contractors plant for the purpose of reviewing various engine combination studies that had been prepared by the contractor at the request of Air Materiel Command. Representatives from Headquarters USAF and Air Materiel Command attended the meeting in which the contractor presented four separate studies involving engines other than the J-34 in the event that prior commitments on the part of the Westinghouse Company precluded the use of J-34 units in production quantities. Of all studies reviewed the installation of two J-33 units in lieu of four J-34 units appeared most attractive from the standpoint of performance as well as simplicity of the airplane and availability of the engines. No definite decisions regarding future engines were reached at the meeting however and the contractor was instructed to proceed with the airplane mock-up based on the use of four Westinghouse J-34 units.

It was anticipated at this time that the greatest number of mock-up comments would center around the airplane cockpit due to the large number of instruments, radio and radar equipment, etc. installed therein.

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Arrangements were therefore made with the contractor to hold a preliminary cockpit mock-up inspection prior to the general airplane mock-up inspection to be attended by a limited number of laboratory representatives of Air Materiel Command for the purpose of resolving as many cockpit arrangement problems as possible. The preliminary inspection was held early in July 1948, and resulted in materially decreasing the number of mock-up comments received at the formal inspection.

The airplane mock-up inspection was held July 16 through 19, 1948, at the contractor's plant, Columbus, Ohio. The airplane configuration at the time of the mock-up included a bomb bay and single instruments for all engine indications. The bomb bay was deleted by the mock-up board upon recommendation by Headquarters, USAF representatives and dual indicating instruments specified in lieu of single instruments to conserve panel space. A complete redesign of the ejection seats was required due to requirements that had been formulated since the beginning of the XF-87 project. These items represent the major design changes dictated by the mock-up board. A more detailed discussion of the mock-up inspection is contained in Section II.

Following the mock-up inspection all changes recommended were incorporated into revision "B" to the airplane model specification and contractual arrangements were completed by Air Materiel Command to allow compliance with the revised specification. Generally good progress was made following the mock-up on fabrication of the actual airplane, however, in some cases it became evident that certain GFP would not be available in time to install on the No. 1 article. The 4-2 400 amp. generators which were required to meet the electrical load requirements for the airplane were not delivered on schedule and smaller R-1 300 amp. generators were substituted therefor. Similarly the formation control stick for the automatic pilot was not available and a standard three knob controller substituted. Satisfactory arrangements were made for the delivery of engines, wheels and brakes, casings and other major items necessary to initiate flight testing of the first airplane.

In August 1946, the contractor submitted a request to the Aeronautical Board through Air Materiel Command for the assignment of the popular name "Bat", to the XF-87. This name was already being used, however, on a guided missile and the request was therefore refused. At a later time the contractor submitted another request for the assignment of "Blackhawk", as a popular name which request was approved.

The contractor submitted a weight study to Air Materiel Command in August 1946, showing the advantages weight-wise of using aluminum tubing and flareless fittings in the hydraulic system of the XF-87 in

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lieu of stainless steel tubing and AN standard fittings. This report was reviewed by Air Materiel Command laboratories concerned and a deviation granted the contractor on the condition that the airplane would be repiped with stainless steel if tests proved this action necessary. The contractor then substituted 24 ST tubing and ermeto fittings for the AN standards and maintained careful inspection of these parts throughout the flight test period. No difficulties were encountered in the hydraulic system chargeable to the use of non standard tubing and fittings.

In September 1946, representatives of the Contractor visited the Air Materiel Command to discuss the possibilities of including a high speed model of the airplane among those to be tested by NACA. After analyzing all available data the contractor was of the opinion that insufficient data was available in the speed range of .85 Mach number and up to assure adequate stability and controllability of the airplane at V max. Accordingly the Aircraft Laboratory, Air Materiel Command and the NACA were contacted in regards to the availability of high speed data on aircraft of the general XF-87 configuration. All agencies were of the opinion that adequate data was available and that the basic NACA research program should not be interrupted to perform tests of a specific airplane model. The contractor was advised of the attitude of NACA and Air Materiel Command on this subject. At a later date the contractor constructed and tested a high speed model at his own expense, the results of which were satisfactory and indicated no adverse stability or controllability conditions up to Mach number of .85.

Since the development of the standard All-Weather fire control system was considerably behind the XF-87 timewise, the Air Materiel Command requested authority in November 1946, to equip the No. 2 airplane with a fixed gun nose as a temporary expedient in order to gain a degree of tactical evaluation of the airplane. This request was approved by Headquarters USAF on 2 December 1946, and the Air Materiel Command requested the contractor to submit a cost estimate for the design and installation of a fixed gun nose. The contractor then proposed the installation of a simulated turret in lieu of the fixed gun nose in order to determine the aerodynamic effects of moving the guns on the nose of a high speed airplane. Since the standard fire control system was being designed around a nose turret, and since any armament installation other than the standard system was considered only temporary, the contractor was authorized to proceed on this basis. The simulated turret was to have been capable of being moved through a forward half-hemisphere in flight and all guns fired from any position in the half-hemisphere. Due to the ultimate termination of the experimental contracts however, the simulated turret was never completed and installed.

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In December 1946, representatives of the contractor visited Air Materiel Command for the purpose of reviewing the proposed flight test instrumentation specification for the No. 1 airplane. A conference was arranged with the instrumentation section of Flight Test Division, Air Materiel Command and Curtiss-Wright report 29X-1, "Instrumentation Requirements AF-87", was discussed in detail. Minor changes to the report were recommended in order that standard Air Force stock items could be used in the airplane, however the contractor's proposal was generally acceptable by Air Materiel Command and action was taken to supply the instrumentation specified. Installation of this equipment, most of which was contained in the dummy nose of the airplane, during fabrication, was accomplished.

In January 1947, the contractor requested that a change order to the contract be authorized for the purpose of allowing the construction and operation of a ground engine test stand. This test stand was for the purpose of working out engine control problems and of familiarizing contractor personnel with the operation of the J-34 units. The contractor's request for additional funds for this purpose was not approved and the contractor then requested authority to operate the first two engines received as GFP in a test stand to be constructed at no expense to the Government. This request was approved and the contractor proceeded to conduct ten hours of ground testing of two J-34 units during which time valuable information regarding installation details and engine operation was obtained.

In January 1947, the Photographic Laboratory, Air Materiel Command by direction from Headquarters USAF initiated a study of all fighter aircraft under development or procurement at that time to determine which aircraft was most suited for modification into a tactical reconnaissance type. As a result of this study the XF-87 was considered the most readily adaptable of all fighter types due primarily to the size of the nose section and the ease with which a camera installation could be made. These findings were transmitted to Headquarters USAF and resulted in the issuance of TI 2087 addendum 2 which directed the modification of one of the "A" airplanes into a photo reconnaissance prototype. Accordingly a conference was held at the contractor's plant in April 1947 for the purpose of defining the photo reconnaissance design and of reaching decisions with the contractor relative to the scheduling of the photo reconnaissance modifications consistent with the test program previously envisioned for both "A" airplanes. The contractor was then requested to submit a cost quotation for the photo reconnaissance modifications to the second "A" airplane following acceptance of that airplane as a basic fighter. The simulated turret tests previously scheduled for the second article were then moved

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to the first article to be performed after Phase I and II of the flight test program. The contractor was then authorized to proceed with the scheduling of the photo reconnaissance airplane designated the XF-87. The engineering work for the XF-87 was completed prior to the time of cancellation of the "7 series, however very little fabrication had been accomplished due to the fact that this airplane was scheduled for delivery approximately eight months following delivery of the number two basic "X" fighter.

In June 1947, the contractor, at the request of the Air Materiel Command, presented a proposal for the substitution of two J-33-29 engines with afterburners in lieu of the four J-34 engines in the basic airplane. This proposal was requested because of the fact that the J-33-29 engine would now deliver comparable thrust to two J-34 engines therefore the performance of the airplane would not be materially changed by the substitution. At the same time however, the airplane would be greatly simplified by the use of two engines rather than four, and the problems of production and servicing in the field greatly reduced. The contractor's studies on this subject indicated that the engine change could be accomplished on either "X" airplane. Since the number 1 article was nearing completion however and in order not to delay flight testing of this article it was decided that the engine change should not be accomplished until the airplane was returned to the contractor for the simulated turret installation and tests. This proposal was approved by Headquarters USAF on 21 August 1947. The airplane with J-33-29 engines was then designated the XF-87A and a separate contract (W33-038-AC-19837) was negotiated to cover this change as well as the simulated turret work on the first article and the photo reconnaissance modification of the second article. The separate contract was desirable because of the fact that funds allocated under the basic contract (AC-6200) would expire prior to the scheduled delivery of either the XF-87A or the XF-87. All engineering work and partial fabrication of the nacelles to receive the J-33-29 engines was completed at the time of termination of contract W33-038-AC-19837.

The contractor submitted the qualifications of the test pilots chosen to fly the first XF-87 to Air Materiel Command in July 1947 for evaluation. These qualifications were referred to Flight Test Division for review, and approval of contractor's pilots Mr. B. L. Miller and Mr. W. P. Harrigan was granted following transition flying in A-26 and B-45 type aircraft.

On September 4 and 5, representatives from the Air Materiel Command visited the contractor's plant for the purpose of conducting an inspection of the special tools and ground handling equipment to be utilized in connection with the forthcoming flight testing of the "X" airplanes. Results of this inspection indicated that the tools and equipment as proposed by the contractor were satisfactory

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for the "X" articles and recommendations for additional tools and equipment were submitted for compliance in case of future production of the XF-87 series.

The engineering acceptance inspection of the No. 1 airplane was scheduled to begin 29 September 1947, however due to a failure of an aileron hydraulic boost cylinder during the proof loading of the control system the inspection was delayed until 7 October 1947. Details of the engineering acceptance inspection are covered in Section II of this report. No major changes were requested as a result of the engineering acceptance inspection however, certain minor changes were made in the interest of flying safety. The local Air Force inspection team had previously conducted their acceptance inspection and the results of the local inspection were very useful to the engineering acceptance inspection board in reaching decisions on items that required action prior to flight. Clearance for flight was granted for the first article following the incorporation of safety changes recommended by the engineering acceptance inspection board. Meanwhile arrangements had been completed with the contractor to conduct the initial flight testing of the airplane at Muroc Air Force Base, California, rather than at the contractor's plant for reasons of safety and consistant with the newly enacted policy of the USAF to conduct all initial experimental flight tests at Muroc. Further arrangements were then made to provide transportation for the airplane to Muroc with a commercial trucking concern.

Preliminary taxi testing of the airplane was accomplished subsequent to the engineering acceptance inspection and prior to the time the airplane was disassembled for shipment to Muroc. These tests revealed an unsatisfactory directional control characteristic due to the fact that the nose wheel centering springs were weak. These springs were replaced prior to flight at Muroc and the condition did not reoccur.

The airplane left the contractor's plant on 9 November 1947, but was returned the same day due to the fact that the vertical fin had failed to clear an underpass in the vicinity of the plant and had sustained considerable damage. The fin was removed and the fuselage inspected for damage prior to dispatch of the convoy for the second time. The damaged fin was repaired and flown to Muroc, arriving at Muroc, prior to the airplane convoy. The convoy again left the plant of the contractor on 10 November 1947, and progressed at about 150- 200 miles per day until the vicinity of Tulsa, Oklahoma, was reached. Approximately 16 miles east of Tulsa, the convoy was involved in a traffic accident and extensive damage to the left hand nacelle resulted. Upon notification of the accident the convoy was

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instructed by Air Materiel Command to proceed to the National Guard Hanger at Tulsa Municipal Airport and await an inspection of the damage to determine if the airplane would have to be returned to the plant for repair. Upon inspection of the airplane it was determined that the damage could be repaired at Muroc and the convoy was instructed to proceed. The convoy arrived at Muroc 1 December 1947 and the contractor immediately began the necessary assembly and repair work in preparation for high speed taxi tests and first flight.

During the course of contractor's flight test period, which is discussed in detail in Section IV, under "Contractor's Flight Testing", the Flight Test Division, Air Materiel Command, was requested to conduct several "preview" flights to determine the suitability of the airplane for production in its present configuration. As a result of these flights (conducted June 3, 4, and 5, 1948) it was determined that the airplane's stalling speed was exceptionally high and could not be tolerated in service because of the take off and landing techniques required. It was also apparent that the maneuverability of the airplane at high altitude should be improved although the maneuvering performance was within the contractors calculated values. Inasmuch as production of the 87 series was scheduled at the time the contractor was requested to investigate a larger wing in an effort to reduce stalling speeds and improve maneuverability. In July 1948 the contractor presented the results of a study of a 740 sq. ft. wing which represented an increase of 140 sq. ft. of area. The performance of this airplane was essentially the same as the basic version except for a small decrease in range and the fact that the stalling speed was reduced from 130 MPH to 114 MPH. This larger wing was authorized for the production airplane and arrangements were made by Procurement Division, Air Materiel Command for the fabrication of a large wing to be fitted on the No. 2 "F" airplane. This airplane would then be redesignated the XF-87C. The fabrication of the wing was terminated at the same time that production planning for this airplane was abandoned.

Following the completion of Phase I and II flight testing in October 1948, the previously mentioned competition was held at Muroc, California, in which service pilots from the Air Defense Command evaluated the XF-87 along with other models to determine which airplane would best fulfill the existing requirement for an All-Weather Interceptor. The requirements for a defensive interceptor had replaced those for an offensive weapon during the course of design and fabrication of the XF-87 and, since this airplane was designed to carry out an offensive mission of 1000 mile radius, it was considered excessively large and costly to operate for consideration as an interceptor.

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Upon direction from Headquarters, USAF, dated 15 October 1946, the Air Materiel Command initiated action in late October 1948 to terminate contract W33-038-AC-19837 in its entirety and to modify contract W33-038-AC-6266 to allow acceptance of the two physical articles in their existing condition. Contract W33-038-AC-19837 covered the Photo Reconnaissance Modification; J-33 engine installation and Simulated Turret installation. Contract W33-038-AC-6266 was the basic airplane contract. The enlarged wing was being carried on under the then existing production tooling contract and was accordingly discontinued.

SECTION II

MOCK-UP

The Mock-Up Inspection was held at the contractor's plant, Columbus, Ohio, July 16 through 19, 1946. A detailed account of the inspection in contained in Memorandum Report No. TSESA-1299 dated 30 July 1946. The following listed personnel were in attendance:

Board Members

Lt. Col. W. M. Yahurin	Headquarters USAF AMAS-3
Maj. G. W. McLaughlin	Headquarters USAF AMAS-4
Maj. P. L. Blum	Maintenance Division, Air Materiel Command
Col. R. J. Tarman	Aircraft Projects Section
Mr. W. H. Thornton	Aircraft Projects Section

Committee Members

Maj. H. H. Sellers	Procurement Division
Mr. J. R. Austin	Procurement Division
Mr. L. H. Johnson	Maintenance Division
Mr. F. W. Polk	Aircraft Laboratory
Mr. H. Headland	Aircraft Laboratory
Mr. J. Kramer	Aircraft Laboratory
Mr. L. J. Carroll	Aircraft Laboratory

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Mr. J. A. Weatherford	Equipment Laboratory
Mr. J. F. Randak, Jr.	Equipment Laboratory
Mr. L. V. Larson	Equipment Laboratory
Mr. R. B. Kensch	Power Plant Laboratory
Mr. L. B. Peltier	Power Plant Laboratory
Mr. J. E. Deremer	Power Plant Laboratory
Mr. C. Castellano	Aero Medical Laboratory
Mr. U. G. Lager	Armament Laboratory
Mr. E. E. Rorer	Armament Laboratory
Mr. R. T. Downey	Systems Engineering Laboratory
Capt. J. E. Woodard	Personal Equipment Laboratory
Mr. J. M. Herald	Aircraft Projects Section

Official Observers

Brig. Gen. A. R. Maxwell	Headquarters USAF AOAS-3
Col. C. H. Austin	Headquarters USAF AOAS-3
Col. D. E. Bailey	Headquarters USAF AOAS-3
Maj. R. Mickey, USMC	Bureau of Aeronautics
Cmdr. L. P. Aurand, USN	Bureau of Aeronautics
Mr. J. M. Dannaher	Ordnance Staff
Mr. A. W. Knisley	Aviation Ordnance, Air Lateriel Command
Lt. Col. W. A. Davis	Procurement Division
Col. E. J. Kendricks	Aero Medical Laboratory
Lt. Col. A. P. Gagge	Aero Medical Laboratory
Mr. C. L. Hall	Aircraft Projects Section

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The mock-up was of good workmanship and adequate for the purpose intended. In addition to numerous small detail changes the following major design changes were made as a result of the mock-up inspection.

a. Study and provide space provisions for a dual control system to be incorporated on production airplanes.

b. Redesign canopy so that it moves aft of the pilot's seat by normal operating method.

c. Redesign windshield and provide "V" type in lieu of four panel type.

d. Eliminate bomb bay.

e. Install dual indicating instruments for all engine indications.

f. Redesign ejector seats to comply with new specifications.

g. Eliminate liaison and Loran radio equipment.

h. Install CO_2 fire extinguisher system.

SECTION III

ENGINEERING ACCEPTANCE INSPECTION

The Engineering Acceptance Inspection was held on the first article at the contractor's plant October 6 through 8, 1947. The aircraft was complete at the time of inspection and had previously been inspected by the local Air Force inspection team. Several minor changes were made to the airplane prior to flight in the interest of flying safety, however no major design changes were requested as a result of this inspection. The following listed personnel attended the inspection.

Board Members'

Mr. W. S. Thornton	Aircraft Projects Section
Lt. Col. J. L. Brownewell	Aircraft Laboratory
Mr. Perry Manta	Procurement Division

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Committee Members

Col. P. B. Klein	Aircraft Projects Section
Lt. Col. H. A. Griffith	Aircraft Projects Section
Mr. J. L. Carrell	Aircraft Laboratory
Mr. Sorro Prete	Aircraft Laboratory
Mr. E. E. Rorer	Armament Laboratory
Mr. L. Castellano	Aero Medical Laboratory
Dr. W. P. Crether	Aero Medical Laboratory
Mr. R. M. Damm	Systems Engineering Laboratory
Mr. J. F. Kanlak	Equipment Laboratory
Mr. John Weatherford	Equipment Laboratory
Mr. L. V. Larson	Equipment Laboratory
Mr. Edward Hass	Equipment Laboratory
Mr. J. Deremer	Power Plant Laboratory
Lt. Wolfe	Power Plant Laboratory
Capt. R. W. Kimbell	Procurement Division
Mr. Aust n	Procurement Division
Capt. Lee Standifer	Headquarters USAF ACAS-4
Lt. Col. O. L. Johnson	Headquarters USAF ACAS-3
Lt. Col. C. A. Thorpe	Headquarters USAF ACAS-3
Comm. J. F. Blackburn	Bureau of Aeronautics
Mr. T. J. Lanch	Bureau of Aeronautics

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SECTION IV

TESTING AND ACCEPTANCE

Contractor's Flight Testing

Upon repair of the damaged left hand engine nacelle and reinstallation of the upper fin, the contractor initiated a series of high speed taxi tests to determine lift-off speeds and to check stability and control at these and lower speeds. These tests were successfully completed in April 1948, and results indicated that adequate directional control was present at low speeds and the lateral and longitudinal stability and control was satisfactory at lift-off speed. On one high speed run the pilot taxied the airplane to 190 MPH at which point all four main wheel tires failed almost simultaneously. Practically all the rubber on the tread of each tire was separated from the cord of the tire by high centrifugal force although only one of the four tires failed to hold air. This incident resulted in a restriction of [illegible] speed on these particular tires however, the speed restriction did not affect the performance of the flight test program.

The first flight occurred 1 March 1948. Duration of the flight was 58 minutes. This flight was uneventful except for tail buffeting which occurred at about 190 MPH. The buffet was attributed at the time to the fact that the main landing gear doors were left unlocked during this flight and were sagging open about eight inches. The airplane was flown to approximately 360 MPH TAS at 15,000 feet altitude and all systems functioned normally. On the next and subsequent flights it became evident that the buffeting experienced on the first flight was due to flow separation at the junction of the horizontal and vertical tail surfaces rather than the effects of the sagging landing gear doors. Accordingly an extensive investigation of this condition was initiated which finally resulted in the installation of a stinger fairing at the junction. This stinger was 13 inches in diameter and about three feet long and successfully eliminated the flow separation at the intersection, however the contractor was never completely successful in raising the critical Mach number of the tail assembly to that calculated for the entire airplane. At the time of cancellation of the project the contractor was fabricating a swept tail assembly for the purpose of attempting to raise the critical Mach number of this component. A total of 55 flights comprising 47 hours of flying time were performed by the contractor. Many of these flights were allocated entirely to buffet investigation although the contractor did gather complete stability and control data up to the point where the tail section became critical (Approximately .78 Mach number).

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One wheels-up landing was made during the course of the contractor's testing caused by failure of the up lock mechanism of the left main gear. The damage resulting was slight and the airplane was quickly repaired and returned to flight status. Considerable difficulty was experienced throughout the program with the fuel regulator-governor assemblies of the J-34 engine. These units required numerous replacements and repairs and constituted the only real delay to the program subsequent to first flight. The results of the contractor's flight test program are summarized as follows:

a. A very unsatisfactory low speed buffet characteristic in the airplane was completely eliminated by design changes.

b. The tail assembly enters a premature buffet before the airplane buffet boundary is reached.

c. The airplane stability about all three axes appears satisfactory.

d. The level flight high speed performance was not obtained due to "b".

e. Most airplane systems, mechanisms and installations gave satisfactory performance.

User Flight Testing

In accordance with Engineering Division request dated 27 November 1947, the Flight Test Division, Air Materiel Command conducted a total of nineteen flights on the XF-87 airplane during the period of 24 September 1948, to 2 October 1948. The purpose of these flights was to obtain limited performance data and pilot's comments on the XF-87 airplane. All maintenance to the airplane during this period was performed by the contractor. Very little difficulty was experienced with the airplane during the period of User flight testing as evidenced by the fact that the Phase II program, consisting of nineteen flights, was completed in seven days. The program was carried out at Muroc Lake, California, and is summarized as follows:

a. For the range of c.g. tested, the handling characteristics and stability of the XF-87 are considered satisfactory with the exception that take-off and landing speeds are very high and that the airplane entered a premature buffet condition before the level flight high speed was reached.

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b. The results of the tests conducted show that the Contractor's guarantee for climb performance is exceeded by the airplane and the high speed and take-off performance is marginal.

A complete discussion of the USAF flight testing of the XF-87 with plotted data is contained in Air Materiel Command Memorandum Report MCR-T-2185, dated 15 February 1949, subject: "Performance Flight Test on the XF-87 Airplane", USAF Serial No. 45-59600.

Wind Tunnel Testing

A .14 scale low speed stability model of the XF-87 airplane was tested in the Wright Brothers Wind Tunnel at M.I.T. Results of these tests indicated adequate stability and controllability at low speeds, but indicated a need for leading edge slat to improve C_L Max at high angles of attack. Based on these results, a leading edge slat was installed on the airplane between the engine nacelles and the fuselage and was operated in conjunction with the trailing edge flaps. Flight tests at Muroc later proved the slat unnecessary and for the majority of flights the slat was locked closed.

A two foot cord airfoil model was tested in the Langley Aeronautical Laboratory of NACA for the purpose of determining optimum flap settings for take-off and cruise conditions. These settings were found to be full-down for take-off and full-up for cruise.

A calculation of the spinning performance of the airplane was made by NACA Langley based upon test results of airplanes similar to the XF-87. This calculation showed spin recovery by normal NACA methods could be accomplished however the rudder forces were determined to be beyond the capabilities of a pilot.

A high speed model (scale unknown) was fabricated and tested at the contractor's expense in the Curtiss-Wright Laboratory at Buffalo. The details of these tests are not available to this Command however the contractor considers the results to show favorable stability and control up to Mach .85.

Structural Test Program

No static test article was procured under the XF-87 contract, however samples of the wing structure were tested by the contractor and found structurally adequate.

In addition to the above, structural tests were conducted on the nose gear assembly, main gear assembly, rear main fuel tank, bomb bay fuel tank the oil tank, the hydraulic reserve tank, the control system, and the ejection seats. All of these items are considered to be structurally adequate.

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Acceptance

Immediately following the decision to abandon the production planning for the XF-87 series the No. 1 airplane was ferried to Wright-Patterson Air Force Base where it was accepted in an "as is" condition by authority of change order No. 18 to Contract W33-038-AC-6266. Similarly the second article was accepted in an unfinished condition and stored at the contractor's plant for use as a spare parts stock pile. Effective date of acceptance of both articles was 14 December 1948.

Following acceptance the first article was assigned to Flight Test Division, Air Materiel Command for further tests or disposition. To date no plans for further utilization of this aircraft have been made.

SECTION V

PROCUREMENT DATA - CONTRACT W33-038-AC-o266

	Item	Date	Cumulative Total
1.	Letter Contract for Preliminary Eng. Data on Curtiss-Wright model 100 (XA-43)	14 Nov. 49	$ 105,895.00
2.	Amendment No. 4 for obligation of additional funds.	26 Mar. 45	366,791.00
3.	Formal CPFF Supply Contract for Eng. Data, Mock-Up, Wind Tunnel Tests.	24 Mar. 45	366,791.00
4.	Amendment No. 1 to CPFF Contract for 2 Flight Articles (XA-43)	27 Jun. 45	5,419,865.52
5.	Amendment No. 6 Changing Airplane to XF-87 and contract to fixed price.	4 Jan. 46	5,419,865.52
6.	Amendment 10 for second XF-87	17 May 46	8,502,145.52
7.	Amendment 18, Flight Test at Muroc	20 May 47	8,627,145.52
8.	Amendment 19, for spare parts	6 Jun. 47	8,865,229.32
9.	Amendment 22, for design changes	18 Jun. 47	8,971,113.04
	Total authorized prior to formal Contract - - - -		8,971,113.04

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10.	Supplement No. 1 to AC-6266 formalizing preceding amendments.	3 Oct 47		$9,107,020.32
11.	Change Order No. 2 for design changes	6 Oct 47		256.00
12.	Change Order No. 3 for structural tests and design changes	28 Nov 47		105,843.72
13.	Change Order No. 4 Listing spare parts	30 Jan 48		No Cost
14.	Change Order No. 6, Flight Testing at Muroc	2 Feb 48		141,268.33
15.	Change Order No. 7, Revised spare parts list and design changes	18 Mar 48		1,425.28
16.	Change Order No. 8 increase Flight Test Program	18 Mar 48		87,561.60
17.	Change Order No. 9 formalizing CCN's	14 May 48		No Cost
18.	Change Order No. 10 formalizing CCN's	29 Apr 48		No Cost
19.	Change Order No. 11 T4E1 Ejector Guns	21 May 48		1,351.24
20.	Change Order No. 12 Scrap material sale	28 May 48	CREDIT	33,391.04
21.	Change Order No. 13 Repair Airplane due to Highway accident	3 Jun 48		39,969.53
22.	Change Order No. 14 Repair Airplane Wheels up landing	19 Jun 48		33,349.97
23.	Change Order No. 15 Engine Changes and rework	30 Aug 48		26,981.00
24.	Change Order No. 16 Formalizing CCN's	24 Sep 48		No Cost
25.	Change Order No. 18 Accept Airplanes "as is"	22 Nov 48	CREDIT	200,932.12
	TOTALS AC-6266			9,310,743.63
	Chargeable to XA-43			863,959.32
	Chargeable to XF-87			8,446,784.51

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Contract W33-038-AC-19837

Item	Date	Amount
Fixed Price Contract J-33 Engine Change	22 Jan 48	558,000.00
Change Order No. 1 For Simulated Turret	25 Feb 48	88,508.87
Change Order No. 3, For Photo Reconnaissance modification	19 Jul 48	202,819.54
Termination Notice	12 Nov 48	- - - - -
TOTAL AC-19837		849,328.41

Total Project

W33-038-AC-c266	9,310,743.83
W33-038-AC-19837	849,328.41
G.F.P.	935,812.52
TOTAL	11,095,884.76
Minus XA-43 Cost	863,959.32
XF-87 Cost	10,231,925.44 *

* Subject to downward revision upon completion of termination proceedings on Contract W33-038-AC-19837.

SECTION VI

RELATED DOCUMENTS

1. Report No. 29-T-1, Flareless Tube Fittings, dated May 29, 1946.
2. Report No. CE-46-18, Hydraulic vs Electrical Aileron Booster Comparison, dated August 6, 1946.
3. Report No. 29X-1, Proposed Flight Test Instrumentation dated October 8, 1946.
4. Report No. CE-46-21, Electrical Load Requirements for windshield deicing on XP-87 airplane dated August 23, 1946.
5. Report No. 29-T-5, Performance Analysis of XP-87 Induction Air Duct - Westinghouse 24C-4A Power Plant Installation dated October 28, 1946.

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6. Report No. CE-46-19, Aileron and Rudder Trim Tab Actuators for XP-87 Airplane dated September 26, 1946.

7. Report No. CE-46-23, Elevator Trim Tab Actuator for XP-87 Airplane, dated September 25, 1946.

8. Report No. CE-46-36, Flap and Slat Actuator XP-87 Airplane dated December 13, 1946.

9. Report No. 29-F-3, Static Test - Fin Specimen dated September 9,1946.

10. Report No. 29-S-1, Investigation of Cabin Tolerance and Comfort for XP-87 dated December 12, 1946.

11. Report No. 29-V-1, Material Allowables on the XP-87 airplane February 4, 1947.

12. Report No. 29-H-1, Flutter Analysis of XP-87 Wing dated February 24, 1947.

13. Report No. 29-F-4, Structural Test Program dated February 18, 1947.

14. Report No. 29-S-2, Analysis of Heat Requirements for Anti-Icing XP-87 dated April 8, 1947.

15. Report No. 29-W-1, Aerodynamic Characteristics and Basic Flight Criteria for Structural Design dated July 8, 1946.

16. Report No. 29-A-3, Vertical Tail Surface Loads - Shears, Bending Moments and Torques dated October 28, 1946.

17. Report No. 29-P-2, Operation and Function of XP-87 Hydraulic Reservoir dated April 30, 1947.

18. Report No. 29-H-2, Geared Spring Tab Flutter Analysis dated April 11, 1947.

19. Report No. 29-H-3, Fuselage Vertical vs. Control Surface Flutter dated May 23, 1947.

20. Report No. H47-2, Notes on Spring Tab Flutter Analysis dated March 17, 1947.

21. Report No. CE-46-14, Variable Incidence Stabilizer Actuator dated February 4, 1947.

22. Report No. 29-A-4, Horizontal Tail Surface Loads - Shears, Bending Moments and Torques dated September 18, 1946.

23. Report No. 29-H-4, Mass Characteristics of XP-87 Control Surfaces dated August 5, 1947.

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24. Report No. 29-F-7, Hydraulic System Report, A/C-7 dated July 24, 1947.

25. Report No. 29-A-3, Pressure Distribution over the Airplane dated October 21, 1946.

26. Report No. 29-C-3, Dive Brakes, Loads and Design of Members dated August 19, 1946.

27. Report No. 29-A-6, Fuselage Loads and Shears Bending Moments and Torques dated August 5, 1946.

28. Report No. 29-A-1, Wing Loads, Shears, Bending Moments and Torques dated August 26, 1946.

29. Report No. 29-A-2, Wing Chordwise Pressure Distribution dated September 16, 1946.

30. Report No. 29-B-1, Aileron Analysis - Loads and Design of Structural Members dated July 12, 1946.

31. Report No. 29-B-2, Landing Flap Analysis - Loads and Design of Structural Members dated August 19, 1946.

32. Report No. 29-B-4, Tab Analysis - Loads and Design of Structural Members, dated August 2, 1946.

33. Report No. 29-B-2, Horizontal Tail Surface Loads, Shears, Bending Moments and Torques dated October 28, 1946.

34. Report No. 29-B-3, Vertical Tail Surface Analysis - Design of Structural Members dated December 15, 1946.

35. Report No. 29-F-8, Main Land ing Gear Drop Test dated August 30, 1947.

36. Report No. 29-F-10, Vibration and Slosh Test - Oil Tank dated September 24, 1947.

37. Report No. 29-F-11, Vibration and Slosh Test - Hydraulic Reserve Tank dated September 25, 1947.

38. Report No. 29-F-12, Proof Load Test - Pilot's Ejection Seat, dated September 4, 1947.

39. Report No. 29-F-9, Nose Gear Drop Test dated August 30, 1947.

40. Report No. 29-F-13, XF-7 Airplane Test Nacelle dated September 3, 1947.

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41. Report No. 29-L-1, Landing Gear Analysis - Load Criteria and Design of Structural Members dated April 29, 1946.

42. Report No. 29-J-3, Fuselage Canopy and Windshield Analysis dated October 11, 1946.

43. Report No. 29-T-15, Control System Proof Tests dated October 17, 1947.

44. Report No. 29-K-1, Control System Analysis - Loads and Design of Structural Members dated December 29, 1946.

45. Report No. 29-C-1, Wing Analysis - Design of Structural Members dated December [illegible], 1946.

46. Report No. 29-A-1, Fitting Analysis dated October 11, 1946.

47. Report No. 29-D-1, Fuselage Analysis - Design of Structural Members dated January 15, 1946.

48. Report No. 29-N-1, Nacelle Analysis - Loads and Design of Structural Members dated November 20, 1946.

49. Report TR47-11, Aluminum Cable and Connector Tests dated May 2, 1947.

50. Report No. TR47-3, Radio Noise Bench Test of Rotating Electrical Equipment dated February 6, 1946.

51. Report No. 29-F-1, Fuselage Fuel Tanks - Accelerated Load Tests dated November 20, 1947.

52. Report No. TR47-[illegible], Test of Fuel Selector Switch dated August 13, 1947.

53. Report No. 29-E-4, C-46 Estimated Weight and Balance dated October 29, 1946.

54. Reports No. 29-E-4A and 29-B-4A, XR-46 Calculated Weights and Horizontal Balances dated May [illegible], 1947.

55. Report No. 29-E-1, C-46 A1 Actual Weight and Balance dated December 12, 1947.

56. Report No. 29-Z-1, Requirements for Curtiss-Wright Airplane, Army Model C-46, submitted January 29, 1946.

57. Pilot's Handbook, submitted December 31, 1947.

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58. Erection and Maintenance Handbook, submitted February 4, 1948.

59. Report S-632a, Finish Specification, submitted April 16, 1947.

60. Construction Progress Photographs submitted monthly, January 1947 through October 1947.

61. Mock-Up Photographs, submitted July 30, 1946.

62. Report No. 6566, Airplane Model Specification submitted January 6, 1947.

63. Monthly Status Reports submitted monthly, July 1946 through November 1947.

64. Performance Report - Specification No. 50749, submitted quarterly, April 1946 through October 1948.

65. Weekly Flight Test Report, submitted weekly, March 4, 1948 through September 23, 1948.

66. Wind Tunnel Test Reports, Massachusetts Institute of Technology, Report No, 726 dated March 1946, No. 731 dated May 1946, and Nos. 737 and 738 dated July 1946.

67. Report No. 29-Y-3, Stability and Control Data, dated March 7, 1947.

68. Report No. 29-Y-6, Performance Data, dated February 10, 1947.

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SERIAL NO. PAGE 1

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Mat. Div. A. C. MA-Wright Field 10-28-39-1M APPENDIX I Page 1 of 2 Pages

DESCRIPTION OF AIRPLANE

Model XF-87 Mfr. Model Spec. No. 9566 A. C. Model Spec. No. - -
Overall Span 60' Overall Length 65' 6" Overall Height 21' 7"

WINGS

Type Mid-Wing Monoplane Stagger - - - Gap Aspect ratio 6 Total Wing Area 600 sq. ft.

	Span ft.	Root-Chord inches	Tip-Chord inches	Incidence deg. (T. L.)	Dihedral deg. L. E.	Sweepback deg. L. E.	Area sq. ft.	Airfoil Section
Upper								
Mid-	60	177 7/8	62 3/16	1	1	4	600	
Lower								

HIGH LIFT DEVICES *

Type Extensible Area Flap Travel 35° Span Inboard 48.5" Outboard 78" Chord Inboard 25.6" Outboard 15.6" Area 23.73 sq. ft. TOTAL

AILERONS

Number 2 Type Conv. All Metal Location Trailing Edge
Balance Area - % Total Area 16.8 ea. sq. ft. Travel: deg. Up 20 deg. Down 20
Trim Tab Area 8 sq. ft. deg. Up 20 deg. Dn. 20 Control Tab Area - sq. ft. deg. Up - deg. Dn -

MAXIMUM FUSELAGE SECTION

Location STA - 336 Dimensions 62.5 x 67" Area 32.4 App sq. ft. Shape Rectangular

STABILIZER

Maximum Chord 93.4" Span 24.53 Ft. Area 135 sq. ft. Adjustable 1° Up 4° Down

ELEVATORS

Span 24.5' Chord 27.5" Balance Area - % Total Area 36.1 sq. ft. Hinge aft LELW
Travel: deg. Up 25 deg. Down 10 Horizontal Tail Area Coefficient - -
Trim Tab Area 1.69 sq. ft. deg. Up 20 deg. Dn. 20 Control Tab Area 2.1 sq. ft. deg. Up 6 deg. Dn. 15

FIN

Number 1 Span 139.7" Chord 119.3" Area 61.8 sq. ft. Adjustable No

RUDDER

No. 1 Span Chord Bal. Area % Area 21.5 sq. ft. Hinge aft LELW
Travel: deg. Rt. 20 deg. Lt. 20 Vertical Tail Area Coefficient - -
Trim Tab Area 1.53 sq. ft. deg. Rt. 20 deg. Lt. 20 Control Tab Area 1.89 sq. ft. deg. Rt. 20 deg. Lt. 20

ALIGHTING GEAR

Main		Auxiliary	
Type	Tricycle(Dual) Wheel Base 202 in.	Type	Dual
No. Wheels	2 Size 36 x 11 Tread 240"	Location	Nose Size 26 x 6.6
Retracting System	Hydraulic Brakes Hydro	Retracting System	Hydraulic

REMARKS:

High Lift Devices

* Type Leading Edge Slot Travel 11.9" out Span 27.5" Chord 15.92" Area 10.76 Sq.Ft.

Drag Devices

Type Wing Dive Brakes Travel 90° Span Inb. 44.2", Outb 67.5" Chord Inb 9", Outb 5.1" Area 20.82 Sq. Ft. TOTAL

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DESCRIPTION OF AIRPLANE

Materials and Construction

Model XF-87 Mfr. Model Spec. 9566 A. C. Spec. - -

WING

The wing is of all metal stressed skin construction of an internally braced multi-spar type. Flap and aileron hinge loads are carried by the rear spar. The wing is broken in the center of the fuselage and tips and engine nacelles are removable.

CONTROL SURFACES

All surfaces are of conventional all metal construction. The ailerons, rudder and elevator are statically and aerodynamically balanced for reduction of control loads.

CONTROL SYSTEM

A single push-pull control system is employed throughout. The ailerons employ a hydraulic boost system with a manual override in case of hydraulic system failure.

FUSELAGE

The fuselage is of all metal, semi-~~monocoque~~ construction employing transverse bulkheads, longerons, and a stressed skin covering.

ALIGHTING GEAR

Conventional tricycle type employing dual wheels throughout. Nose gear is of co-rotating type eliminating use of shimmey dampner.

REMARKS:

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Mat. Div. A. C. SD-Wright Field 16-28-49-1M

APPENDIX I (cont'd)

DESCRIPTION OF EQUIPMENT

Airplane Model XF-87 Mfr. Model Spec. 9566 Date Nov. 11, 1948

PYROTECHNICS

Item	Service No.	Location	Type	Spares Normal	Spares Alternate
Flares					
Signal			NONE		

PHOTOGRAPHIC (XRF-87C)

Normal Type and Location: Forward Shooting 12° Down - Nose
Split Vertical -Nose
~~Alternate Type and Location:~~ Vertical -Nose
Tri-Metrigon -Nose

RADIO

Interphone	AAF Combat Interphone	IFF	SCR-695B
Radio Compass	AN/ARN-6	Altimeter	AN/APN-1
Marker Beacon	R-193	Localizer	RC-103
Liaison	———	Glide Path	AN/ARN-5A
Command	AN/ARC -3		

NAVIGATION

Automatic Pilot Type F-1

Drift Meter None

MISCELLANEOUS

Oxygen Pressure Demand System (Low Pressure Storage)

Type of Ice Elimination Thermal Anti-icing of all airfoil surfaces and lips of induction air ducts.

Type of Life Raft Type G-2 one man rafts (2)

Type of Flotation None

Crew Accommodations Ejection seats for pilot and radar operator.

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APPENDIX I (cont'd)

DESCRIPTION OF POWER PLANT

Airplane Model XF-87 Number of Main Engines 4 Arrangement 2 per Nacelle

ENGINE

Manufacturer Westinghouse Mfr. Model Spec. 24C-4A & B A. C. Designation J-34- 7 & 9
Mfg. Spec. No. A. C. Spec. No. A. C. Approved
Type Gas Turbine
No. Cyl. Bore Stroke Compression Ratio Reduction Gear Ratio
Type Axial Flow Blower Ratios

Rating:	Altitude ft.	Power b. hp.				
Take-off	S. L.	Static Thrust at 12,000 RPM - 3000 Lb.				
Normal	S. L.	Static Thrust at 11,000 RPM - 2450 Lb.				
Normal						
Military		Static Thrust at 12,500 RPM 3200 Lb. APP.				

Magneto Mfr. No./Eng. Spark Plug Mfr. No./Eng.
Carburetor Mfr. No./Eng. Type A. C. Setting Fuel octane
Mixture Control Type Air Intake Normal Pressure
Cooling No. Radiators Type Total Coolant Capacity gal.
Temp. Control Radiator Location Total Frontal Area sq. ft.
Intercooler Type Location Total Frontal Area sq. ft.
Type Exhaust System Straight Tail Pipe
Location of Discharge Rear Nacelle Glare Shielded From Silencers
Remarks:

LUBRICATION SYSTEM

Capacities, gal.: Normal 16 Gal. Maximum 16 Gal. No. Tanks 2 Location Nose of Nacelle
No. Oil Coolers Location Temp. Control None
Remarks:

FUEL SYSTEM

Capacities, gal.: Normal 1400 Maximum 3100 Main — Reserve — Aux. — Bomb Bay —
No. Tanks 6 Location and Construction 4 internal tanks located center fuselage section - 2 wing tip drop tanks.
Remarks:

AUXILIARY POWER PLANT

Description:

None

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APPENDIX II

OFFICIAL SUMMARY OF CHARACTERISTICS

Date of Issue ____

AIRPLANE

Manufacturer Curtiss-Wright Type Fighter Model XF-87

Mfr. Model Spec. No. 9566 Contract No. W33-038-AC-6266 A. C. Type Spec. No. - - -

Crew 2 Wing Loading 61.7 lb./sq. ft. Power Loading 4.1 lb./bhp. Design Altitude 35,000 ft.

Wing Area 600 sq. ft. Span 60 ft. 0 in MAC 128.5 in. Aspect Ratio 6 Airfoil 65(112)-111a NACA

Wing Type Straight High Lift Devices Fowler Flaps Landing Gear Type Tricycle

ENGINES

Number 4 Mfr. Westinghouse Spec. No. 24C Type Turbo-jet Model 24C

No. Cyl. - - Supercharger Blower Ratios — Turbo Type —

Prop. Gear Ratio — Compression Ratio — Cooling —

Carburetor Type — Setting — Fuel — octane

Intake Type — Exhaust Type —

Rating:	Altitude ft.	Power b. hp.	Speed r. p. m.	Man. Pr. in. Hg	Time Limit minutes	Blower Ratio	Mixture F/A
Take-off	S. L.						
Normal	S. L.	3000	12000				
Normal		2450	11000				
Military		3200	12500				

PROPELLERS

Number Mfr. Type Rotation

Diameter ft in. No. of Blades Type Control Setting to at

Blade Dwg. No. Hub Dwg. No.

Clearances —ground —fuselage —between disks Weight each lb.

WEIGHTS AND BALANCE

Design Useful load 11940 lb.
Crew @ 200 lb. each 400 lb.
Fuel @ 6.0 lb./gal. 19600 lb.
Oil @ 7.5 lb./gal. 120 lb.
Armament & Bombs 3100 lb.
Misc. Equipment 2254 lb.
lb.

Weight Empty 27,935 lb. Design Gross Weight 39875 lb.

Balance with Design Useful Load—c. g. 20 % MAC
Safe Limits of c. g. 18 % MAC to 23 % MAC

Normal Fuel 1300 gal. Max. Fuel 3100 gal.
Normal Bombs None lb. Max. Bombs 4000 lb.

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OFFICIAL PERFORMANCE SUMMARY

APPENDIX III

Model XF-87 Date of issue 15 February 1949

1. Level Flight Speeds at Design Altitude of sea level ft. with Design Gross Weight of 39,200 lb.

Maximum Speed	506 Kn.	at	12,500	r. p. m. with	b. hp. (100 % rated)
High Speed		at		r. p. m. with	b. hp. (% rated)
Operating Speed		at		r. p. m. with	b. hp. (% rated)
Cruising Speed	430 Kn.	at	11,400	r. p. m. with	b. hp. (91 % rated)

2. Optimum Range and Endurance with 3,100 gal fuel and 0 lb. bombs.

At High Speed	miles at		mi./gal. or		hrs. at		gal./hr. (s. f. c.)
At Operating Speed	miles at		mi./gal. or		hrs. at		gal./hr. (s. f. c.)
At Cruising Speed	1,891 KN	miles at	.61	mi./gal. or	4.4	hrs. at	705 gal./hr. (s. f. c.)

3. Practical Range and Endurance with gal. fuel and lb. bombs.

At Operating Speed	miles at		mi./gal. or		hrs. at		gal./hr. (s. f. c.)
At Cruising Speed	miles at		mi./gal. or		hrs. at		gal./hr. (s. f. c.)

4. Climb Data with Gross Weight of 39,200 lb.

Standard Altitude	ft.	S. L.	10,000	20,000	30,000	35,000	
Climbing Speed		343 Kn.	359 Kn.	375 Kn.	387 Kn.	391 Kn.	
Engine Speed	r. p. m.	12,500	12,500	12,500	12,500	12,500	
Total Power	b. hp.						
Maximum Rate	f. p. m.	5,500	4,260	3,200	2,000	1,400	
Minimum Time	min.	0	2.	4.5	8.4	11.4	

5. Ceiling: Normal Engine Operation: Service Ceiling 45,500 ft. Absolute Ceiling 47,000 ft.

6. Take-off and Landing Distances—To Clear 50 ft. Obstacle at Sea Level (no wind).

Take-off	3,750	ft. at	113	m. p. h.	35	deg. flap.	Gr. Wt. 39,000 lb.	Ground run 2,750 ft.
Land	No Data	ft. at		m. p. h.		deg. flap.	Gr. Wt. lb.	Ground run ft.

7. References and Remarks:

Data taken from Air Materiel Command Memo Report MCRFT-2183 dated 15 February 1949, "Performance Flight Tests on the XF-87 Airplane, USAF No. 45-59600."

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EXHIBITS
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POSITION

EXHIBITS

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CONVERSION TABLE

NAUTICAL TO STATUTE MILES
STATUTE TO NAUTICAL MILES

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NAUTICAL TO STATUTE MILES CONVERSION TABLE

N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S
1000	1152	2000	2303	3000	3455	4000	4606	5000	5758	6000	6909	7000	8061	8000	9212	9000	10364
1010	1163	2010	2315	3010	3466	4010	4618	5010	5769	6010	6921	7010	8072	8010	9224	9010	10375
1020	1175	2020	2326	3020	3478	4020	4629	5020	5781	6020	6932	7020	8084	8020	9235	9020	10387
1030	1186	2030	2338	3030	3489	4030	4641	5030	5792	6030	6944	7030	8095	8030	9247	9030	10398
1040	1198	2040	2349	3040	3501	4040	4652	5040	5804	6040	6955	7040	8107	8040	9258	9040	10410
1050	1209	2050	2361	3050	3512	4050	4664	5050	5815	6050	6967	7050	8118	8050	9270	9050	10421
1060	1221	2060	2372	3060	3524	4060	4675	5060	5827	6060	6978	7060	8130	8060	9281	9060	10433
1070	1232	2070	2384	3070	3535	4070	4687	5070	5838	6070	6990	7070	8141	8070	9293	9070	10444
1080	1244	2080	2395	3080	3547	4080	4698	5080	5850	6080	7001	7080	8153	8080	9304	9080	10456
1090	1255	2090	2407	3090	3558	4090	4710	5090	5861	6090	7013	7090	8164	8090	9316	9090	10467
1100	1267	2100	2418	3100	3570	4100	4721	5100	5873	6100	7024	7100	8176	8100	9327	9100	10479
1110	1278	2110	2430	3110	3581	4110	4733	5110	5884	6110	7036	7110	8187	8110	9339	9110	10490
1120	1290	2120	2441	3120	3593	4120	4744	5120	5896	6120	7047	7120	8199	8120	9350	9120	10502
1130	1301	2130	2453	3130	3604	4130	4756	5130	5907	6130	7059	7130	8210	8130	9362	9130	10513
1140	1313	2140	2464	3140	3616	4140	4767	5140	5919	6140	7070	7140	8222	8140	9373	9140	10525
1150	1324	2150	2476	3150	3627	4150	4779	5150	5930	6150	7082	7150	8233	8150	9385	9150	10536
1160	1336	2160	2487	3160	3639	4160	4790	5160	5942	6160	7093	7160	8245	8160	9396	9160	10548
1170	1347	2170	2499	3170	3650	4170	4802	5170	5953	6170	7105	7170	8256	8170	9408	9170	10559
1180	1359	2180	2510	3180	3662	4180	4813	5180	5965	6180	7116	7180	8268	8180	9419	9180	10571
1190	1370	2190	2522	3190	3673	4190	4825	5190	5976	6190	7128	7190	8279	8190	9431	9190	10582
1200	1382	2200	2533	3200	3685	4200	4836	5200	5988	6200	7139	7200	8291	8200	9442	9200	10594
1210	1393	2210	2545	3210	3696	4210	4848	5210	5999	6210	7151	7210	8302	8210	9454	9210	10605
1220	1405	2220	2556	3220	3708	4220	4859	5220	6011	6220	7162	7220	8314	8220	9465	9220	10617
1230	1416	2230	2568	3230	3719	4230	4871	5230	6022	6230	7174	7230	8325	8230	9477	9230	10628
1240	1428	2240	2579	3240	3731	4240	4882	5240	6034	6240	7185	7240	8337	8240	9488	9240	10640
1250	1439	2250	2591	3250	3742	4250	4894	5250	6045	6250	7197	7250	8348	8250	9500	9250	10651
1260	1451	2260	2602	3260	3754	4260	4905	5260	6057	6260	7208	7260	8360	8260	9511	9260	10663
1270	1462	2270	2614	3270	3765	4270	4917	5270	6068	6270	7220	7270	8371	8270	9523	9270	10674
1280	1474	2280	2625	3280	3777	4280	4928	5280	6080	6280	7231	7280	8383	8280	9534	9280	10686
1290	1485	2290	2637	3290	3788	4290	4940	5290	6091	6290	7243	7290	8394	8290	9546	9290	10697
1300	1497	2300	2648	3300	3800	4300	4951	5300	6103	6300	7254	7300	8406	8300	9557	9300	10709
1310	1508	2310	2660	3310	3811	4310	4963	5310	6114	6310	7266	7310	8417	8310	9569	9310	10720
1320	1520	2320	2671	3320	3823	4320	4974	5320	6126	6320	7277	7320	8429	8320	9580	9320	10732
1330	1531	2330	2683	3330	3834	4330	4986	5330	6137	6330	7289	7330	8440	8330	9592	9330	10743
1340	1543	2340	2695	3340	3846	4340	4998	5340	6149	6340	7301	7340	8452	8340	9604	9340	10755
1350	1555	2350	2706	3350	3858	4350	5009	5350	6161	6350	7312	7350	8464	8350	9615	9350	10767
1360	1566	2360	2718	3360	3869	4360	5021	5360	6172	6360	7324	7360	8475	8360	9627	9360	10778
1370	1578	2370	2729	3370	3881	4370	5032	5370	6184	6370	7335	7370	8487	8370	9638	9370	10790
1380	1589	2380	2741	3380	3892	4380	5044	5380	6195	6380	7347	7380	8498	8380	9650	9380	10801
1390	1601	2390	2752	3390	3904	4390	5055	5390	6207	6390	7358	7390	8510	8390	9661	9390	10813
1400	1612	2400	2764	3400	3915	4400	5067	5400	6218	6400	7370	7400	8521	8400	9673	9400	10824
1410	1624	2410	2775	3410	3927	4410	5078	5410	6230	6410	7381	7410	8533	8410	9684	9410	10836
1420	1635	2420	2787	3420	3938	4420	5090	5420	6241	6420	7393	7420	8544	8420	9696	9420	10847
1430	1647	2430	2798	3430	3950	4430	5101	5430	6253	6430	7404	7430	8556	8430	9707	9430	10859
1440	1658	2440	2810	3440	3961	4440	5113	5440	6264	6440	7416	7440	8567	8440	9719	9440	10870
1450	1670	2450	2821	3450	3973	4450	5124	5450	6276	6450	7427	7450	8579	8450	9730	9450	10882
1460	1681	2460	2833	3460	3984	4460	5136	[illegible]	6287	6460	7439	7460	8590	8460	9742	9460	10893
1470	1693	2470	2844	3470	3996	4470	5147	5470	6299	6470	7450	7470	8602	8470	9753	9470	10905
1480	1704	2480	2856	3480	4007	4480	5159	5480	6310	6480	7462	7480	8613	8480	9765	9480	10916
1490	1716	[illegible]	[illegible]	3490	4019	4490	[illegible]70	5490	6322	6490	7473	7490	8625	8490	9776	9490	10928
1500	1727	2500	2879	3500	4030	4500	5182	5500	6333	6500	7485	7500	8636	8500	9788	9500	10939
1510	1739	2510	2890	3510	4042	4510	5193	5510	6345	6510	7496	7510	8648	8510	9799	9510	10951
1520	1739	2520	2902	3520	4053	4520	5205	5520	6356	6520	7509	7520	8659	8520	9811	9520	10962
1530	1762	2530	2913	3530	4065	4530	5216	5530	6368	6530	7519	7530	8671	8530	9822	9530	10974
1540	1773	2540	2925	3540	4076	4540	5228	5540	6379	6540	7531	7540	8682	8540	9834	9540	10985
1550	1785	2550	2963	3550	4088	4550	5239	5550	6391	6550	7542	7550	8694	8550	9845	9550	10997
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1570	1808	2570	2959	3570	4111	4570	5262	5570	6414	6570	7565	7570	8717	8570	9868	9570	11020
1580	1819	2580	2971	3580	4122	4580	5274	5580	6425	6580	7577	7580	8728	8580	9880	9580	11031
1590	1831	2590	2982	3590	4134	4590	5285	5590	6437	6590	7588	7590	8740	8590	9891	9590	11043
1600	1842	2600	2994	3600	4145	4600	5297	5600	6448	6600	7600	7600	8751	8600	9903	9600	11054
1610	1854	2610	3005	3610	4157	4610	5308	5610	6460	6610	7611	7610	8763	8610	9914	9610	11066
1620	1865	2620	3017	3620	4168	4620	5320	5620	6471	6620	7623	7620	8774	8620	9926	9620	11077
1630	1877	2630	3028	3630	4180	4630	5331	5630	6483	6630	7634	7630	8786	8630	9937	9630	11089
1640	1888	2640	3040	3640	4191	4640	5343	5640	6494	6640	7646	7640	8797	8640	9949	9640	11100
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1660	1911	2660	3063	3660	4214	4660	5365	5660	6517	6660	7669	7660	8820	8660	9972	9660	11123
1670	1923	2670	3075	3670	4226	4670	5378	5670	6529	6670	7681	7670	8832	8670	9984	9670	11135
1680	1935	2680	3086	3680	4238	4680	5389	5680	6541	6680	7692	7680	8844	8680	9995	9680	11147
1690	1945	2690	3098	3690	4249	4690	5401	5690	6552	6690	7704	7690	8855	8690	10007	9690	11158
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1710	1969	2710	3121	3710	4272	4710	5424	5710	6575	6710	7727	7710	8878	8710	10030	9710	11181
1720	1981	2720	3132	3720	4284	4720	5435	5720	6587	6720	7738	7720	8890	8720	10041	9720	11193
1730	1992	2730	3144	3730	4295	4730	5447	5730	6598	6730	7750	7730	8901	8730	10053	9735	11204
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1750	2015	2750	3167	3750	4318	4750	5470	5750	6621	6750	7773	7750	8924	8750	10076	9750	11227
1760	2027	2760	3178	3760	4330	4760	5481	5760	6633	6760	7784	7760	8936	8760	10087	9760	11239
1770	2038	2770	3190	3770	4341	4770	5493	5770	6644	6770	7796	7770	8947	8770	10099	9770	11250
1780	2050	2780	3201	3780	4353	4780	5504	5780	6656	6780	7807	7780	8959	8780	10110	9780	11262
1790	2061	2790	3213	3790	4364	4790	5516	5790	6667	6790	7819	7790	8970	8790	10122	9790	11273
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1870	2153	2870	3305	3870	4456	4870	5608	5870	6759	6870	7911	7880	9062	8870	10214	9870	11365
1880	2165	2880	3316	3880	4468	4880	5619	5880	6771	6880	7922	7880	9074	8880	10225	9880	11377
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1910	2199	2910	3351	3910	4502	4910	5654	5910	6805	6910	7957	7910	9108	8910	10260	9910	11411
1920	2211	2920	3362	3920	4514	4920	5665	5920	6817	6920	7968	7920	9120	8920	10271	9920	11423
1930	2222	2930	3374	3930	4525	4930	5677	5930	6828	6930	7980	7930	9131	8930	10283	9930	11434
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1950	2245	2950	3397	3950	4548	4950	5700	5950	6851	6950	8003	7950	9154	8950	10306	9950	11457
1960	2257	2960	3408	3960	4560	4960	5711	5960	6863	6960	8014	7960	9166	8960	10317	9960	11469
1970	2268	2970	3420	3970	4571	4970	5723	5970	6874	6970	8026	7970	9177	8970	10329	9970	11480
1980	2280	2980	3431	3980	4583	4980	5734	5980	6886	6980	8037	7980	9189	8980	10340	9980	11492
1990	2291	2990	3443	3990	4594	4990	5746	5990	6897	6990	8049	7990	9200	8990	10352	9990	11503

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STATUTE TO NAUTICAL MILES CONVERSION TABLE

S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N
1000	868	2000	1737	3000	2605	4000	3474	5000	4342	6000	5210	7000	60.3	8000	6947	9000	7816
1010	877	2010	1745	3010	2614	4010	3482	5010	4350	6010	5219	7010	6087	8010	6955	9010	7824
1020	886	2020	1754	3020	2623	4020	3491	5020	4359	6020	5228	7020	6096	8020	6965	9020	7833
1030	894	2030	1763	3030	2631	4030	3480	5030	4368	6030	5236	7030	6105	8030	6973	9030	7842
1040	903	2040	1772	3040	2640	4040	3508	5040	4377	6040	5245	7040	6114	8040	6982	9040	7850
1050	912	2050	1780	3050	2649	4050	3517	5050	4385	6050	5254	7050	6122	8050	6991	9050	7859
1060	921	2060	1789	3060	2657	4060	3526	5060	4394	6060	5263	7060	6131	8060	6990	9060	7868
1070	929	2070	1798	3070	2666	4070	3534	5070	4403	6070	5271	7070	6140	8070	7008	9070	7876
1080	938	2080	1806	3080	2675	4080	3543	5080	4411	6080	5280	7080	6148	8080	7017	9080	7885
1090	947	2090	1815	3090	2683	4090	3552	5090	4420	6090	5289	7090	6157	8090	7025	9090	7894
1100	955	2100	1824	3100	2692	4100	3560	5100	4429	6100	5297	7100	6166	8100	7034	9100	7902
1110	964	2110	1832	3110	2701	4110	3569	5110	4438	6110	5306	7110	6174	8110	7043	9110	7911
1120	973	2120	1841	3120	2709	4120	3578	5120	4446	6120	5315	7120	6183	8120	7051	9120	7920
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1140	990	2140	1858	3140	2727	4140	3595	5140	4464	6140	5332	7140	6200	8140	7069	9140	7937
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1170	1020	2170	1884	3170	2753	4170	3622	5170	4490	6170	5358	7170	6226	8170	7095	9170	7963
1180	1020	2180	1893	3180	2762	4180	3630	5180	4498	6180	5367	7180	6235	8180	7104	9180	7972
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1210	1050	2210	1919	3210	2788	4210	3656	5210	4524	6210	5393	7210	6261	8210	7130	9210	7998
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1250	1090	2250	1954	3250	2822	4250	3691	5250	4559	6250	5428	7250	6296	8250	7164	9250	8033
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1310	1140	2310	2006	3310	2874	4310	3743	5310	4611	6310	5480	7310	6348	8310	7216	9310	8084
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1370	1190	2370	2058	3370	2927	4370	3795	5370	4663	6370	5532	7370	6400	8370	7269	9370	8137
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1490	1294	2490	2162	3490	3031	4490	3899	5490	4768	6490	5636	7490	6504	8490	7373	9490	8241
1500	1303	2500	2171	3500	3039	4500	3908	5500	4776	6500	5645	7500	6513	8500	7381	9500	8250
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1680	1459	2680	2327	3680	3196	4680	4064	5680	4933	6680	5801	7680	6669	8680	7538	9680	8406
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1780	1546	2780	2414	3780	3283	4780	4151	5780	5019	6780	5887	7780	6756	8780	7625	9780	8493
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1900	1650	2900	2518	3900	3387	4900	4255	5900	5124	6900	5992	7900	6860	8900	7729	9900	8597
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1920	1667	2920	2536	3920	3404	4920	4273	5920	5141	6920	6009	7920	6878	8920	7746	9920	8615
1930	1676	2930	2544	3930	3413	4930	4281	5930	5150	6930	6018	7930	6886	8930	7755	9930	8623
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1950	1693	2950	2562	3950	3430	4950	4299	5950	5167	6950	6035	7950	6904	8950	7772	9950	8641
1960	1702	2960	2570	3960	3439	4960	4307	5960	5176	6960	6044	7960	6912	8960	7781	9960	8649
1970	1711	2970	2579	3970	3448	4970	4316	5970	5184	6970	6053	7970	6921	8970	7790	9970	8658
1980	1719	2980	2588	3980	3456	4980	4325	5980	5193	6980	6061	7980	6930	8980	7798	9980	8667
1990	1728	2990	2597	3990	3465	4990	4333	5990	5202	6990	6070	7990	6939	8990	7807	9990	8675

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SERIAL NO.

Mat. Div. A.C.-WC-Wright Field 10-25-39-1M

APPENDIX I (cont'd)

DESRIPTION OF ARMAMENT

Airplane Model XF-87 Mfr. Model Spec. 5966 Date 15 November 1948

DESCRIPTION OF ARMAMENT

No.	Type	Cal.	Rds. ea.	Location
No armament installation on either "X" airplane.				
Fire control system consisting of a 4 x 20 MM turret with 20 sec. ammo. per gun and automatically aimed and fired by radar under separate development for this and other airplanes.				

Gun Sight Type and Location. A-1B located in front of pilot.

NORMAL BOMBS (Wt. 1,000 lbs.)

Sta.	Location	N	Size	Type	Bomb Bay Tank
A	Wing Tips	2	1000 lb. or smaller	G.P.	or gals
B					or gals
C					or gals
D					or gals
E					or gals
F					or gals

ALTERNATE BOMBS (Max. Wt. lbs.)

Sta.	No.	Size	Type	No.	Size	Type	No.	Size	Type	No.	Size	Type
A			or			or			or			
B			or						or			
C			or			or			or			
D			or						or			
E			or						or			
F			or						or			

Bomb Sight Type and Location

CHEMICALS (Smoke)

Type Tank

Amount None

Location

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PERFORMANCE OR PRODUCTION PERFORMANCE CHARACTERISTICS

FLIGHT DATA BRANCH

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Type All Weather Fighter — Model MX-745

Contractor Curtiss — Contract No. AC-6266

ENGINE(S)

No. of engines Four — Make & model J-34 Westinghouse

Supercharger
Make —
Diam. — Gear Ratio —

Engine Ratings	Altitude (Feet or P.S.I.)	R.P.M. (max.)	Rating
Take-off	3000	12,500	S.L. Static
Military	3000	12,500	S.L. Static
Normal	2430	11,000	S.L. Static
Max. emergency	—	—	—

PROPELLER(S)

Make & Model —

Speed in level flight	R.P.M. (max.)	Alt. (feet)	Horsepower S.H.P.
High speed, normal	599 (520)	S.L.	12,000 #
High speed, military	599 (520)	S.L.	12,000 #

Rate of climb	R.P.M.	Alt. (feet)	H.P.
Normal	—	—	—
Military power	3000	20,000	38,866
War emergency power	—	—	—

Time to climb	R.P.M.	Alt. (feet)	H.P.
Normal	—	—	—
Military power	5	20,000	38,866
War emergency power	—	—	—

TABLE OF WEIGHTS AND USEFUL LOADS

	Number of Active Engines (Normal Rating)	Fuel Load (lbs. or gals.)	Oil (lbs. or gals.)	Military Load (lbs.)	Target Weight (lbs.)
Condition					
Ref.	—	—	—	—	—
Alt.	870 @ 49,687 #	391	0	3133	35,000 —
Service Ceiling	—	—	—	—	—
Normal	—	—	—	—	—
Military	41,000	—		38,866	

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	Take-off & L.D. over 50' obst.	Take-off (lbs.)	Landings (lbs.)
Design Gr. Wt.		28,566	
Alt. Gr. Wt.		19,667	

WEIGHTS

Item	Design	Maximum	Target
Gross lb.	28,566		
Wg. ldg. (#/sq. ')	61.0		
Pow ldg. (#/# thr. or B.H.P.)	3.24		
Tire ldg. (Foot Print, #/sq. ')			
Limited Maneuverable Load Factor			
Wt. V	27,288		

DIMENSIONS

Span	60.0'	Dihedral	1°	M.A.C.	
Height	20.5'	Length	65.6'	Root Chord	14.0'
W. Area	685	Tread	20.0'	Sweep Back	0°

OIL

Capacity 120 Gal. Spec. A.A.F. Spec. 3065

FUEL

Design 133 Built-in 133 Maximum 233 Spec. AN-F-28

CREW

Normal Two (Pilot & Radar Observer) Alternate

RADIO AND RADAR

AN/ARC-3	Command Set	AN/ARR-2A	Glide Path Receiver
AN/ARN-6	Radio Compass	AN/APN-1	Altimeter
AN/APX-2A	Marker Beacon	AN/APX-6A	I.F.F.
AN-104A	Localizer Receiver	AN/ARC-11	Control Beacon
		AN/APG-3	Gun Laying

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ARMAMENT

Guns and Cannons	No.	Cal.	Type & Location	Rds. per gun
Normal	4	20 mm	Nose, Turret	270
Alternate				

Bombs	Loading lbs.	Alternate Load (No. & Size)
Design	2000	2 x 1000
Max. tot.	2	2 x 500
Max. size	1000	2 x 250

Rockets — No. & Size: None

SPECIAL FEATURES

Retractable Leading Edge Slats
Split Dive Flaps
Pressurized Cabin
Crew Ejection Seats

Self-Sealing Fuel Tanks Are Located in Fuselage
Underslung Drop Tanks
Afterburning available Fort. O. and War Emergency Power

ADDITIONAL INFORMATION

Information requested by Historical Office, AMC — Date 24 June 1949
Information furnished by: Flight Data Branch, MCREOA-9 — Date 27 June 1949

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NEWSPAPER CLIPPINGS

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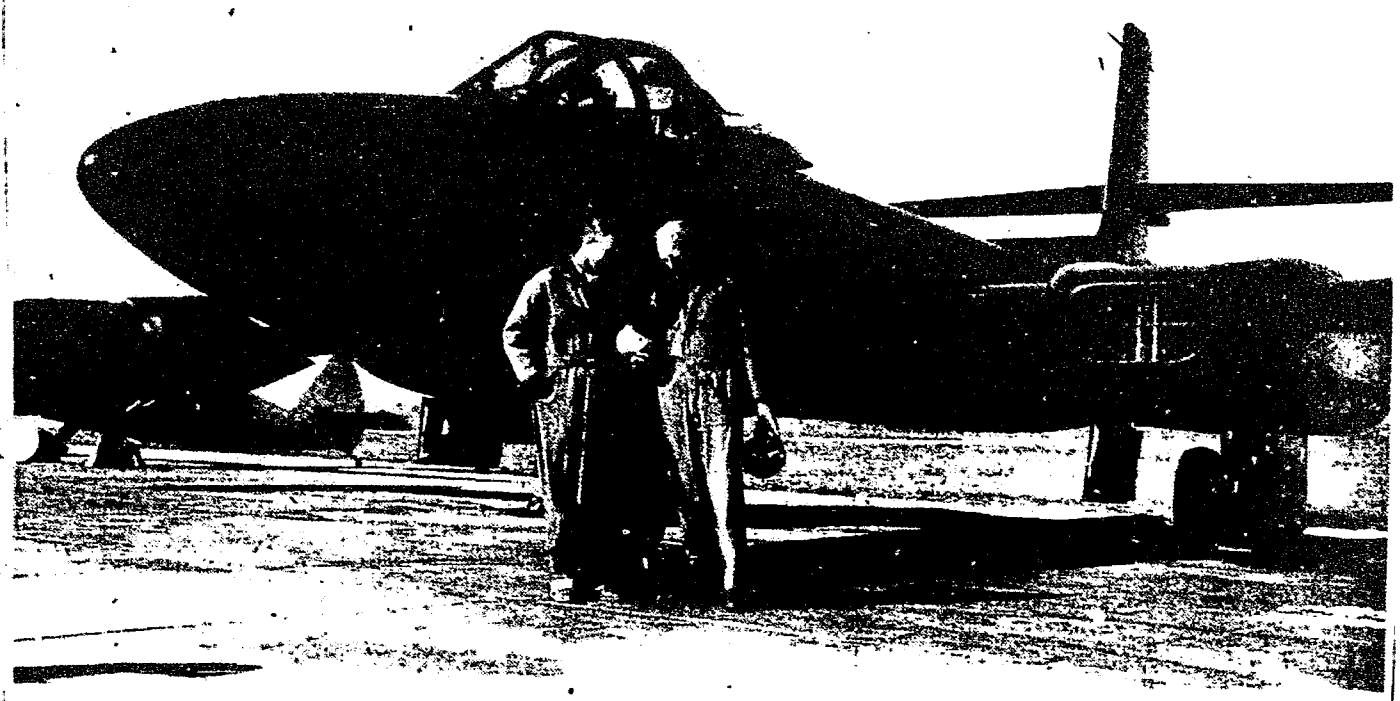
DAYTON DAILY NEWS, DAYTON, OHIO, OCTOBER 14, 1948

New Bomber-Size Jet Fighter Reaches Field After Flight From Oklahoma



MILTON KISKA (left), flight engineer, and B. L. Miller, pilot, stand before the Curtiss XF-87 "Blackhawk," new jet fighter, which made its first appearance at Wright Field, Thursday.

A jet fighter whose size compares more favorably with a light bomber, made its first appearance at Air Materiel Command headquarters, Thursday morning.

It was the XF-87, a four-engined jet propelled, all-weather fighter produced by the Curtiss-Wright Corp., at Columbus. Wright Field was the terminus of the plane's first cross-country flight—from Muroc, Cal., to Dayton via Oklahoma City.

Early last spring, the XF-87 made the trip from Columbus to Muroc, Cal., but not under its own power. Instead, it was crated; placed aboard a truck and given a military escort. The initial part of the truck trip was marred when the rudder failed to clear a railroad underpass just west of Columbus.

* * *

THE RETURN flight was much speedier and uneventful. B. Lee Miller, a Curtiss-Wright test pilot, was at the controls. The Oklahoma City-Dayton leg of the return flight—a distance of approximately 690 air miles—was made in one hour, 55 minutes, for an average of 360 miles per hour. The stop at Tinker Air Base in Oklahoma City was for refueling purposes.

Miller was accompanied on the flight by Milton Kiska, flight test engineer for the aircraft company. Miller said the plane handled beautifully on the flight. He refused any details on flight performance, but said the hop was made at altitudes varying from 25,000 to 31,000 feet.

The "Blackhawk" as the plane has been dubbed by its manufacturer, is designed to operate in the 600 mile per hour speed class. It's gross weight compares favorably, however, with that of the B-17 (gross weight of the B-17 was approximately 22 tons.) It has a wing span of approximately 60 feet and an over-all length of about 65 feet. Its range is 1500 miles.

Air Force officials said the XF-87 is capable of operating under the most extreme weather conditions as a result of the power potential in four Westinghouse 240-jet engines. Two jet engines are housed in single nacelles on each wing.

* * *

AIR FORCE flight tests on the Blackhawk were completed recently at Muroc—in record time—with Maj. R. L. Johnson, test pilot for the AMC's flight division at the controls. Nine days were required for the intensive test program. During that time, the plane made 19 flights for a total of 12 hours and 58 minutes.

It is believed that this is the fastest flight test phase ever conducted by the AF at the Muroc base.

Further flight testing will be carried on for the next few weeks at Wright Field. After those tests are completed, the plane will be flown to Columbus for factory inspection.

News Staff Photo by Paul Hoge

THE JET-BLACK, newest jet fighter of the Air Force—the XF-87—as it made high speed pass over Wright Field on its arrival there Thursday morning.

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PHOTOGRAPHS

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Mock-Up of the Curtiss-Wright XP-87

All-Weather Fighter Airplane

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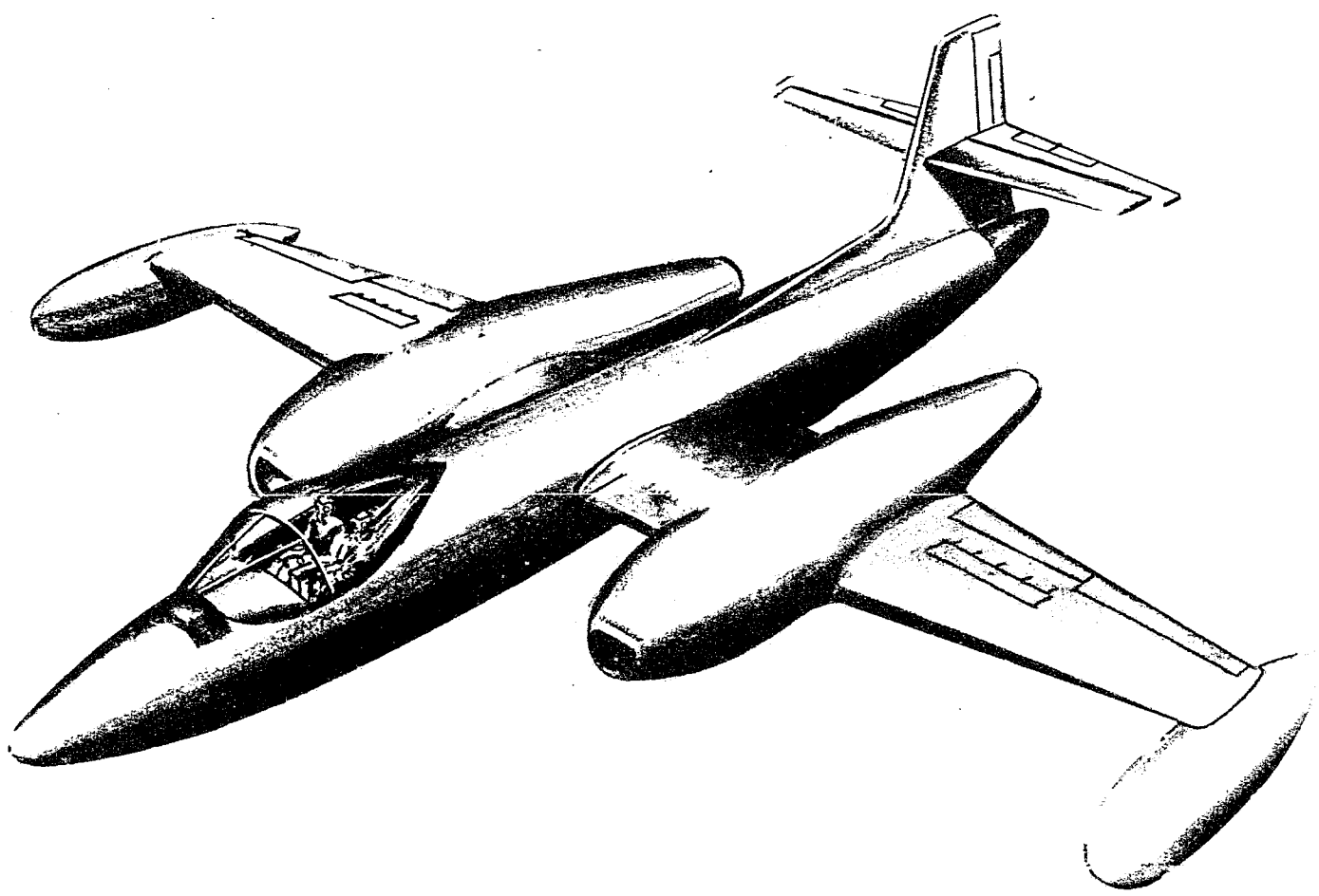

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Curtiss-Wright XP-87 All-Weather Fighter Airplane

In Flight

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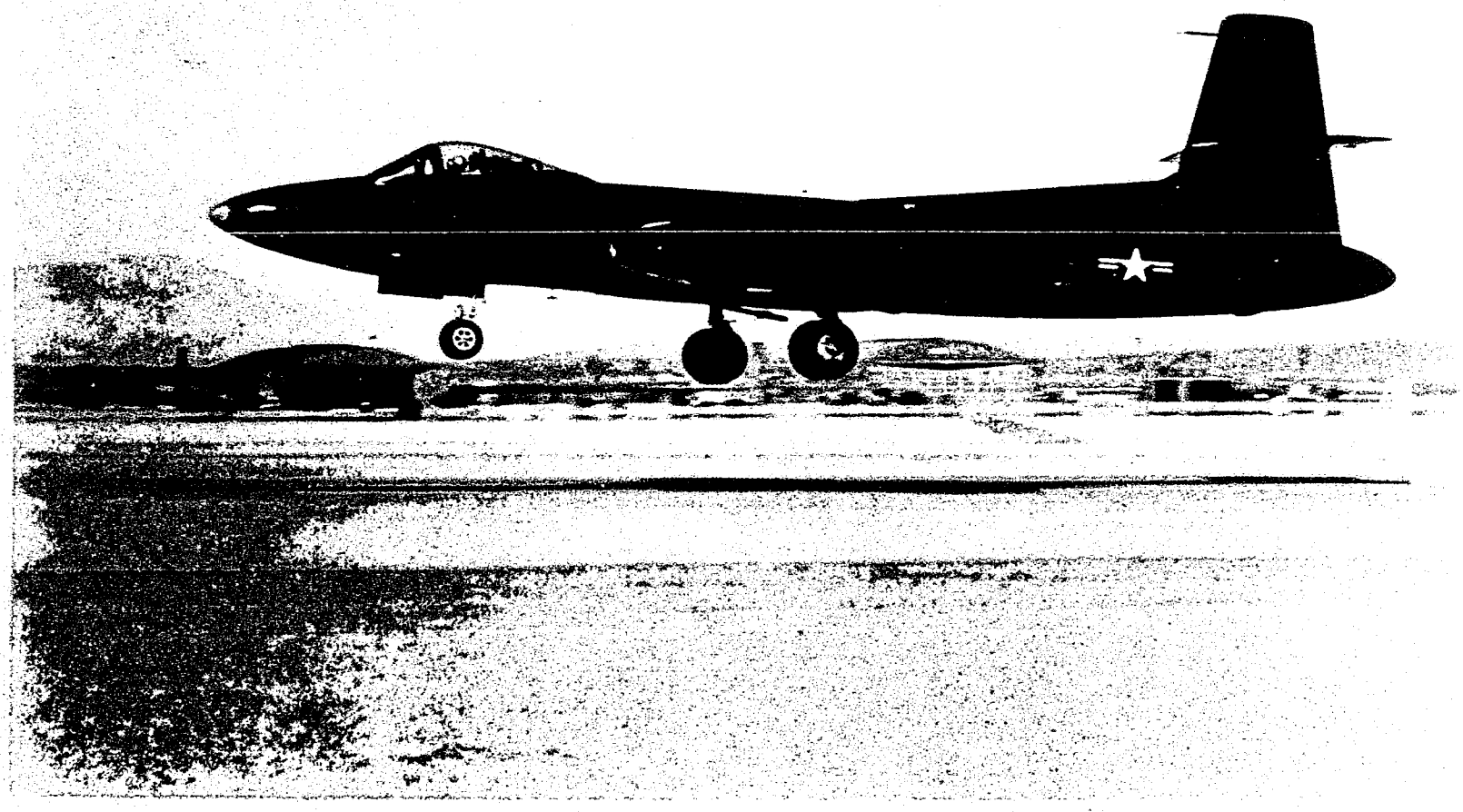

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Curtiss-Wright XF-87 All-Weather Fighter Airplane

Front View

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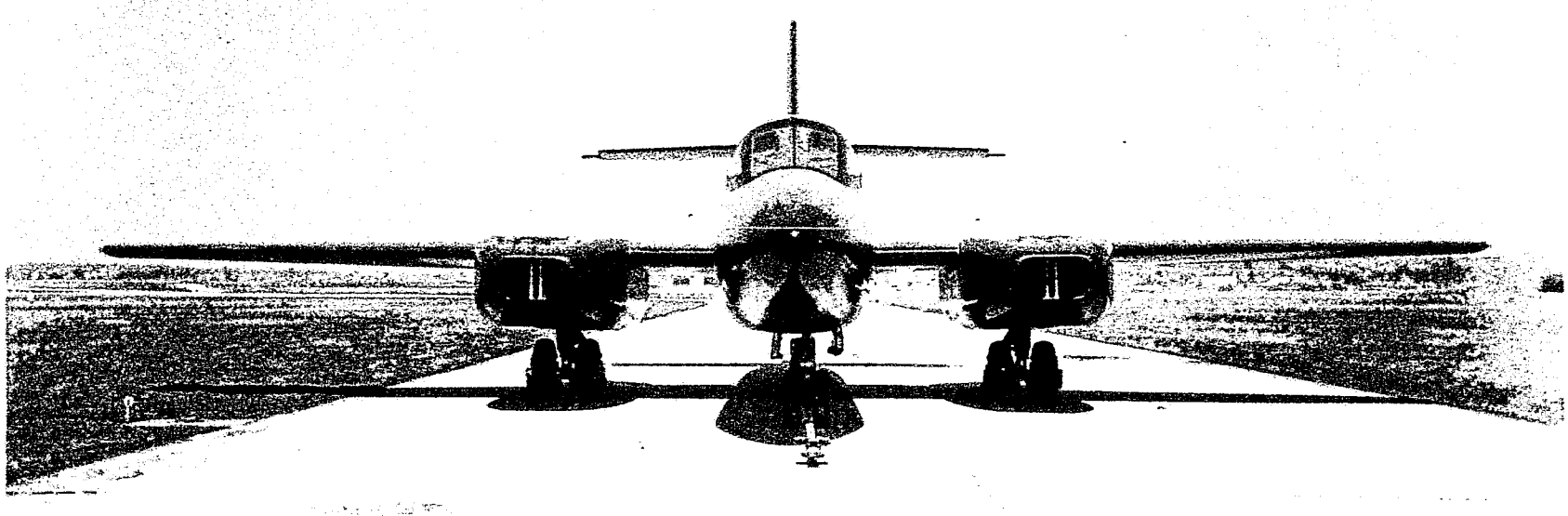

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Curtiss-Wright XF-87 All-Weather Fighter Airplane

Rear View

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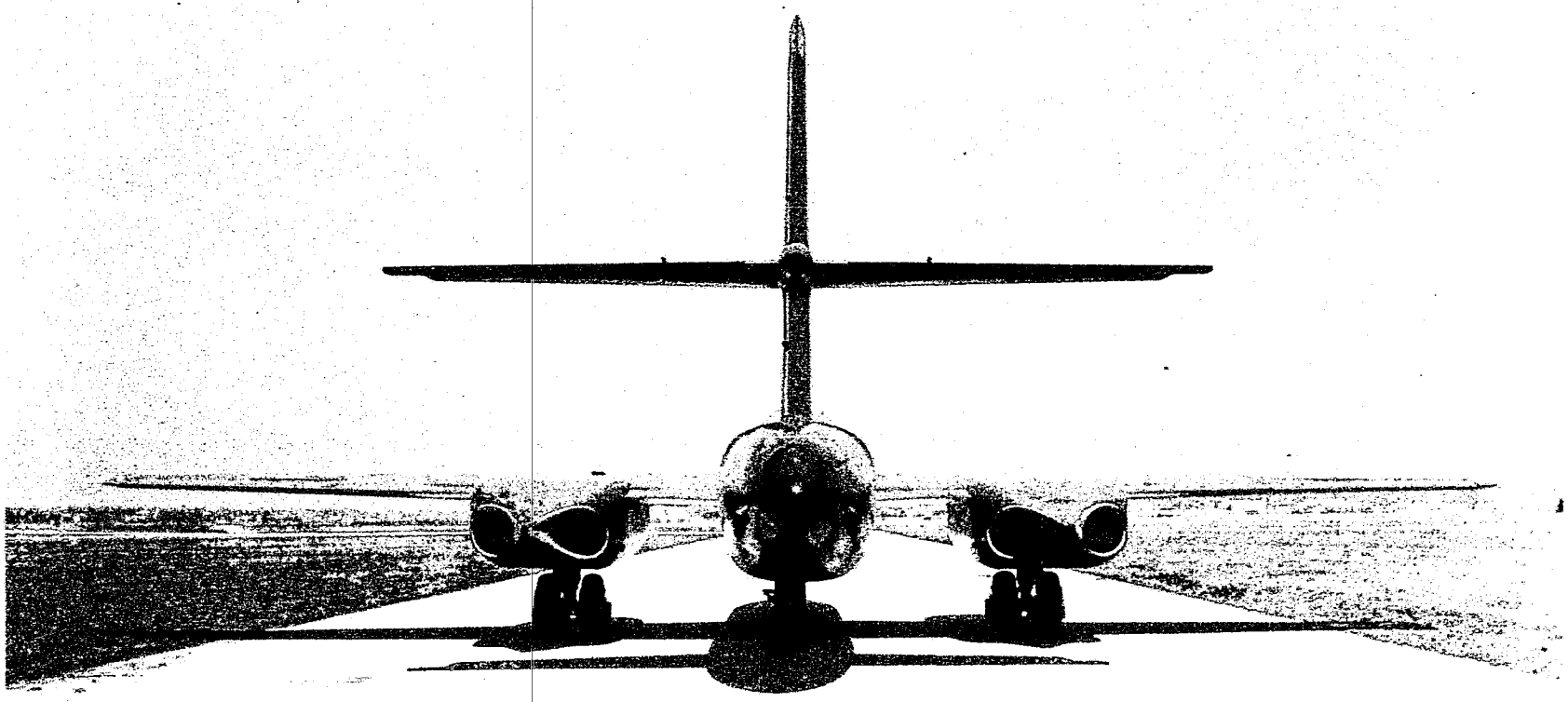

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Curtiss-Wright XF-87 All-Weather Fighter Airplane

Right Side View

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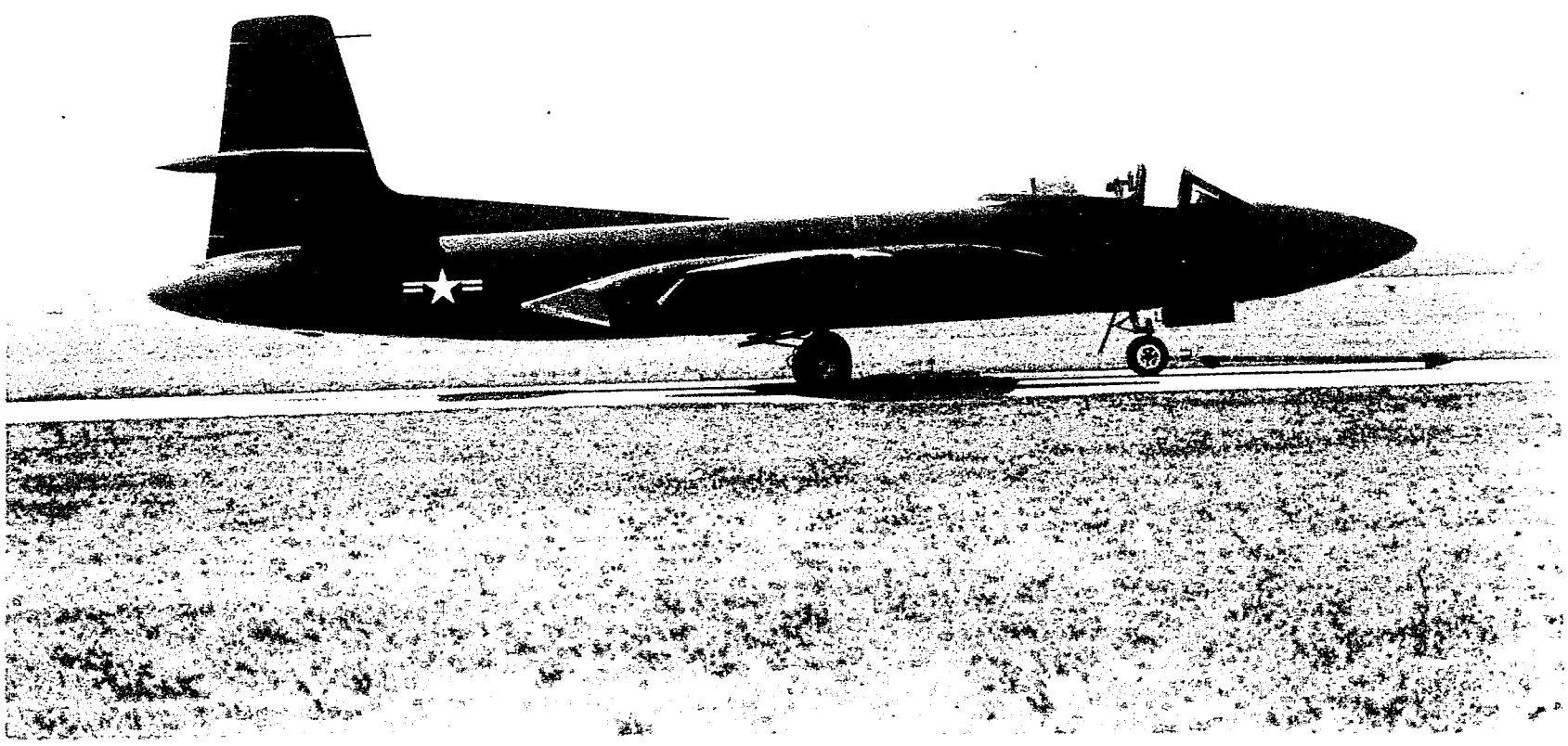

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202.1-46
Vol I
March 1950

CASE HISTORY OF THE T-31 TRAINER

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202.1-45
Vol I
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CASE HISTORY OF

THE T-31 TRAINER

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CASE HISTORY OF

THE T-31 TRAINER

Prepared by
Historical Office
Executive Secretariat
Air Materiel Command
Wright-Patterson Air Force Base
March 1950

By

Amy C. Fenwick
Historian

Prepared under provisions of AF Regulation No. 210-3 as a part of the USAF Historical Program.

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Glossary of Abbreviations*

Actg.	Acting
Actg. Chief	Acting Chief
Add.	Addendum
Adj.	Adjutant
AG	Adjutant General
AGO	Adjutant General's Office
Admin.	Administration
Admin. Sect.	Administration Section
Admin.	Administrative
Admr.	Administrator
Adm.	Admiral
Aero. Bd.	Aeronautical Board
Aero. Equip. Br.	Aeronautical Equipment Branch
Aero. Med. Lab.	Aeronautical Medical Laboratory
Agree.	Agreement
AAG	Air Adjutant General
Air Chem. Officer	Air Chemical Officer
Air Commun. Officer	Air Communications Officer
AC	Air Corps
ACFR	Air Corps Factory Representative
Air Crew Tng. Div.	Air Crew Training Division
ADC	Air Defense Command
Air Docs. Div.	Air Documents Division
ADRC	Air Documents Research Center (London)
Air Engr.	Air Engineer
Air Eng. Dvlpmt. Center	Air Engineering Development Center
AI	Air Inspector
A.I.R. Div.	Air Intelligence Requirements Division
AJA	Air Judge Advocate
AMA	Air Materiel Area
AMC	Air Materiel Command
ANG	Air National Guard
Air Ord. Officer	Air Ordnance Officer
APG	Air Proving Ground
APGC	Air Proving Ground Command
Air QM	Air Quartermaster
ARC	Air Reserve Corps
AS	Air Service
ASC	Air Service Command
Air Serv. Div.	Air Service Division
ATC	Air Training Command
ATI	Air Technical Index
Air Tech. Intell.	Air Technical Intelligence

* A list of special abbreviations used only in this history is appended to this glossary.

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ATIG	Air Technical Intelligence Group
ATLO	Air Technical Liaison Officer
ATSC (E)	Air Technical Service Command (Europe)
ATC	Air Transport Command
Air Trans. Div.	Air Transport Division
AU	Air University
Airborne Com.	Airborne Command
Airc.	Aircraft
Airc. Component Req. Br.	Aircraft Component Requirements Branch
Airc. Components Br.	Aircraft Components Branch
Airc. Lab.	Aircraft Laboratory
Airc. Mod. Br.	Aircraft Modification Branch
Airc. Proc. Br.	Aircraft Procurement Branch
Airc. Proj. Sect.	Aircraft Projects Section
Airc. Radio Lab.	Aircraft Radio Laboratory
ARCO	Aircraft Resources Control Office
ASU	Aircraft Scheduling Unit
Alloc.	Allocations
alum.	aluminum
amend.	amendment
AFL	American Federation of Labor
ASA	American Standards Association
amp.	ampere
Anal.	Analysis
Anal. Div.	Analysis Division
approx.	approximately
ADTIC	Arctic, Desert, and Tropic Information Center
Arm.	Armament
Arm. Lab.	Armament Laboratory
AAC	Army Air Corps
AAF	Army Air Forces
AAF Bd.	Army Air Forces Board
AAF CF	Army Air Forces Central Files
AAFIT	Army Air Forces Institute of Technology
AAFPR	Army Air Forces Plant Representative
AAFPFO	Army Air Forces Procurement Field Office
AAFRR	Army Air Forces Resident Representative
AAF Tact. Center	Army Air Forces Tactical Center
AAFTB	Army Air Forces Technical Base
AACS	Army Airways Communications System
AFF	Army Field Forces
AGF	Army Ground Forces
ANB Stdz. Br.	Army-Navy-British Standardization Branch
AN Mun. Bd.	Army-Navy Munitions Board
AN Pet. Bd.	Army-Navy Petroleum Board
AN Stds. Br.	Army-Navy Standards Branch
AR	Army Regulation

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ASF	Army Service Forces
assy.	assembly
Asst.	Assistant
AC/AS, Intell.	Assistant Chief of Air Staff, Intelligence
AC/AS, MM&D	Assistant Chief of Air Staff, Materiel, Maintenance, and Distribution
AC/AS, OC&R	Assistant Chief of Air Staff, Operations, Commitments, and Requirements
AC/AS, Pers.	Assistant Chief of Air Staff, Personnel
AC/AS, Plans	Assistant Chief of Air Staff, Plans
AC/AS, Tng.	Assistant Chief of Air Staff, Training
Asst. Secy. War	Assistant Secretary of War
Asst. Secy. War (Air)	Assistant Secretary of War for Air
Assoc.	Association
AOAMD	Atlantic Overseas Air Materiel District
AEC	Atomic Energy Commission
attach.	attachment
attn.	attention
ADP	Authority for District Purchase
AFP	Authority for Purchase
aux.	auxiliary
Avn.	Aviation
Avn. Ord. Eng. Office	Aviation Ordnance Engineering Office
Base Tng. Units	Base Training Units
B/L	bill of lading
Bd.	Board
Bomb.	Bombardment
Bomb. Br.	Bombardment Branch
bhp	brake horsepower
Br.	Branch
BAC	British Air Commission
B.T.U.	British Thermal Unit
BuAer	Bureau of Aeronautics
BAGR	Bureau of Aeronautics General Representative
BuOrd	Bureau of Ordnance
BuShips	Bureau of Ships
cg	center of gravity
C	Centigrade
CF	Central Files
CPD	Central Procurement District
chap.	chapter
Chem.	Chemical
Chief of Admin.	Chief of Administration

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C/AC	Chief of Air Corps
C/AS	Chief of Air Staff
C/S	Chief of Staff
Cir.	Circular
CAA	Civil Aeronautics Administration
CAA	Civil Aeronautics Authority
Civ. Pers. Div.	Civilian Personnel Division
CTI	Classified Technical Instruction
CC/S	Combined Chiefs of Staff
CIOS	Combined Intelligence Objectives Sub-Committee
Comdt.	Commandant
Com.	Command
Comdr.	Commander
CG	Commanding General
CO	Commanding Officer
Comm.	Committee
Commn.	Commission
Commun.	Communications
Commun. Equip. Officer	Communications Equipment Officer
Co.	Company
comp(s).	compiler(s)
conf.	conference
C	Confidential
Cong.	Congress
CIO	Congress of Industrial Organizations
Cong.	Congressional
contd.	continued
Contr.	Contract
Contr. Files	Contract Files
Contr. Law Br.	Contract Law Branch
Contr. Sect.	Contract Section
Contr.	Contracting
Contr. Officer	Contracting Officer
CFE	contractor-furnished equipment
Control Br.	Control Branch
Control Sect.	Control Section
CMP	Controlled Materials Plan
Coord.	Coordination
Coordr.	Coordinator
Corp.	Corporation
Corps of Engrs.	Corps of Engineers
CPFF	Cost-Plus-a-Fixed-Fee
CIC	Counter Intelligence Corps
Counter Intell. Div.	Counter Intelligence Division
DA	Defense Aid
DPC	Defense Plant Corporation

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Dept.	Department
Deputy C/AS	Deputy Chief of Air Staff
Deputy C/S	Deputy Chief of Staff
Det.	Detachment
dvlpmt.	development
Dvlpmt. Eng. Br.	Development Engineering Branch
Dir.	Director
Dir. Mil. Req.	Director of Military Requirements
Disposal Sect.	Disposal Section
Distrib.	Distribution
Dist.	District
Dist. Eng. Div. Liaison Officer	District Engineering Division Liaison Officer
Dist. Serv. Sect.	District Service Section
Dist. Supvr.	District Supervisor
Div.	Division
DNI	Division of Naval Intelligence
doc(s).	document(s)
East. Dist.	Eastern District
EPD	Eastern Procurement District
ed.	editor
EPF	Emergency Plant Facilities
Engr(s).	Engineer(s)
(E)	Engineering [as used after AC/S (MM&D)]
Eng.	Engineering
Eng. & Proc.	Engineering and Procurement
Eng. Div.	Engineering Division
E.O.	Engineering Order
Eng. Sect.	Engineering Section
Eng. Shops Lab.	Engineering Shops Laboratory
Equip.	Equipment
Equip. Lab.	Equipment Laboratory
ETO	European Theater of Operations
Exec.	Executive
Expend. Control Br.	Expenditure Control Branch
Expend. O.	Expenditure Order
Exp.	Experimental
Exp. Eng. Br.	Experimental Engineering Branch
Exp. Eng. Sect.	Experimental Engineering Section
Fac.	Facilities
Fac. Br.	Facilities Branch
Fac. Eng. Br.	Facilities Engineering Branch
Fac.	Facility
F	Fahrenheit

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FBI	Federal Bureau of Investigation
FM	Field Manual
Field Serv. Sect.	Field Service Section
Fighter Br.	Fighter Branch
Fiscal Br.	Fiscal Branch
Fiscal Records Br.	Fiscal Records Branch
FY	Fiscal Year
FP	Fixed-Price
Flight Sect.	Flight Section
FTC	Flying Training Command
fr.	from
Gen.	General
GHQ	General Headquarters
G.O.	General Order
Gen. Proc. Br.	General Procurement Branch
GSC	General Staff Corps
Glider Br.	Glider Branch
Govt.	Government
GFE	Government-furnished equipment
GFE Br.	Government-Furnished Equipment Branch
Ground Safety Sect.	Ground Safety Section
Hq.	Headquarters
Hist.	Historical
hist.	history
hp.	horsepower
H. Rpt.	House Report
Incl.	Inclosure
Inc.	Incorporated
IAS	Indicated Air Speed
Ind.	Indorsement
Indust.	Industrial
Indust. Fac. Sect.	Industrial Facilities Section
Indust. Plan. Sect.	Industrial Planning Section
Indust. Serv. Br.	Industrial Service Branch
Info.	Information
Insp.	Inspection
Insp. Div.	Inspection Division
Insp. Sect.	Inspection Section
Inspr.	Inspector
Inspr.-in-Charge	Inspector-In-Charge
IG	Inspector General

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Instr.	Instrument
Intell.	Intelligence
IDC	Inter-Desk Correspondence
IDM	Inter-Desk Memorandum
IATA	International Air Transport Association
ICAN	International Committee for Air Navigation
IOM	Inter-Office Memorandum
ICC	Interstate Commerce Commission
JAC	Joint Aircraft Committee
JC/S	Joint Chiefs of Staff
Joint Comm.	Joint Committee
JIC	Joint Intelligence Committee
JIOA	Joint Intelligence Objectives Agency
Joint R&D Bd.	Joint Research and Development Board
JAG	Judge Advocate General
JAGD	Judge Advocate General's Department
Lab.	Laboratory
LMAL	Langley Memorial Aeronautical Laboratory
Legal Br.	Legal Branch
Ltr.	Letter
Ltr. Contr.	Letter Contract
L. I.	Letter of Instruction
Ltr. Intent	Letter of Intent
Ltr. Term. Notice	Letter Termination Notice
Lib.	Library
Ltd.	Limited
Log.	Logistics
Log. Plan. Div.	Logistics Planning Division
Maint.	Maintenance
Maint. Control Sect.	Maintenance Control Section
Maint. Div.	Maintenance Division
Mgr.	Manager
Mgmt.	Management
Mgmt. Control	Management Control
Mfg. Methods Staff	Manufacturing Methods Staff
MS	manuscript
MIT	Massachusetts Institute of Technology
Mat. Distrib. Br.	Materials Distribution Branch
Mat. Lab.	Materials Laboratory
Mat.	Materiel
M&S	Materiel and Services
Mat. Center	Materiel Center

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Mat. Com.	Materiel Command
Mat. Div.	Materiel Division
MM&D	Materiel, Maintenance, and Distribution
Med.	Medical
MTO	Mediterranean Theater of Operations
Memo.	Memorandum
Memo. Rpt.	Memorandum Report
MIAD	Miami Air Depot
MCPD	Midcentral Procurement District
MAMA	Middletown Air Materiel Area
MWPD	Midwestern Procurement District
mph	miles per hour
Mil.	Military
MID	Military Intelligence Division
Mil. Intell. Serv.	Military Intelligence Service
Mil. Pers. Div.	Military Personnel Division
misc.	miscellaneous
Misc. Br.	Miscellaneous Branch
MOAMA	Mobile Air Materiel Area
Mod.	Modification
Mod. Center	Modification Center
Mun.	Munitions
NACA	National Advisory Committee for Aeronautics
NDRC	National Defense Research Committee
Natl. Mil. Estab.	National Military Establishment
NRC	National Research Council
NSC	National Security Council
ND	Navy Department
n.	note
No.	number
Office Admin. Sect.	Office Administration Section
OCAC	Office, Chief of Air Corps
OCSO	Office of Chief Signal Officer
OEM	Office of Emergency Management
O.I.	Office Instruction
OJA	Office of the Judge Advocate
ONI	Office of Naval Intelligence
OPM	Office of Production Management
OSRD	Office of Scientific Research and Development
OSS	Office of Strategic Services
Office, Under Secy. War	Office of the Under Secretary of War
OAMA	Ogden Air Materiel Area
OCAMA	Oklahoma City Air Materiel Area
Op'l	Operational

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Op'l Div.	Operational Division
Op'l Tng. Unit	Operational Training Unit
Ops.	Operations
OC&R	Operations, Commitments, and Requirements
Ops. Div.	Operations Division
Ord.	Ordnance
Ord. Dept.	Ordnance Department
Ord. Motor Maint. Co.	Ordnance Motor Maintenance Company
Org.	Organization(al)
Org. Plan. Div.	Organizational Planning Division
OAMD	Overseas Air Materiel District
POAMD	Pacific Overseas Air Materiel District
p.(pp.)	page(s)
par.	paragraph
Pat. Liaison Br.	Patent Liaison Branch
Pers.	Personnel
Pers. & Base Servs. Div.	Personnel and Base Services Division
Pers. Sect.	Personnel Section
Photo.	Photograph
Photo.	Photographic
Photo. Lab.	Photographic Laboratory
Plan.	Planning
Plans, Anal. & Rpts. Div.	Plans, Analysis, and Reports Division
Plans & Liaison Div.	Plans and Liaison Division
psi	pounds per square inch
Power Plant Lab.	Power Plant Laboratory
pres.	president
Proc.	Procurement
Proc. Control Sect.	Procurement Control Section
Proc. Div.	Procurement Division
Proc. Field Offices	Procurement Field Offices
(P)	Production [as used after AC/S (MM&D)]
Prod.	Production
Prod. Coord. Br.	Production Coordination Branch
Prod. Div.	Production Division
Prod. Eng. Sect.	Production Engineering Section
Prod. Req. Plan	Production Requirements Plan
Prod. Resources Sect.	Production Resources Section
Prod. Survey Br.	Production Survey Branch
Proj(s).	Project(s)
Proj. Records	Project Records
Prop.	Propeller
Prop. Lab.	Propeller Laboratory
PGC	Proving Ground Command
PRO	Public Relations Office
Pub(s).	Publication(s)

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Pubs. Br.	Publications Branch
Pubs. Lib.	Publications Library
P.O.	Purchase Order
Purchase Sect.	Purchase Section
Quality Control Sect.	Quality Control Section
QM	Quartermaster
QMG	Quartermaster General
Radiation Lab.	Radiation Laboratory
RG	radiogram
Readj.	Readjustment
Readj. Div.	Readjustment Division
Rear Adm.	Rear Admiral
RFC	Reconstruction Finance Corporation
Records Br.	Records Branch
Redistrib.	Redistribution
Redistrib. & Salvage Office	Redistribution and Salvage Office
ref.	reference
Ref. Lib.	Reference Library
Reg.	Regulation
rpt(s).	report(s)
Rep(s).	Representative(s)
Req.	Requirements
Req. Br.	Requirements Branch
Req. Div.	Requirements Division
Res.	Research
R&D	Research and Development
Res. & Eng. Div.	Research and Engineering Division
Resources Control Sect.	Resources Control Section
Resources Div.	Resources Division
R	Restricted
rpm	revolutions per minute
RAMA	Rome Air Materiel Area
R&R	Routing and Record Sheet
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
SAMA	Sacramento Air Materiel Area
SAAMA	San Antonio Air Materiel Area
SBAMA	San Bernardino Air Materiel Area
School of Avn. Medicine	School of Aviation Medicine
S	Secret
Secy.	Secretary
Secy. War	Secretary of War

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Sect.	Section
Serv(s).	Service(s)
SF	Service Forces
Serv. Group	Service Group
Serv(s). Subsect.	Service(s) Subsection
SOS	Services of Supply
Sess.	Session
shp	shaft horsepower
Sig. C	Signal Corps
SAE	Society of Automative Engineers
SME	Society of Mechanical Engineers
SEPD	Southeastern Procurement District
Special Asst.	Special Assistant
S.O.	Special Orders
Special Serv. Div.	Special Service Division
Spec(s).	Specification(s)
Specs. Br.	Specifications Branch
SPAMA	Spokane Air Materiel Area
Sqdn.	Squadron
Std(s).	Standard(s)
Stdz.	Standardization
SWNCC	State-War-Navy Coordinating Committee
Stat.	Statistical
Stat. Control Office	Statistical Control Office
Stat. Div..	Statistical Division
Stat.	Statutes
SAC	Strategic Air Command
Subdiv.	Subdivision
Subsect.	Subsection
Supt(s).	Superintendent(s)
Supvr(s).	Supervisor(s)
Supp.	Supplement
Supp. Agree.	Supplemental Agreement
Supply & Maint.	Supply and Maintenance
Supply Div.	Supply Division
SHAEF	Supreme Headquarters, Allied Expeditionary Forces
SPB	Surplus Property Board
Tach.	Tachometer
Tact.	Tactical
TAC	Tactical Air Command
Tech.	Technical
Tech. Data Lab.	Technical Data Laboratory
Tech. Exec.	Technical Executive
TI	Technical Instruction
TM	Technical Manual

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T.O.	Technical Order
Tech. Serv. Div.	Technical Service Division
TTC	Technical Training Command
Tech. Tng. Div.	Technical Training Division
TG	telegram
TG Term. Notice	Telegram Termination Notice
tel.	telephone
Tel. Conv.	Telephone Conversation
TT	teletype
Term(s).	Termination(s)
Term. Contr. Officer	Termination Contracting Officer
Term. Sect.	Terminations Section
Traffic Div.	Traffic Division
Tng.	Training
TAD	Training Aids Division
Tng. & Trans. Br.	Training and Transport Branch
Tng. Plans Div.	Training Plans Division
Trans.	Transport
Trans.	Transportation
Treas.	Treasurer
TCC	Troop Carrier Command
TWX	teletypewriter exchange message
U	Unclassified
Under Secy. War	Under Secretary of War
USCO	Unit Security Classification Officer
Unit Tng. Div.	Unit Training Division
UAW	United Automobile Workers
U.K.	United Kingdom
USAF	United States Air Force
USMC	United States Marine Corps
UN	United Nations
USN	United States Navy
USSTAF	United States Strategic Air Forces
Univ.	University
v.	vice
v. pres.	vice president
VE Day	Victory in Europe Day
VJ Day	Victory in Japan Day
vol(s).	volume(s)
WAA	War Assets Administration
WD	War Department
WDGS	War Department General Staff

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WDSS	War Department Special Staff
WMC	War Manpower Commission
WPB	War Production Board
WRAMA	Warner Robins Air Materiel Area
Wash.	Washington, D. C.
Weather Div.	Weather Division
West. Dist.	Western District
WPD	Western Procurement District
WW I	World War I
WW II	World War II
WF	Wright Field
WF CF	Wright Field Central Files
W-PAFB	Wright-Patterson Air Force Base
ZI	Zone of the Interior

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SUPPLEMENTARY GLOSSARY OF ABBREVIATIONS

AF	Air Force
AC/AS-3	Assistant Chief of Air Staff-3
AC/AS-4	Assistant Chief of Air Staff-4
C/AS-3	Chief of Air Staff-3
CFP	contractor-furnished property
Comm.	Committee
DCS/Mat.	Deputy Chief of Staff, Materiel
Dep.	Deputy
GFP	Government-furnished property
P.R.	purchase request

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SUMMARY

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CASE HISTORY OF THE T-31 TRAINER

Up to the time Japan surrendered in 1945 the AAF had trained more than 190,000 pilots. At that time the AAF decided to cease pilot training temporarily because of the large surplus of well-trained pilots. However, the AAF realized in 1946 that the surplus was dwindling as pilots passed their effective combat age, or because their availability was lost through death, retirement, relief from duty, or physical handicaps. Therefore, in order to remedy the anticipated shortage in pilot personnel, the AAF revived the pilot training program.

16A

It was during 1946 that the USAF was first asked by the Navy Department to inspect the Fairchild Navy XNQ-1 primary trainer and to consider a joint Navy and AAF procurement contract. The XNQ-1 was designed to be an all-metal, low-wing, two-place monoplane with tandem seating, equipped with an electrically operated retractable landing gear, and powered by a Lycoming XR-680-13 engine. The AAF designation T-31A was assigned by the Air Materiel Command (AMC) to the procurement of this Navy trainer. The XNQ-1 had the following characteristics: gross weight of 3,700 pounds, rate of climb of more than 1,000 feet per minute, maximum speed of 170 mph /147 knots/, wing span of 41 feet 5 inches, over-all length of 27 feet 11 inches, and height of 9 feet 10 inches. The Navy contract NOa(s)-6662 for construction of two of these trainers had been awarded to the Fairchild Aircraft Corporation, Hagerstown, Maryland, following a design competition.

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In May 1946 the Navy Department forwarded the detail specification NAVER SD-400 for the XNQ-1 trainer to the Bureau of Aeronautics representative at Wright Field, and instructed him to obtain all data or information available as to the plans at AMC for trainer aircraft. The Procurement Division, AMC, notified the Bureau of Aeronautics representative on 14 May 1946 that the AAF projected training plane program at that time was still in the tentative stage. However, requirements had been set up in the AAF JX-4 aircraft program for new primary, basic, and advanced type trainers, but data on the military characteristics were not available at AMC at that time.

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It was several months later that the Navy Department suggested to the Aeronautical Board that the AAF commands should be invited to inspect the XNQ-1 airplane at the contractor's facility. The Navy Department believed it necessary to procure XNQ's in addition to the two test articles then on contract in order to conduct thorough evaluation studies for both services.

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The Engineering Division, AMC, reported to the Navy Department on 16 August 1946 that representatives of the Assistant Chief of Air Staff-4, Training Command, and AMC had inspected the Fairchild XNQ-1 primary trainer. As the result of this inspection AMC had been advised that the airplane did not meet the requirement of the Training Command and that it would not be included in the Air Forces' requirement schedule.

Later in 1946, the Assistant Chief of Air Staff-4, Washington, reported that Headquarters, AAF was reviewing military characteristics for new training aircraft which would replace the trainers then in use in the training program. The Training Command had recommended the development of the PT-3? combination type trainer with tricycle landing gear to replace both the PT-13 and the AT-6 type aircraft. It had been emphasized that one factor to be considered was the fact that because of budgetary cutbacks the costs of the trainers were to be kept to a minimum. However, to complete this trainer aircraft study, Assistant Chief of Air Staff-4 requested AMC to review certain problems pertaining to the training program. AMC was to consider the following factors: comparative cost of developing an aircraft and procuring 100 articles conforming to new military characteristics as compared with cost of procuring 100 tactical aircraft of a design which had already been developed; and comparative cost of developing a trainer similar to the AT-6 as compared with cost of developing the same aircraft with a tricycle landing gear.

AMC representatives witnessed the Navy final demonstration and service acceptance trials of the XNQ trainer at the Patuxent River Naval Station in May 1947. Although military characteristics for this type of aircraft were not available, the AMC representatives examined the technical details of the plane and flew it to determine its general handling characteristics. In their opinion the design of the airplane appeared extremely clean, with emphasis on ease of maintenance. AMC considered the airplane satisfactory from an engineering viewpoint although its value as an AAF trainer was questioned because of its light weight, low power, and conventional landing gear. However, AMC believed at the time of the tests that this trainer could be used for Air Reserve or Air National Guard training or as an emergency expedient to meet Training Command requirements.

The AMC review of the trainer aircraft problems was not completed by AMC until July 1947. At that time AMC reported that there were no training aircraft which would meet the proposed PT-3? military characteristics which had been submitted by Headquarters, AAF. AMC believed that to attain the desired

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high speed of 275 mph /238 knots/ at tactical operating altitude, a power plant of at least 700 horsepower would be necessary. As a result, the aircraft would be larger and considerably more expensive than the PT or BT airplanes of World War II. AMC suggested that the most economical approach to insure at least an interim trainer would be to purchase an aircraft which had been built and tested. Among the trainers suggested were the PT-13, AT-6, and the Navy Fairchild XNQ-1. For maximum utility and minimum initial cost AMC believed the Navy XNQ the most desirable of the three models. AMC also pointed out the possibility that it might be approximately fiscal year 1950 before production could be started on the proposed PT-BT airplane if a development program were carried out and production engineering and tooling subsequently established. However, AMC believed that the PT-13, AT-6, or the XNQ production could be started in 1948. Headquarters, AAF was advised that incorporation of tricycle landing gear would not appreciably affect the cost of the PT-BT type airplanes, provided the feature was anticipated in the original design. The tricycle gear would reduce the number of ground accidents, particularly from ground loops, thus improving safety, although maintenance of the retracting mechanism would be slightly higher.

16

On 27 March 1947 the Air Defense Command (ADC) at Mitchel Field, New York, submitted its review of the training aircraft program to the Commanding General, AAF. This review compared the AT-6 trainer with the new "all purpose" XNQ-1 trainer and with a hypothetical trainer having higher performance characteristics than either the XNQ-1 or the AT-6. ADC had selected the XNQ-1 for this study rather than some other trainer for the following reasons: the XNQ-1 had already been purchased in small quantities by the Navy and was undergoing exhaustive tests; considerable factual data were available for study purposes because of the Navy's production and tests; and the close proximity of ADC to the Fairchild plant would allow that command to visit the plant, study the plane, and test it in flight. ADC stated that the purpose of the study had not been to "sell" the Fairchild trainer, nor to imply that it was the best airplane available to replace the AT-6. However, General Stratemeyer, Commanding General, ADC, did state that as a result of this study, it appeared that the Fairchild XNQ-1 would be a highly satisfactory plane to supplant the AT-6, although it might not be the most satisfactory. It was pointed out in this study that the yearly cost of operating the AT-6 aircraft was considerably higher than the yearly cost of operating the XNQ-1 or the hypothetical trainer. Also, ADC believed that the study left no question that from an operational and economic standpoint the AT-6 should be supplanted as rapidly as possible by a new type

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of all purpose trainer for the Air Reserve program as well as
7 the whole AAF program.

On 15 April 1947, the Assistant Chief of Air Staff-3, Washington, reported to ADC that Headquarters, AAF and the Air Training Command (ATC) had thoroughly investigated the Navy XNQ-1 and had determined that it did not fulfill the military characteristics established for trainers which would be utilized in the new concept of a combined primary-basic training program. In addition, the Assistant Chief of Air Staff-3 considered the continuation of the AT-6's for Air Reserve pilot training undesirable because pilot training with that trainer would not be of adequate value for mobilization assignments for Air Reservists. Also, that office considered the replacement of the AT-6's with
9 a similar type of training aircraft as undesirable. Because of current fiscal limitations and the time consuming task of manufacturing and accepting a new type of trainer, the Assistant Chief of Air Staff-3 believed that the trainer procurement objectives would have to be postponed until fiscal year 1949. However, the Deputy Commander of the AF had expressed the opinion that the AT-6 reserve pilot training was of doubtful value, and had suggested that a revised program be developed before 30 June 1947 to replace AT-6's with service types, including A-26, B-25,
10 C-47, P-47, and P-51 aircraft. The Deputy Assistant Chief of Air Staff-3 stated that these services types which were in excess of AAF requirements were available in sufficient numbers, and that unless utilized by the Air Reserve they would be "cocooned" or declared surplus and lost to the AAF. It was realized that replacement of the AT-6's with service types would increase the flying costs and reduce the number of reserve personnel to receive pilot training; however, it was believed that the effectiveness of the training program would be greatly improved by
9, 10 utilization of these types.

According to the Report from the Chief of Staff to the Secretary of the AF for fiscal year 1948 it became apparent during that fiscal year that newly graducted pilots would have to be prepared to fly types of aircraft which previously had been reserved for the more experienced pilots. In order to meet this anticipated change, many of the previous steps in the training program were consolidated. The primary phase of training was eliminated, and the basic course was started and completed in the former advanced trainer—the AT-6. The advanced training phase
16A was accomplished in the current tactical types, the F-51, F-80, and the B-25.

The USAF Chief of Staff also reported that 716 pilots had been trained in fiscal year 1948, and that by the end of that

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period the yearly output had been increased to 924. However, it was realized by the USAF that this rate would not be sufficient to maintain and provide replacements for a 70-Group Air Force, or to provide the necessary reserve to allow immediate expansion of the AF in case of war. Consequently, during fiscal year 1949 pilot training was to be increased to 3,000 pilots per year. The training rate was to be increased each year thereafter until the ultimate objective of approximately 6,000 pilots per year was obtained. This number was believed sufficient by the USAF to support the 70-Group Air Force and to provide trained pilots as replacements in the National Guard and Air Reserve squadrons following their active duty with regular AF units.

16A

In the fall of 1948 the Training Division of Training and Requirements, Operations, reported that its flying training program was faced with two serious problems. The first was an unduly expensive curriculum. Although all basic flying training was then being given in the T-6 aircraft, it was planned to replace the T-6 with the T-28, a 6,000-pound, 800-horsepower trainer of relatively high performance. However, the Training Division realized that the T-28 would not fit into the economy program which had been made necessary by budget limitations if used as the "all-through" trainer. It was also believed that in the event of mobilization the procurement of a trainer as large as the T-28 in quantities would aggravate the wartime shortage of strategic materials. The other flying training problem was the lack of a substitute for the B-25 as a twin-engine trainer, and the fact that one could not be developed and procured in less than three and one-half to four years. However, a revision in the pilot training program had been made and approved by the Chief of Staff, USAF, to accomplish a solution to both these problems. ATC had been directed to effect this new program of changing the ratio of single-engine to twin-engine trainer graduates from 67 per cent twin-engine and 33 per cent single-engine to 20 per cent twin-engine and 80 per cent single-engine. This reduction in twin-engine aircraft requirements would prolong the availability of the B-25 twin-engine trainer by approximately one year. However, the increased single-engine trainer requirements would present earlier shortages in single-engine trainer aircraft. Replacements were then being developed for this phase.

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Also in the fall of 1948, Training and Requirements, Operations, advised the Deputy Chief of Staff, Material, that a lighter basic trainer (PT-HT) in the 3,500 to ,000-pound weight class was being introduced into the training program to further reduce the cost of training. Utilization of this trainer for the first 130 hours of training and of the T-28 in the succeeding

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135 hours, in lieu of the T-28 the entire time would result in major economies in the initial investments, maintenance, and
19, 27 gasoline consumption. Training and Requirements recommended the introduction of the Navy Fairchild XNQ-1 into the program and its procurement from Fiscal Year 1949 funds to meet the require-
19 ments of the lighter trainer. Fairchild had indicated its willingness to the USAF to initiate a development program cover-ing the installation of a higher powered engine in the Model XNQ in order to develop a trainer which would more nearly meet the
17 requirements of both the AAF and the Navy. Therefore, arrange-
18, 21 ments had been made to loan one of the Navy XNQ-1 aircraft to Fairchild for the purpose of performing flight tests. Training and Requirements believed that introduction of the XNQ-1 in the lighter trainer field would release T-6's and T-28's for use in the advanced phase of training, and that combined procure-ment of the XNQ and T-28 in fiscal years 1950 and 1951 would
23 relieve all single-engine training aircraft shortages.

When the recommendation for the procurement of the XNQ-1 was presented to the Assistant for Programming, Operations, that office indicated that any PT-BT procurement from 1949 money would require a diversion from other sources. According to Procurement and Industrial Planning, Materiel, all funds in the Supplemental 1948 budget for the procurement of aircraft had also been committed. However, Procurement and Industrial Planning, Materiel, suggested to General Powers, Deputy Chief of Staff, Materiel, that it might be possible to reduce the contract for the production of T-28 trainers by approximately 76 aircraft without affecting availability of the T-28. This plan would make funds available for procurement of approximately 100 NQ trainers, a sufficient quantity to establish the XNQ-1
20 production line and carry production through fiscal year 1950. This diversion of funds and cutback in the T-28 procurement was
2 approved by the Assistant for Logistics Planning, Materiel, and by General Powers on 13 October 1948. However, when Mr. Symington, Secretary of the AF, presented the facts of the flight training program to Mr. Forrestal, Secretary of Defense, on 29 October 1948 he pointed out that funds in the amount of $10[illegible],220,000 resulting from cancellation of 5[illegible] F-47's, 30 [illegible]-47's, and 100 F-82's could be used for procurement of F-[illegible]'s, F-[illegible]'s, and 100
27 XNQ-1 aircraft. Mr. Forrestal presented his recommendation for approval of the AF's proposed use of the $100,220,000 funds to
3[illegible] the President on 22 November 1948. It was on the basis of recommendations of the Department of the AF, review and comments of the Munitions Board and the Research and Development Board, and his own review of the matter that Mr. Forrestal concluded
[illegible] that this change in the procurement plan was warranted.

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Meanwhile, on 14 October 1948, the Chief of Staff, USAF, notified the Deputy Chief of Staff, Materiel, and the Deputy Chief of Staff, Operations, that the Secretary of the AF had approved the procurement of enough Fairchild XNQ trainers to establish a production line which might be followed with Fiscal Year 1950 funds. This number was estimated at approximately 150 articles costing approximately $[illegible],000,000 to $10,000,000. Subsequently, the Assistant Deputy Chief of Staff, Materiel, notified AMC regarding this action and instructed AMC to proceed with the procurement. TI-2249, Addendum No. [illegible], dated 27 October 1948, initiated action for changes in the existing aircraft procurement program to include procurement of 150 Fairchild XNQ trainers. However, on 17 December 1948, General Powers, Acting Deputy Chief of Staff, Materiel, advised AMC that the Secretary of Defense had certified to the President and requested the release of funds in the amount of $8,261,500 for the procurement of 100 T-31 (XNQ) trainers. Therefore, AMC was directed to proceed with immediate negotiations on the procurement of the 100 T-31's. Procurement action was to be limited solely to negotiations without making any commitments whatsoever until the funds had been released. Subsequently, the Procurement Division, AMC, instructed the Training, Transport and Special Aircraft Branch of that division to immediately take all necessary procurement action on the T-31 which would expedite placement of the aircraft contract as soon as funds were released by the President. Tooling was to be procured for a maximum production rate of 50 articles per month, and an immediate mock-up or 689 inspection was to be held in order to determine the changes considered necessary by the Training Command, USAF personnel, Navy, and AMC.

In the meantime, the Procurement Division, AMC, learned that the Beech Aircraft Corporation was modifying its Bonanza aircraft to meet the "expressed desires" of the Training Command. In view of this information, Procurement officials believed it desirable to have some type of competition conducted between the modified Beech Bonanza and the XNQ type aircraft, using a set of military characteristics as a basis for the evaluation.

However, the first official notice that AMC had of the Beech Mentor Model 45 was on 9 December 1948 when Beech submitted photographs and a news release announcing its first flight. The Model 45, a single-engine, all-metal, two-place primary and basic-advanced trainer, had made its initial flights from the Beech field, Wichita, Kansas, on 2 December 1948. This aircraft had been developed from the Beechcraft Bonanza, and was powered by a Continental E-185 engine. The first official engineering estimates indicated that it would have a cruising speed of 160

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mph /136 knots/ at 10,000 feet, a true air speed of 176 mph /152 knots/ at sea level, and a permissible indicated maximum dive speed of 280 mph /243 knots/. Beech indicated that it could produce and deliver this new trainer in quantities for less than $20,000 complete.

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Simultaneous with Beech's announcement of its trainer was the announcement of the Texas Engineering and Manufacturing Company that its military type primary trainer would be ready for demonstration and flight test on 15 January 1949. The Texas Engineering trainer was a low wing monoplane type of all-metal construction with hydraulically operated landing gear and flaps; its tandem seating arrangement, cockpit controls, canopy, and instruments were to be similar to those of the AT-6 trainer. The prototype had been thoroughly tested to assure performance that would meet all requirements of AF primary training. An estimated price of $12,000 each was given for production of this aircraft in quantities for the AF.

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On 28 December 1948 the Under Secretary of the AF asked the Deputy Chief of Staff, Materiel, if procurement of the Fairchild NQ (T-31) should not be withheld until some questions had been answered regarding the advantages of the Fairchild procurement over the Beech trainer "off-the-shelf" procurement. Subsequently, when Research and Development, Materiel, submitted a comparison of the Fairchild T-31 and the Beech Model 45 to the Deputy Chief of Staff, Materiel, that office stated that it could not support any arguments in favor of direct procurement of the XNQ aircraft. However, since the Beech trainer did not meet the Training Command's specifications for a trainer of 3,500 to 4,000 pounds with a conventional type landing gear, Research and Development, Materiel, recommended that a committee be appointed to evaluate available aircraft of that type, and that the best article be procured as a result of this comparative evaluation. A decision on the matter of the evaluation was made when the Board of Senior Officers (Fairchild Board) met early in January 1949. The board reviewed and made recommendations for changes in the composition of the AC Group Program, the aircraft production program, and the Research and Development program of the USAF. As a result of the aircraft procurement program review, this board recommended that for the training program an evaluation should be conducted by AMC and the Training Command of the Fairchild and Beech primary-basic trainer and the trainer of any other company in that category; and further recommended that procurement of the quantity of 110 NQ trainer aircraft scheduled from Fiscal Year 1948 Supplemental funds and the quantity of 209 NQ trainers scheduled from Fiscal Year 1950 funds be withheld pending this evaluation.

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On 6 January 1949, President Truman approved the change in the proposed use of the $109,220,000 aircraft funds which had been requested by the Secretary of Defense on 22 November 1948. However, the Deputy Chief of Staff, Materiel, informed the Procurement Division, AMC, that the procurement directive for the 100 T-51 trainers was to be temporarily withheld until all existing aircraft of that type in industry had been evaluated. In accordance with the decisions of the Senior Officers Board, Training and Requirements, Operations, requested the Deputy Chief of Staff, Materiel, to direct AMC to circularize industry for all existing models of this type of aircraft. These models were to be assembled at the Wright-Patterson Air Force Base for full evaluation, including flight, by a board consisting of members of AMC, USAF Headquarters, and ATC. The board was to evaluate the competing aircraft against minimum requirements of the military characteristics for this type trainer, and to weigh the performance of this aircraft against the mission, cost of operation, producibility, ease of maintenance, and unit cost.

On 1 February 1949 the Directorate of Training and Requirements, Operations, outlined the military characteristics for a basic trainer which was to be used in the first 130 hours of the pilot training program and which was to replace the old PT-13 and BT-13 trainers. This trainer was to be a single-engine, conventionally powered land plane to serve as basic trainer for AF student pilots prior to commencing training in advanced types. The following requirements were specified: performance at a high speed of 150 knots (minimum) at tactical operating altitude of 7,500 feet (minimum), service ceiling of 12,000 feet, crew of two, weight of 3,500 to 4,000 pounds, tandem cockpit arrangement, and retractable tricycle or conventional landing gear. These characteristics were forwarded by the Deputy Chief of Staff, Materiel, to AMC to be used in the proposed evaluation of the Fairchild, Beech, and other existing models of that type. TI-2231, Addendum No. 1, dated 7 February 1949, directed Procurement and Industrial Planning, AMC, to canvass industry for all of the existing models which would meet these characteristics, and to evaluate all of the technical data which were to be submitted prior to the meeting of the Evaluation Board.

In the meantime a procurement inspection was conducted at the contractor's plant on the Fairchild T-31 trainer (XNQ-1) which had the R670-13 engine installed. Personnel from AMC; the Training Command; Operations, USAF Headquarters; and Materiel, USAF Headquarters, were members of this inspection board. The inspection board stated that the aircraft would be considered acceptable if their recommended changes were incorporated. On

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19 January 1949, Fairchild indicated the changes which it would incorporate in the T-31 trainer to comply with AMC recommendations.

In conformance with the directive from USAF, the Procurement Division, AMC, wrote to 36 major and minor aircraft companies outlining the USAF intention of procuring 100 single-engine, tandem, two-place basic trainers. These companies were asked to submit an aircraft which would meet the specified characteristics. Fairchild, Beech, and Texas Engineering were the only manufacturers to submit airplanes for the evaluation. The different divisions and laboratories of AMC conducted the preliminary review of the TEMCO TE-1A, Beech Model 45, and Fairchild XNQ-1 airplanes prior to the evaluation by the Evaluation Board. In summarizing the results of these evaluations by the various laboratories, the Procurement Division concluded that the Fairchild XNQ-1 showed first, Beech Model 45 second, and TEMCO TE-1A third in the over-all order of merit established for the competing aircraft. However, the Procurement Division recommended that the board consider some of the following factors in the final evaluation: (1) any one of the three articles could be made into a technically acceptable aircraft by making minor changes; (2) aircraft selected should be subjected to a further review for specification requirements; and (3) selection of the final model should be based on over-all long range costs and suitability for the prescribed mission.

Originally, Fairchild had submitted an estimate of $4,600,000 for construction of the 100 NQ trainers at a maximum production rate of 25 per month, whereas Beech and Texas Engineering had quoted prices of $15,000 and $9,265, respectively, for each of their trainers if procured in quantities of 100 articles. However, by the time of the evaluation, the over-all unit cost to the Government for the 100 airplane program, by model, showed the Temco price at $24,249, Beech at $31,366, and Fairchild at $[illegible],458. The over-all cost included airframes, GFP, fuel and oil, maintenance, and spare parts.

The cost factor and the following considerations were used in the final evaluation of the three models, Fairchild, Beech, and Temco, by the Evaluation Board on 25 February 1949: technical considerations, maintenance, and ability to perform mission. Each member of the board also flew each model prior to the final rating of the aircraft. Four of the board members voted for the Beech Model 45 as first choice, Fairchild as second choice, and Temco as third choice. The fifth member of the board, General McNaughton, Director of Training and Requirements, Operations, cast the dissenting vote in favor of the Fairchild XNQ.

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In a memorandum to the Chief of Staff on 17 March 1949, General McNaughton stated that it appeared that one of the deciding factors in selecting the Beech Model 45 had been the use of the tricycle landing gear on this aircraft. However, General McNaughton did not feel that it was the time to introduce the tricycle landing gear in the training program. He believed that pilots could be transitioned from a conventional type gear to a tricycle gear with no difficulty, whereas the reverse was difficult and time consuming. After carefully analyzing AF's evaluation, flying the aircraft himself, and listening to arguments pro and con at the Evaluation Board meeting, General McNaughton stated that he had come to the conclusion that the AF would be in a much sounder position by purchasing the Fairchild aircraft. Thus, he recommended that: (1) the Fairchild [redacted] in its existing configuration and with the Lycoming O-380-13 installed be procured and continued in the production line until it was known that there would be no more conventional type aircraft utilized by the USAF; and (2) that two Fairchild [redacted] articles incorporating the Lycoming GO-580 engine and tricycle landing gear be developed in order that the model might be placed in production at the proper time. General Vandenberg, Chief of Staff, noted his concurrence with General McNaughton's recommendations.

The Assistant Deputy, Chief of Staff, Materiel, informed the Chief of Staff on 21 March 1949 that on the long range trainer program the Fairchild [redacted] would be more expensive although there was not much difference from the viewpoint of producibility and capacity between Fairchild [redacted] and the Beech Model 45. However, that office believed that the decision should be in favor of the airplane selected by the using agency. Therefore, since the Training Command believed that the Fairchild would do the best job, the Chief of Staff, Materiel offered no objection to changing the majority recommendation of the Evaluation Board. Several days later the Office of Deputy Chief of Staff, Materiel, issued Procurement Directive 49-33 authorizing AMC to proceed with procurement of 100 T-31 (Fairchild [redacted]) aircraft. (This procurement directive nomenclature was later changed to 49-5.) Procurement Directive 49-33 also specified that the contractor was to furnish all possible equipment normally supplied as GFE at a cost not to exceed two to three per cent of the cost of such equipment.

On 21 April 1949, the Procurement Division, AMC, requested Fairchild to submit price quotations for the 100 T-31A airplanes. The O-470-13 engine, power plant accessories, propeller, electrical equipment, instruments, and various radio and radio accessories as outlined to the contractor by AMC on the 15 April 1949 were to be

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GFP items. Subsequently, General Shepard, Chief, Procurement Division, approved Purchase Request 57544 in the amount of $7,370,000 for the procurement of 100 T-31A trainers, spare parts, special tools, ground handling equipment, technical data, and flight testing. A statement of the findings and determinations for permission to negotiate for this procurement was presented to the Under Secretary of the AF on 5 May 1949. Approval of the procurement from Supplemental Fiscal Year 1948 funds was recommended by the Under Secretary on 13 May 1949.

Shortly after the Under Secretary approved the procurement, General Wolfe, Director of Procurement and Industrial Planning, AMC, questioned the feasibility of having Fairchild furnish all equipment which normally would be GFP. Fairchild had originally agreed to furnish the GFP items for about a two to three per cent handling charge. However, the proposal submitted by Fairchild in May 1949 had requested $7,141,227 for the 100 articles, GFP, construction of a warehouse at Hagerstown at $340,000 (included in the cost price), stocking of spares for the Five Year Program, with a four and one half per cent handling charge plus a profit of seven per cent on the GFP items and GFP spares. The normal procedure for procurement of these aircraft with the Government furnishing the GFP would cost $6,219,657, including general and administrative expense at four and one half per cent and profit of seven per cent. General Wolfe believed that the AF could buy a better airplane cheaper and with less confusion through the normal procurement procedure. He recommended that Procurement Directive 49-35 be rescinded and a directive issued specifying procurement of the T-31 in the normal manner. Mr. Barrows, Under Secretary of the AF, also believed the Fairchild quotation excessive, and stated that he wished it were possible to reopen the competition to find out what kind of proposition Beech would offer.

General Griswold, Acting Deputy Chief of Staff, Materiel, reported to Mr. Barrows on 7 June 1949 that he and General Craig, Deputy Chief of Staff, Materiel, had discussed the Fairchild trainer proposal. They had agreed that the proposal was "out of line" because of the inclusion of the four and one-half per cent handling charge and the seven per cent profit for furnishing the GFP. They believed that three courses of action appeared feasible: (1) accept General Wolfe's recommendation and follow the usual procurement practice; (2) circularize industry (including Fairchild) for the construction of 100 T-31 aircraft on the basis of the procurement directive; or (3) reopen negotiations with high level Fairchild personnel with a view to reducing or eliminating the seven per cent profit proposed. However,

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General Griswold believed that the circularization of industry for construction of the models would cause a strong adverse reaction from the aircraft industry. Therefore, he recommended that the possibility of reopening the negotiations with Fairchild should be exhausted before a final decision was made. If this effort proved unsuccessful, he recommended that they follow the
135 usual procurement practice. In the meantime, the Training, Transport and Special Aircraft Branch of the Procurement Division
136 requested the buyer of trainer aircraft to hold the negotiations for the procurement of this trainer in abeyance.

Representatives of AMC and the contractor met early in July 1949 to again discuss negotiations for the procurement of these trainers. As a result of this meeting Fairchild submitted its estimate of $7,734,170.86 for the 100 T-31A trainers, spare parts, special tools, handbooks, 5,000 cycle test of production landing gear, and phase II flight testing program. The contractor pointed out that his prices for procuring material that was normally GFP would be higher than for the Government to furnish it because he would have to buy in smaller quantities. Also, there was the possibility that prices might have increased since AMC purchased some of the items on the list. AMC representatives agreed that the over-all prices for such items appeared reasonable in view of these conditions. Although the contractor's proposal of seven per cent profit on the airplanes was acceptable to the negotiators, Fairchild did not feel that the three per cent maximum profit rate on furnishing those items was reasonable. Despite all the objections on the part of the contractor, AMC would offer no compromise, and Fairchild finally agreed to accept the three per cent profit
141 for furnishing what were normally GFP items. However, it was understood that no precedent was being established with regard to future negotiations.

In the meantime, negotiations had been reopened with high level Fairchild personnel, and a quotation of $6,33[illegible],203.76 for the 100 T-31 trainers had been given. This price included spare parts (20 per cent), special tools and ground handling equipment, handbooks, 5,000 cycle test, phase II flight tests, items normally GFP, spares GFP (20 per cent) with seven per cent allowed for profit, and four and one-half per cent for general and administrative expenses. These figures were based on the usual procurement practice whereby the Government furnished the GFP. Fairchild also quoted a price of $1,[illegible]55,719 for furnishing GFP items and 20 per cent spares, and agreed to accept a profit of three per cent and four and one-half per cent general and administrative expense for furnishing the GFP, thus bringing the total
143 cost to $6,[illegible]89,762.

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After consideration of these quotations, Mr. Barrows recommended that one of the following plans be executed: (1) circularize industry for construction of 100 T-31 aircraft on basis of the procurement directive; or (2) disregard all previous negotiations relative to the XN, and circularize industry for quotations on a design based on military characteristics.

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General Griswold of the Office of Deputy Chief of Staff, Materiel, reported to General McKee, Assistant Vice Chief of Staff, on 2[illegible] July 1[illegible] that Generals Wolfe, Carroll, and Cook of AMC, Generals Craig and Griswold of Office, Deputy Chief of Staff, Materiel, General Boatner of USAF Comptroller's Office, Generals Smith, Brandt, and McNaughton of Office, Deputy Chief of Staff, Operations, and General Burns of Office, Secretary of Defense, had met to consider the trainer aircraft program. As a result of this meeting the following decisions were to be submitted for approval; (1) procurement of the T-31 Fairchild trainer would not be made; (2) the existing stock of T-6 trainers would be adequate to carry out the existing pilot training program until approximately 1955; and (3) T-6's would be overhauled at a cost of approximately $16,000 each, which would result in an airplane essentially equal to a new one and with improved handling characteristics. These decisions were based on the reduction of the 6,100 pilot program to a 3,000 pilot program and reduction in the National Guard units and the Reserve program. This reduced

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program would be ample to meet the needs of the Training Command. These proposals were approved by the Vice Chief of Staff, and were cleared and concurred in by both the Secretary and Under Secretary of the AF. However, the Vice Chief of Staff recommended that, subject to review by the Senior Officers Board, procurement be made of three each service test models of the Temco, Beech, and Fairchild trainers. These were the only new trainers known to be available which promised any suitability for mass production in event of an emergency. Therefore, the Vice Chief of Staff believed that these types should be thoroughly evaluated in actual service test training in order to determine the type which would be placed in mass production in event of an emergency. Furthermore, any changes found essential as a result of the service tests should be incorporated in the production drawings so that immediate

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production of a satisfactory war-time trainer could be undertaken.

In accordance with instructions from the Vice Chief of Staff, the Director, Procurement and Industrial Planning, Materiel, issued Procurement Directive [illegible]-5 on 3 August 1[illegible] to AMC directing that immediate action be taken to terminate the procurement

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of the 100 T-31 Fairchild trainers. Also, on the same date the Director, Procurement and Industrial Planning, Materiel, directed

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AMC to obtain cost quotations and delivery dates on three T-31
147 Fairchild trainers, three T-34 Beech trainers, and three T-35 Temco trainers desired for evaluation and service testing.

On 19 August 1949, AMC advised Fairchild that the procurement of the 100 T-31 airplanes had been cancelled. However, the company was requested to submit cost information for three newly manufactured T-31 (XNQ) type aircraft on the following basis: (1) T-31's in the "as is" condition (the XNQ Navy configuration); (2) XNQ with conventional landing gear and all changes recommended by both the 609 Inspection Board and the Evaluation Board; and (3) XNQ with tricycle landing gear and GSO 580 Lycoming engine and changes recommended by both the 609 Inspection Board and the
152 Evaluation Board. Also, costs and delivery dates on the basis of 10 articles in the above-named configurations were requested. When these figures and estimates were submitted to the Director, Procurement and Industrial Planning, on 24 August 1949, the following were quoted for the T-31: $170,000 each for three T-31's (XNQ configuration with no changes) with delivery of first article eight months after definitive contract; $205,000 each for three T-31's, XNQ configuration with changes as determined by 609 and Evaluation Boards and with conventional landing gear, with delivery of first airplane 10 months after date of definitive contract; and $250,000 each for three T-31's, XNQ configuration with changes as determined by 609 and Evaluation Boards except for substitution of a tricycle landing gear and a GSO 580 engine.
153 Delivery of the first article of this last configuration was estimated at 12 months after date of the definitive contract.

The Senior Officers Board met on 29 August 1949 to review the procurement and research and development programs for fiscal year 1950 based on the estimated minimum funds which would be made available as a result of appropriations by the 81st Congress for that period. At this meeting the board considered the proposal to utilize the Fiscal Year 1949 /Supplemental Fiscal Year 1949/ funds which had previously been planned for production of 100 T-31 aircraft for modernizing T-6 aircraft and also for the procurement of three Fairchild T-31, three Beech T-34, and three Temco T-35 trainers. However, General Kessler, Procurement and Industrial Planning, Materiel, recommended that the AF utilize the two XNQ's which had been loaned to the AF by the Navy for the evaluation in lieu of procuring three new models. The board finally concluded that the procurement of the three new models at a high cost was unwarranted because of the availability of the two prototype XNQ's. Therefore, it recommended that the funds proposed for this procurement be utilized to modernize additional T-6's, and that the two XNQ's serve in the competitive

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evaluation with the T-34 and T-35 trainers which were to be procured. Mr. Barrows' approval of this recommendation is shown on the report of the Senior Officers Board.

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The Secretary of the AF wrote to the Secretary of Defense on 4 October 1949 requesting that $7,630,000 of the $8,261,300 originally certified for procurement of 100 T-31's be recertified for modernization of 700 T-6's plus additional spare requirements. Mr. Symington stated that originally the AF had planned to use the T-31 (Fairchild XNQ) in the first training phase and the T-28 (North American) single-engine trainer in the second training phase of the flight training program. Procurement of each of these types was to have been made annually until the wartime built T-6 was phased out. In order to support the 70-Group Program of 6,160 pilots per year, a total of 1,690 T-31's and 1,903 T-28's would have been required. The initial procurement of 266 T-28's and 100 T-31's had been certified for procurement from Fiscal Year 1948 Supplemental funds. However, limitations of the Fiscal Year 1950 and the proposed level of Fiscal Year 1951 funds for aircraft procurement had necessitated lowering the AF pilot training program to a level of 3,000 pilots per year. Also a corresponding reduction in the Reserve and other training programs had made an increased quantity of T-6 trainers available to the AF training program. Although the T-6 was not considered the most suitable or economical for the early stages of AF pilot training, a modernized version was believed to be capable of satisfactorily performing the mission. Thus, the Secretary of the AF believed it to the best interests of the AF to forego the introduction of
157 the T-31 "at present" and to modernize 700 T-6's.

As late as 3 November 1949 the Procurement Division, AMC, was seeking information from Procurement and Industrial Planning, Materiel, relative to the configuration and procurement status of the T-34 Beech and Temco T-35 trainers. The Procurement Division understood that three each of the T-34 and T-35 trainers were to be procured and placed in service test together with the existing two T-31 (Navy XNQ) trainers. Procurement and Industrial Planning, Materiel, advised the Procurement Division on 3 November 1949 that the question of procurement of three each Beech and Temco T-34 and T-35 trainers had been presented at the fifth meeting of the Senior Officers Board on 17 October. Although the board had recommended that the AF proceed with the procurement of these trainers as originally planned, the minutes of the meeting had not been approved by the Chief of Staff or the Secretary of the AF. A procurement directive was to be forwarded to AMC as soon as approval of these
159 minutes was received. Also, Procurement and Industrial Planning, Materiel, stated that the two Navy XNQ's were to be retained by
160 the AF, as negotiations were in progress with the Navy to allow Fairchild to perform certain changes to the airplane.

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1. (U) Ltr., 3 May 1946
Fr: BuAer, Navy Dept., Wash.
To: BuAer Gen. Rep., Central Dist. [WF]
(File: CF-B)

The Navy Dept., BuAer, Wash., forwarded the detail specification of the XNQ-1 primary trainer which was being manufactured by Fairchild, to the BuAer General Rep., Central District, at Wright Field. The first airplane of this type was expected to be flown in July 1946 with the R-680-13 engine installation. That office requested that the Central District obtain similar data on Army development and plans on trainer aircraft from AMC. This information was forwarded by the BuAer Central District to Aircraft Sect., Proc. Div., on 8 May 1946. The detail specification covered the requirements for the design of a single engine, two-place monoplane, to be known as the XNQ-1 airplane. This trainer was to have a gross weight of 3,724 lbs., high speed of 175 mph (151.97 knots) at sea level, service ceiling of 16,000 feet, and a maximum range of 955 statute miles (829 nautical miles) at 1,500 ft. altitude.

2. (U) 2nd Ind., 14 May 1946
Fr: Col. G. E. Schaetzel, Chief, Airc. Sect., Proc. Div.
To: BuAer Central Rep., Central Dist.
(File: CF-B)

Proc. Div. advised the BuAer General Representative that the AAF projected training plane program was still in the tentative stage. However, requirements had been set up in the AAF JX-4 Aircraft program for new primary, basic, and advanced type trainers, but data on the military characteristics were not available to the Command.

3. (U) Ltr., 15 July 1946
Fr: Rear Adm. L. C. Stevens, Navy Dept., BuAer, Wash.
To: Recorder, Aero. Bd.
(File: CF-B)

BuAer had a new primary trainer, the XNQ-1, under development which in general conformed to the specifications "as visualized by joint conferences of the A.A.F. and Naval Training Commands." The [Navy] Detail Specification SD400 and mock-up photographs of the Fairchild XNQ-1 primary trainer were forwarded with this letter and were to be circulated to the AAF for information, comment, and suggestions. BuAer also suggested that the AAF commands be invited to inspect this airplane at the contractor's facility. Preliminary test flight of the airplane was expected to be held in Aug.

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1946. BuAer believed that procurement in addition to the two tests articles on contract for the Navy was necessary in order to conduct thorough evaluation studies for both services. Therefore, the Navy stated a desire to discuss arrangements for a joint Army-Navy procurement of XNQ-1 airplanes.

4. (U) 2nd Ind., 16 Aug. 1946
Fr: Col. G. F. Smith,
Chief, Serv. Engr. Subdiv.
Eng. Div.
To: Navy Dept., BuAer, Wash.
(File: CF-B)

The Navy Dept. letter of 15 July 1946 had been forwarded by 1st Indorsement from the Aero. Bd. to the Eng. Div., for information, comment, and suggestions. Eng. Div. informed the Aero. Bd. that representatives of AC/AS-4, Tng. Com., and AMC had inspected the Fairchild XNQ-1 primary trainer. However, because it did not meet the requirements of the Tng. Com. it had not been included in the Army's requirement schedule.

5. (U) Excerpt from
U. S. Air Services,
Nov. 1946
(File: Ref. Lib.)

The Navy primary trainer, the Fairchild XNQ-1, had recently been successfully tested at Fairchild Aircraft Div. This trainer was a low-wing, all-metal, two-place monoplane with tandem seating, powered by a Lycoming nine-cylinder engine rated at 320 hp. and equipped with an electrically operated retractable landing gear. This trainer had a gross weight of 3,700 lbs., expected rate of climb of more than 1,000 ft. a minute, estimated maximum speed of 170 mph (147 knots), wing span of 41 feet 5 inches, overall length of 27 feet 11 inches, and height of 9 feet 10 inches.

6. (C) Ltr., 12 Dec. 1946
Fr: Brig. Gen. A. R. Crawford,
Chief, Res. & Eng. Div.,
AC/AS-4, Wash.
To: CG, AMC
(File: CF-B)

AMC was advised that Hq. AAF was reviewing military characteristics for new training aircraft which were to replace the trainers then in use in the training program. The Tng. Com. had recommended the development of the PT-BT combination type trainer with tricycle landing gear to replace both the PT-13 and the AT-6 type aircraft. One factor to be considered was the fact that because of budgetary cutbacks the costs of the trainers were to be kept to a minimum.

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To complete this trainer aircraft study, some estimated production costs were requested from AMC. Some of the major points to be reviewed by AMC were:

1. Comparative cost to develop an aircraft and procure 100 articles with military characteristics conforming to those submitted with this letter as compared with procuring 100 tactical aircraft which had already been developed and which would be utilized as trainers in the Tng. Com.

2. Estimate of comparative cost to develop a trainer similar to the AT-6 as compared with cost to develop the same aircraft with a tricycle landing gear.

3. Estimate of savings and/or advantages in developing an aircraft similar to the AT-6 and procuring a quantity of 200 as compared to the cost of developing two separate aircraft and procuring 100 articles of each.

7. (C) Ltr., 27 Mar. 1947
Fr: Lt. Gen. G. E. Stratemeyer,
Comdr., ADC,
Mitchel Field, N. Y.
To: CG, AAF, Wash.
(File: AAG, Wash.)

Air Defense Com. (ADC) submitted a study to CG, AAF which had been prepared by that Command to compare the AT-6 type aircraft with a "new all purpose" trainer manufactured by Fairchild, known as Navy XNQ-1, and also with a hypothetical trainer which had the same initial cost as the AT-6, but which had higher performance characteristics than the XNQ-1 or the AT-6. That Command stated that the XNQ-1 had been chosen for this study rather than some other trainer being manufactured or contemplated for manufacture for the following reasons:

1. The XNQ-1 had already been purchased in small quantities by the Navy and at that time was undergoing exhaustive tests.

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2. Because of the Navy production and tests, considerable factual data were available for study purposes.

3. Close proximity of Fairchild plant to ADC would make it convenient for ADC to visit the plant, study the plane, and test it in flight.

However, the purpose of the study had not been to "sell" the Fairchild trainer, or to imply that it was the best plane available for substitution for the AT-6. But General Stratemeyer stated that as a result of this study, he believed that the Fairchild XNQ-1 appeared to be a highly satisfactory plane to supplant the AT-6, although it might not be the most satisfactory. It was also pointed out by this study that the yearly cost of operating the AT-6 aircraft was considerably higher than the yearly cost of operating the XNQ-1 or the hypothetical trainer. ADC believed that the study left no doubt, from an operational and economic standpoint, that the AT-6 should be supplanted as rapidly as possible by a new type all purpose trainer for the Air Reserve program as well as the whole AF program.

8. (U) Ltr., 31 Mar. 1947
Fr: Rear Adm. C. A. Nicholson, BuAer, Navy Dept., Wash.
To: CG, AMC
Thru: BuAer Gen. Rep., WF
(File: CF-B)

The Model XNQ-1 experimental training airplane was scheduled to be sent to the Naval Air Test Center, Patuxent River, Md., to begin final demonstration and service acceptance trials during the first week of May 1947. The Navy invited AMC to send a representative board to the Test Center to attend and participate in the final demonstration and service acceptance trials.

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9. (U) Ltr., 18 Apr. 1947
Fr: Maj. Gen. E. E. Partridge, Asst. C/AS-3, Wash.
To: CG, ADC, Mitchel Field, N. Y.
(File: AAG, Wash.)

AC/AS-3, Wash., advised ADC that Hq. AAF and ATC had thoroughly investigated the Navy XNQ-1 trainer and had determined that it did not fulfill the military characteristics established for trainers which would be utilized in a new concept of a combined primary-basic training program. Also it was pointed out that the Navy evaluation of its trainer had not been completed. In addition, AC/AS-3 stated that because of current fiscal limitations and time-consuming task of manufacturing and accepting a new type of trainer aircraft, procurement objectives would have to be postponed until FY 1949. Hq. AAF considered the replacement of AT-6's with a similar type of training aircraft or the continuation of AT-6's for Air Reserve pilot training as undesirable. It was also believed that pilot training with AT-6's would not be of adequate value for mobilization assignments of Air Reservists. Hq. AAF realized that use of tactical aircraft, such as 51's, P-47's, B-25's, A-26's, and C-47's which were in excess of AAF requirements, would increase the hourly flying costs and reduce the number of personnel to receive pilot training, but it was believed by that headquarters that the AAF would benefit more by use of the tactical types. ADC representatives were requested to attend a conference at Hq. AAF on 28 April 1947 concerning utilization of tactical aircraft for the Air Reserve training in FY 1948.

10. (C) Memo, 24 Apr. 1947
Fr: Brig. Gen. Thomas S. Power, Dep. Asst. C/AS-3, Wash.
To: CG, AAF, Wash.
(File: AAG, Wash.)

The Dep. Asst. C/AS-3 briefed the CG, AAF on the ADC's recommendation for replacing the AT-6 trainer with a new type all-purpose trainer, with consideration being to the Fairchild Navy XNQ-1. Several conferences held between ATC, ADC, and Tng. Div. of AC/AS-3 had resulted in a new set of characteristics for a primary-basic type training aircraft. However, the Fairchild XNQ-1 was too light and too slow, and there was no existing type which

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would satisfy the military characteristics required. At a previous conference, the Deputy Commander of the AAF had expressed the opinion that the AT-6 was of doubtful value and had suggested that a revised program be developed before 30 June 1947 to replace AT-6's with service type, such as A-26, B-25, C-47, P-47, and P-51. These types were at the time available in sufficient numbers, and AC/AS-3 stated that unless utilized by the Air Reserve they would be "cocooned" or declared surplus and lost to the AAF.

11. (U) Wire, 9 May 1947
Fr: BuAer, Wash.
To: CG, AMC
Thru: BuAer, Central Dist., WF
(File: CF-B)

The Navy advised AMC that the Model XNQ-1 experimental primary trainer was to be flown by the contractor to the Naval Air Training Center, Patuxent River, Md., on 12 May 1947 for final demonstration.

12. (U) Wire, 12 May 1947
Fr: AC/AS-3, AAF, Wash.
To: CG, AMC
(File: CF-B)

On 12 May 1947, AC/AS-3, Washington, stated that the Navy was contemplating construction evaluation acceptance tests 20 May at Navy Patuxent Air Base. Personnel of AMC were to be alerted for readiness to participate in these tests.

13. (U) Wire, 23 May 1947
Fr: Hq. AAF, Wash.
To: CG, AMC
(File: CF-B)

The 28th of May 1947 had been set as the date of construction evaluation acceptance test of Fairchild trainer XNQ-1 at Navy's Patuxent River Air Base. The "Phase O" tests of this trainer were of primary interest to the AAF. Hq. AAF requested a report from AMC on results of the observations and suitability of this trainer.

14. (U) Ltr., 3 June 1947
Fr: Col. C. F. Smith,
Chief, Airc. Proj. Sect.,
Eng. Div.
To: Naval Air Test Center,
U. S. Naval Air Station
Patuxent River, Md.
(File: CF-B)

AMC expressed its appreciation to the Navy for the Navy's co-operation in making the XNQ-1 available for evaluation.

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15. (U) Ltr., 4 June 1947
Fr: Col. G. F. Smith,
Chief, Airc. Proj. Sect.
Eng. Div.
To: AC/AS-4, Wash.
(File: CF-B)

Colonel A. T. Culbertson and W. A. Summerfelt of AMC witnessed the XNQ-1 Navy trainer trials at Patuxent River Naval Station on 28 May 1947. Although military characteristics for this type of aircraft or specific information on which to base the evaluation were not available, the AAF personnel decided to examine the technical details of the aircraft and to fly it to determine its general handling characteristics. The design of the airplane appeared extremely clean, with emphasis on ease of maintenance. The AMC personnel considered the airplane satisfactory from an engineering standpoint. However, its value as an AAF trainer was questioned because of its light weight, low power, and conventional landing gear. It was believed that it might be used for Air Reserve or Air National Guard training or as an emergency expedient to meet training requirements. However, this was a matter for A-3 /Hq. AAF/ Req. Sect. and the ATC to decide.

16. (C) 1st Ind., 21 July 1947
Fr: Brig. Gen. J. S. Stowell,
Chief of Adm., AMC
To: AC/AS-4, Wash.
(File: CF-B)

AMC had completed a review of the training aircraft at the request of the Hq. AAF. At the time there were no training aircraft which would meet the proposed "PT-HT" military characteristics which had been submitted by Hq. AAF. AMC believed that attainment of the desired high speed of 275 mph (238.71 knots) at tactical operating altitude would necessitate a power plant of at least 700 hp. The aircraft, as a result, would be larger and considerably more expensive than the PT or HT airplanes of World War II. Also it was believed that the maintenance would be approximately double that of the existing AT-6 because of the complicated equipment, high engine horsepower, and greater weight. It was believed that the most economical approach to insure at least an interim trainer would be to purchase an aircraft which had been built and flown. The PT-13, AT-6, or Navy Fairchild XNQ-1 were suggested. For maximum utility and minimum initial cost,

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AAC believed the Navy XNQ was the most desirable of the three models. It was believed that this aircraft could be purchased at a cost of approximately $45,000 per unit for first 75 airplanes, $35,000 per unit for first 150, $28,000 per unit for 300, or $22,000 for quantity of 600. The Navy had indicated that it would participate in a program for procurement of the XNQ airplane and thus reduce the cost. Another factor pointed out was that it would be approximately FY 1950 before production could be started on the proposed "PT-BT" airplane, if a development program were carried out and production engineering and tooling subsequently established. However, the PT-13, AT-6, or the XNQ production could be started in 1948.

16A. (U) Excerpt from Rpt. of C/S, USAF, to Secy. of the AF for FY ending 30 June 1948 (File: Hist. Office)

Under the section dealing with the flying training of the Tng. Div., Ops., it was reported that the AF had trained over 190,000 pilots up to the time Japan surrendered. At the end of the war the pilot training program had been cancelled because of the large surplus of well-trained pilots. However, it was realized that this surplus would dwindle as pilots passed the effective combat age, or as their availability was lost through death, retirement, relief from active duty, or physical incapacity. In order to remedy anticipated shortages in pilot personnel, the pilot-training program was revived in 1946. In FY 1948, 716 pilots were trained, and at the end of that period the yearly output rate had been increased to 984. It was realized that this rate would not be sufficient to man and provide replacements for a 70-Group AF, or to provide a reserve necessary to allow for immediate expansion of the AF in case of war. The pilot training program was to be increased in FY 1949 to 3,000 pilots per year. The training rate would be increased each year thereafter until the ultimate objective of approximately 6,000 pilots per year was reached. This number

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would be sufficient to support the 70-Group Program. It was realized that the new pilots would have to be prepared to fly much higher, faster, and farther than pilots of previous years. To meet this change, many of the phases of former training had been consolidated. The primary phase of training had been eliminated, and the pilots in the future were to begin their flying and complete the basic course in the former advanced trainer, the AT-6. Until the new basic trainer, the T-28, was developed, the advanced training of student pilots was to be accomplished in the current tactical types, the F-51, F-80, and the B-25.

17. (U) Ltr., 9 Sept. 1948
Fr: Fairchild Aircraft Div.
Fairchild Engine & Airplane Corp., Hagerstown, Md.
To: C/S, USAF, Wash.
(File: Airc. & Missiles Sect., Proc. Div.)

Fairchild had designed, manufactured and delivered to the BuAer, Navy Dept. two flight articles of the experimental primary training airplane Model XNQ-1 in accordance with requirements of Navy contract NOa(s) 6662. The evaluation test results of the Navy Dept. and USAF personnel indicated the desirability of increasing the performance characteristics of the airplane by installing a high powered engine. Fairchild was desirous of initiating a development program covering the installation of a higher powered engine in the Model XNQ in order to develop a trainer airplane which would more nearly meet the requirements of both AAF and Navy. However, in order to initiate such a program it was essential that one of the Model XNQ-1 airplane then in the custody of the Navy Dept. be loaned to Fairchild for approximately four months. Fairchild requested the loan of Model XNQ-1 airplane bearing BuAer Serial #75725. After tests of the aircraft had been accomplished it was to be returned to its original configuration prior to redelivery to the Air Force.

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13. (U) Ltr., 13 Sept. 1948
Fr: Maj. Gen. E. M. Powers,
Asst. Dep. C/S, Mat.,
USAF, Wash.
To: BuAer, Navy Dept., Wash.
(File: Airc. & Missile Sect.,
Proc. Div.)

Asst. Dep. C/S, Mat. requested that BuAer arrange to loan Model XNQ-1 airplane, serial #75725, to the USAF for loan by the AF to Fairchild under an existing blanket bailment agreement between Fairchild and the AF. The purpose of this loan was to permit Fairchild to increase the performance characteristics of the airplane by installing a higher powered engine.

19. (C) Memo., 30 Sept. 1948
Fr: Brig. Gen. K. P. McNaughton,
Actg. Dir., Tng. & Req.,
Ops., Wash.
To: Dep. C/S, Mat., Wash.
(File: R&D, Wash.)

Tng. & Req. of Dep. C/S, Ops., notified the Dep. C/S, Mat., that a new pilot training program had been approved. This program would require procurement of a PT-BT airplane in the 3,500-4,000-lb. weight class with the following delivery schedule: 44 by Jan. 1950, 114 by Apr. 1950, and 176 by July 1950. Tng. & Req. recommended that the Navy Fairchild XNQ-1, which met these requirements, be procured from FY 1949 funds. This memo. was co-ordinated by Tng. Div., Req. Div. and Asst. for Programming of Dep. C/S, Ops., and by the Dir. of Program Standards & Cost Control of the Comptroller. The Asst. for Programming of Dep. C/S, Ops. made a notation on the memo. indicating that since all FY 1949 funds had been earmarked, the PT-BT procurement from 1949 money would require diversion of funds. That office "co-ordinates with the proviso that the necessary diversion be co-ordinated" by them.

20. (C) Memo., 2 Oct. 1948
Fr: Brig. Gen. A. A. Kessler, Jr.,
Dir., Proc. & Indust. Plan.,
Dep. C/S, Mat., Wash.
To: Gen. Powers,
Asst. Dep. C/S, Mat., Wash.
(File: R&D, Wash.)

The Dir., Proc. & Indust. Plan., Mat., informed Gen. Powers, Asst. Dep. C/S, Mat., that all funds in the Supplemental 1948 budget for the procurement of aircraft had been committed. However, Proc. & Indust. Plan., believed that funds for the introduction of NQ production at Fairchild could be provided by reducing the North American T-28 contract by approximately 76 aircraft. This would not affect the availability of T-28's, but would allow for procurement of approximately 100 NQ trainers sufficient to get the production started and carry it through FY 1950.

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However, additional funds would be required from FY 1950 budget to procure the additional NQ trainers.

21. (U) Ltr., 4 Oct. 1948
Fr: BuAer, Navy Dept., Wash.
To: Asst. DCS/Mat., Wash.
(File: Airc. & Missiles Sect., Proc. Div.)

BuAer was fulfilling the AAF request for loan of the Model XNQ trainer. This aircraft was to be ferried from Naval Air Test Center, Patuxent River, Md., on or about the first of Oct. 1948. It was to be delivered into the custody of AMC representative at Fairchild factory at Hagerstown, Md.

22. (C) Memo., 13 Oct. 1948
Fr: Dir., Proc. & Indust. Plan., Dep. C/S, Mat., Wash.
To: Air Comptroller, Wash.
Dep. C/S, Ops., Wash.
Dep. C/S, Mat., Wash.
C/S Wash.
(File: R&D, Wash.)

Proc. & Indust. Plan., Mat., stated that the revised pilot training program had been approved to promote greater efficiency and increase economy of operation. This change in program had generated a procurement requirement from Supplemental 1948 funds for a primary basic trainer in the 3,500 to 4,000-lb. class. The Fairchild XNQ airplane met the requirement for this aircraft. However, there were no funds available in Supplemental 1948 budget to provide for procurement of this aircraft. Thus, it had been proposed to reduce the quantity of 266 North American T-28's then under procurement by about 76 articles to provide for procurement of approximately 100 Fairchild trainers. Because of "the lead time" involved, this would not adversely affect the T-28 availability from production provided additional T-28's were procured from FY 1950 funds. Proc. & Indust. Plan. recommended that FY 1949 Aircraft Program be amended to provide for reduction of quantity of T-28's then on contract from 266 to 190, and to authorize procurement of 100 Fairchild XNQ type trainers from money made available by this reduction on T-28 procurement. Approval by the following offices is shown on this document: Director of Proc. & Indust. Plan.; Asst. of Logistics Plan., Mat.; and Gen. Powers, Dep. C/S, Mat.

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23. (C) Memo., 13 Oct. 1948
Fr: Col. G. P. Disosway,
Actg. Chief, Tng. Div.
Directorate of Tng. &
Req., Wash.
To: Gen. Powers,
Asst. Dep. C/S, Mat., Wash.
(File: R&D, Wash.)

On 13 Oct. 1948, Tng. Div., Directorate of Tng. & Req., informed Gen. Powers, Mat., that the flying training program at that time faced several serious problems. It was believed that the curriculum at that time was unduly expensive. Although all basic training was being given in T-6 aircraft, Tng. Div. planned to replace that aircraft, as it wore out, with the T-28, a 6,000-lb., 800-hp. trainer. However, the T-28 would not "fit into" the economy program necessitated by future budget limitations if used as an all-through trainer. It was also believed that procurement of as large an aircraft as the T-28 in quantities required in the event of mobilization would aggravate the wartime shortage of strategic materials. Consequently the pilot training program had been revised and approved by the C/S to attain a solution to these problems. This program, which was to be implemented by the ATC, was to change the ratio of trained graduates from 67% twin-engine and 33% single-engine to 20% twin-engine and 80% single-engine training. Thus the increased single-engine training requirement would bring earlier shortages in single-engine training aircraft. To further reduce the cost of training, a lighter single-engine basic trainer (3,500 to 4,000 lbs.) was being introduced into the program to be used in the first 130 hrs. of flying. Tng. Div. believed that the introduction of a basic trainer of the XNQ type would release T-6's and T-28's for use in the advanced phase.

24. (C) Memo., 19 Oct. 1948
Fr: Gen. Muir S. Fairchild,
Vice C/S, USAF, Wash.
To: Dep. C/S, Ops., Wash.
Dep. C/S, Mat., Wash.
The Comptroller, Wash.
(File: AAG, Wash.)

The Vice C/S, USAF, informed the Dep. C/S, Mat., the Dep. C/S, Ops., and the Comptroller, USAF, on 19 Oct. 1948 that the Secy. of the AF had approved for implementation several proposals submitted by the C/S concerning the aircraft procurement program. Among the proposals for implementation was the procurement of enough Fairchild XNQ trainers to establish a production line which might be followed

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with FY 1950 funds. It was estimated that this number would be approximately 150 articles costing approximately $9,000,000 to $10,000,000.

25. (C) Wire, 20 Oct. 1948
Fr: Asst. Dep. C/S, Mat., Wash.
To: CG, AMC
(File: Office, CG for Ops.)

The Asst. Dep. C/S, Mat., Wash., notified AMC that the Secy. of the AF had approved for implementation some proposals submitted by the C/S, USAF, concerning the aircraft procurement program. AMC was to take appropriate action regarding the procurement of enough Fairchild NQ primary-basic trainers to establish a production line which might be followed with fiscal year 1950 funds.

26. (C) TI-2249, Add. #4, 27 Oct. 1948
(File: Hist. Office)

This TI initiated action for changes in the current aircraft procurement program and planning for future procurement programs approved by the Secy. of the AF. Among the programs planned was the 150 Fairchild NQ type aircraft at a cost of approximately $9,000,000 to $10,000,000. This procurement would establish a production line for primary-basic trainers which might be continued, utilizing FY 1950 funds when available.

27. (C) Memo., 29 Oct. 1948
Fr: W. Stuart Symington, Secy. of the AF, Wash.
To: Mr. [James V.] Forrestal, Secy. of Defense, Natl. Mil. Estab., Wash.
(File: Hist. Office)

Mr. Symington, Secy. of the AF, advised Mr. Forrestal, Secy. of Defense, that an evaluation of the Navy XNQ trainer and the review of the AF flight training program had been completed. As a result, it was believed that utilization of the Fairchild NQ trainer in the first 130 hours of flight training and the T-28 in the succeeding 135 hours in lieu of the entire time on the T-28 would result in major economies in initial investment, maintenance, upkeep, and gasoline consumption. In order to effect these economies, the AF planned to procure a quantity of the Fairchild NQ trainers. To initiate the program the AF proposed to procure 100 NQ Fairchild trainers at a total cost of $8,261,500. The money for this procurement was to be made available from funds resulting from cancellation of 58 F-87's, 30 RF-87's,

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and 100 F-84's. Approval of this action by the Under Secy. of the AF appears on this document.

28. (C) Ltr., 29 Oct. 1948
Fr: Gen. J. T. McNarney, CG, AMC
To: C/S, USAF, Wash.
(File: Hist. Office)

Gen. J. T. McNarney, AMC, requested authorization from C/S, USAF, to contract "immediately" for 100 NQ trainers at a unit price of $82,615 or total price of $8,261,500. Approval of the action by Gen. Hoyt S. Vandenberg, C/S, USAF, is shown on this document.

29. (U) Ltr., 5 Nov. 1948
Fr: Fairchild Airc. Div.,
To: CG, AMC
(File: Airc. & Missiles Sect., Proc. Div.)

Although BuAer had agreed to loan an XNQ-1 airplane to Fairchild through the USAF, and the aircraft had been delivered to the contractor for modification, bailment instructions covering the loan of the aircraft had not been received. Since the contractor was to make test flight of the aircraft within a couple of months, Fairchild requested that action be taken at the earliest possible date to initiate bailment instructions. The period of bailment to be covered by this instruction was to extend from 12 Oct. 1948 to approximately 12 Feb. 1949.

30. (U) Ltr., 9 Nov. 1948
Fr: Col. G. E. Schaetzel, Chief, Airc. & Missiles Sect., Proc. Div.,
To: C/S, Mat., Wash.
(File: CF-B)

Proc. Div., AMC, advised the Dep. C/S, Mat. (Wash.), that the designation T-51A had been assigned to the procurement of the Fairchild trainer, Navy designation XNQ.

31. (U) Ltr., 9 Nov. 1948
Fr: Brig. Gen. A. A. Kessler, Jr., Dir., Proc. & Indust. Plan., Dep. C/S, Mat., Wash.
To: BuAer, Dept. of Navy, Wash.
(File: R&D, Wash.)

Dir., Proc. & Indust. Plan., Mat. requested BuAer's approval of loan of XNQ airplane, Serial No. 75726, by the AF to Fairchild under the existing blanket bailment agreement. Fairchild wished to overhaul this aircraft so its performance characteristics would be those of a new aircraft. Also the AF desired to evaluate the XNQ airplane Serial No. 75725 with airplane Serial No. 75726 to determine which was more suitable for needs of the AF.

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32. (U) R&R-1, 10 Nov. 1948
Fr: Col. G. E. Schaetzel, Chief, Airc. & Missiles Sect., Proc. Div.
To: Tng. & Trans. Br., Airc. & Missiles Sect., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Airc. & Missiles Sect., Proc. Div., requested Tng. & Trans. Br., Proc. Div., to take necessary action to initiate bailment instructions covering the loan of Navy Model No. 75725 to Fairchild Aircraft. Gen. McNaughton, Director, Tng. & Req., had advised AMC that plans had been made to fly both versions of the XNQ airplane with R-680-10 and GSO-580 engines at Hagerstown to compare their flight characteristics.

33. (U) Memo., 12 Nov. 1948
Fr: Lt. Col. G. W. Graham, Chief, Tng., Trans., & Spec. Airc. Br., Proc. Div.
To: Trainer Unit, Tng., Trans. & Spec. Airc. Br., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Tng., Trans. & Special Airc. Br., Proc. Div., directed Trainer Unit, Proc. Div., to take necessary action to bail the Navy XNQ trainer to Fairchild under blanket bailment contract ac-11023. Beech Aircraft Corp. had modified their Bonanza aircraft to meet the "expressed desires" of the ATC. Tng., Transp., & Special Airc. Br. believed that the normal approach to this situation would be to have some type of competition between the modified Beech Bonanza and the XNQ type aircraft, with a set of military characteristics as a basic for such a competition.

34. (U) R&R-1, 16 Nov. 1948
Fr: Maj. N. F. Bardell, Tng. Div., Directorate of Tng. & Req., Wash.
To: Dir., R&D, Wash.
(File: R&D, Wash.)

Tng. & Req., /Dep. C/S, Cps./ advised R&D, Mat., that the Tng. Div. had taken steps to arrange an evaluation and flight test of the new XNQ trainer at Fairchild-Hagerstown within a couple of weeks. The test was to include a comparison between two XNQ models; one equipped with a 300-hp. radial engine, and the other with a 350-hp. flat engine. The evaluation was to be attended by representatives of Hq, USAF, AMC, ATC, and the Navy. Tng. & Req. desired the attendance of representatives of R&D at this evaluation.

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35. (U) R&R-1, 16 Nov. 1948
Fr: Col. G. E. Schaetzel, Chief, Airc. & Missiles Sect., Proc. Div.,
To: Engine Br, Airc. Sect., Supply Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Airc. & Missiles Sect., Proc. Div., requested Supply Div., to investigate the availability of the R-680-13 Lycoming engine for use on a trainer aircraft, designated the XNQ-1. This information was to include engines stored in AF stock, surplus, War Assets Administration (WAA) and any other Govt. agency, and the number of new engines, serviceable, and repairable engines.

36. (U) R&R-1, 19 Nov. 1948
Fr: Col. G. E. Schaetzel, Chief, Airc. & Missiles Sect., Proc. Div.
To: Bailment & Sales Br., Servs. Sect., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Airc. & Missiles Sect., Proc. Div., instructed Bailment & Sales Br., Proc. Div., to prepare bailment instruction to Fairchild covering the loan of one Navy Model XNQ-1. This aircraft was to be bailed for the purpose of performing test flights in order to determine the performance of the plane using GSO-580 Lycoming engine. These flight characteristics were to be used for comparison with R-680-10 engine originally installed in the Navy XNQ-1. Bailment instructions were to extend from 12 Oct. 1948 to 12 Feb. 1949.

37. (U) Bailment Instruction 48C to Blanket Bailment Agree. W33-038 ac-11023, 22 Nov. 1948 Fairchild Airc. Corp. Fairchild Engine & Airplane Div.
(File: Contr., Proc. Div.,

Bailment Instructions No. 48C to Bailment Agreement ac-11023 with Fairchild provided for loan of Navy Model XNQ-1 aircraft, BuAer Serial No. 75725, for purposes of performing test flights in order to determine the performance of the XNQ-1 airplane employing the GSO 580 Lycoming engine. This period of bailment was to expire on 28 Feb. 1949.

38. (C) Ltr., 22 Nov. 1948
Fr: James Forrestal, Secy. of Defense, Natl. Mil. Estab., Wash.
To: The President, White House, Wash.
(File: Hist. Office)

Mr. Forrestal, Secy. of Defense, recommended that the President approve the release of funds in the amount of $109,220,000 for procurement of 48 F-39, 110 F-94, and 100 MQ aircraft. Cancellation of the procurement of the XF-87 and /RF-87/ at a cost of $80,220,000, which had been approved by the President on 28 May 1948, left this sum available for alternative procurement. Also, procurement of the F-84 aircraft in the amount of $29,000,000 which had been included in

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the $103,630,000 approved by the President on 16 Sept. 1948 had been withheld. The Dept. of the AF proposed to procure the F-89, F-94, and MQ airplanes with this $109,220,000 ($80,220,000 and $29,000,000). On the basis of recommendations of the Dept. of the AF, review and comments of the Munitions Board and the Research and Development Board, and his own review of the matter, Mr. Forrestal concluded that the change was warranted.

39. (U) Wire, 23 Nov. 1948
Fr: Proc. & Ind. Planning, Dep. C/S, Mat., Wash.
To: Servs. Sect., Proc. Div.
(File: Airc. & Missile Sect., Proc. Div.)

Dep. C/S, Mat., Wash., stated that one XNQ-1 airplane, BuAer No. 75725, had been delivered by the BuAer, Navy Dept., to the Fairchild factory at Hagerstown, Md., for the purpose of conducting comparative flight tests for the USAF with the engine modified. Any overhauling or tuning up required was to be accomplished by Fairchild at company expense.

40. (U) R&R-2, 23 Nov. 1948
Fr: Col. R. W. Finn, Chief, Airc. Sect., Supply Div.
To: Trainer Unit, Airc. & Missiles Sect., Proc. Div.
(File: Contr., Proc. Div.)

Supply Div. stated that only two R-680-13 serviceable engines were in USAF stock. An inquiry was being made to determine the quantity of new, serviceable, and repairable R-680-13 engines which might be available from War Assets stock.

41. (U) Ltr., 26 Nov. 1948
Fr: Fairchild Aircraft Div.
To: CG, AMC
(File: Airc. & Missiles Sect., Proc. Div.)

Fairchild requested that XNQ-1 airplane Serial No. 75726 be bailed to them for the purpose of performance comparison with XNQ-1, Serial No. 75725. This bailment period was to extend from 16 Nov. 1948 to 28 Feb. 1949.

42. (U) Amend. #1 to Blanket Bailment Agree. W33-038 ac-11023, 6 Dec. 1948
(File: Contr., Proc. Div.)

Amendment No. 1 to Bailment Instruction 48C of blanket bailment agreement W33-038 ac-11023 provided for bailment of Navy Model XNQ-1 aircraft, BuAer Serial No. 75726, to Fairchild. This aircraft was to be used for comparison with GSO-580 Lycoming engine installed in XNQ-1 Serial No. 75725.

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43. (U) Ltr., 9 Dec. 1948
Fr: Beech Airc. Corp., Wichita, Kan.
To: Capt. M. S. Stok, Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Beech Aircraft Corp. submitted photographs and a news release announcing the first flight of their Mentor Model 45. That company hoped to present this aircraft to USAF for evaluation. The Mentor Model 45, a single-engine, all-metal, two-place primary and basic-advanced trainer had made its initial flights from the Beech Field, Wichita, Kan., on 2 Dec. 1948. This aircraft, developed from the Beechcraft Bonanza, was powered by a Continental E-185 engine. The first official engineering estimates indicated that it would have a cruising speed of 160 mph /138 knots/ at 10,000 ft., a true air speed of 176 mph /152 knots/ at sea level, and a permissible indicated maximum dive speed of 280 mph /243 knots/. Beech indicated that it could produce and deliver this new trainer in quantities for less than $20,000 complete.

44. (C) Ltr., 17 Dec. 1948
Fr: Maj. Gen. E. M. Powers, Actg. Dep. C/S, Mat., Wash.
To: CG, AMC
(File: Hist. Office)

Actg. Dep. C/S, Mat., Wash., notified AMC that the Secy. of Defense had certified to the President and requested release of $8,261,500 for 100 T-31 aircraft. AMC was to proceed with immediate negotiations leading to this procurement. However, any action taken was to be confined solely to negotiation, with no commitments made until the funds had been released.

45. (S) Ltr., 20 Dec. 1948
Fr: Gen. J. T. McNarney, CG, AMC
To: Dep. C/S, Mat., Wash.
(File: Hist. Office)

AMC had reviewed the proposed 48 Group Planning Program as requested by Hq. USAF. AMC made some recommendations as to particular tooling, facilities and scheduling in event the program was adopted by the AF for FY 1950. Originally the T-31 had been scheduled for 24 articles per month peak rate. However, to fill possible Navy requirements and to provide "some mobilization potential" at a very nominal cost, AMC recommended that tooling and facilities be provided for a peak rate of 50 per month.

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46. (U) R&R-1, 22 Dec. 1948
Fr: Brig. Gen. H. Shepard, Chief, Proc. Div.
To: Chief, Airc. & Missiles Sect., Proc. Div.
(File: Hist. Office)

Chief, Proc. Div., AMC, directed Airc. & Missiles Sect., Proc. Div., to proceed with immediate negotiations leading to procurement of 100 T-31 aircraft as directed by Hq. USAF letter of 17 Dec. 1948. AMC action was restricted solely to the negotiations. However, GFP lists, interim reports, purchase requests, and findings and determinations were to be prepared, and any other action was to be taken that would help in permitting placement of the contracts for the airplanes and GFP as soon as funds were released.

47. (U) Memo., 22 Dec. 1948
Fr: Lt. Col. D. W. Graham, Chief, Tng., Trans., & Special Airc. Br., /Proc. Div./
To: Mr. N. Silverston, Tng., Trans. & Special Airc. Br., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Tng., Trans., & Special Airc. Br., Proc. Div., directed that action be taken to conduct preliminary negotiations for 100 T-31 Fairchild trainers. A budget of $8,261,500 had been established for this procurement, although no commitments were to be made at that time. Proc. Div. was to co-ordinate the specification, prepare the GFP list, and arrange for an inspection of the two Navy aircraft which had been bailed to Fairchild. For cost estimating purposes, General Wolfe, /Chief, Proc. & Indust. Mobilization, AMC/, had directed that the radial engine be used for this trainer.

48. (U) R&R-1, 23 Dec. 1948
Fr: Col. R. W. Finn, Chief, Airc. Sect., Supply Div.
To: Tng., Trans. & Special Airc. Br., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Supply Div. stated that screening of R-680-13 engines in War Assets stocks indicated that no engines were available for return to USAF. All engines of this model in War Assets stock were either used or scrap, and the two in USAF stock had also been used.

49. (U) R&R-1, 23 Dec. 1948
Fr: Col. B. I. Funk, Chief, Airc. & Missiles Sect., Proc. Div.
To: Tng., Trans. & Special Airc. Br., Proc. Div.
With: R&R-2, 23 Dec. 1948
(File: Airc. & Missiles Sect., Proc. Div.)

Hq. USAF authorized AMC to proceed with negotiations to procure 100 T-31A airplanes from Fairchild. The Chief, Airc. & Missiles Sect., Proc. Div., instructed Tng., Trans. & Special Airc. Br. to take necessary action to prepare GFP lists, interim reports, purchase requests, findings and determinations and accomplish any action which would serve to expedite

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placement of aircraft contracts as soon as funds were released. The R-680-10 engine was the only engine to be considered for this aircraft. Tooling was to be procured for a maximum rate of 50 per month. Also an immediate mock-up or 689 inspection was requested in order to determine the changes considered necessary by ATC, USAF personnel, Navy, and AMC to reach definite configuration. By R&R-2 on 23 Dec. 1948, Tng., Trans. & Special Airc. Br. recommended that the R-680-13 which was then installed in the XNQ-1 remain in use until the availability of that engine had been determined.

50. (U) Wire, 23 Dec. 1948
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: Dep. C/S, Mat., Wash.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Proc. Div., AMC, notified Dep. C/S, Mat., Wash., that an inspection was to be made of the Fairchild XNQ to determine the configuration of the T-31 trainer. This inspection was to be held at Fairchild Aircraft, Hagerstown, Md., on the 5th of January 1949. Hq. USAF was requested to notify the appropriate agencies, including the Navy.

51. (U) Ltr., 23 Dec. 1948
Fr: Texas Eng. & Mfg. Co., Inc.,
Dallas, Tex.
To: Mr. N. Silverston,
Proc. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Texas Eng. & Mfg. Co. informed AMC that its military type primary trainer would be ready for demonstration and flight test on 15 Jan. 1949. This aircraft was of all-metal construction, low-wing monoplane type, having hydraulically operated landing gear and flaps, and with tandem seating arrangement, cockpit controls, instruments, and canopy similar to those of the AT-6. The initial prototype had been thoroughly tested to assure performance that met all the requirements of AF training. A price of $12,000 was given for production of this aircraft in quantities for the AF.

52. (U) Ltr., 23 Dec. 1948
Fr: Fairchild Airc. Div.
To: Airc. & Missiles Sect.,
Proc. Div.
(File: CF-B)

Fairchild informed AMC that the model NQ trainer with the Lycoming R-680-13 engine installed would be available at Fairchild for AF procurement inspection on 5 Jan. 1949.

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53. (U) Memo., 28 Dec. 1948
Fr: Mr. A. S. Barrows,
Under Secy. of AF
To: Gen. Craig,
Dep. C/S, Mat., Wash.
(File: R&D, Wash.)

Mr. Barrows, Under Secy. of the AF, asked Gen. Craig, Dep. C/S, Mat., whether procurement of the Fairchild T-31 (Navy designed NQ) trainer should not be held up at least until there had been an opportunity to answer some questions as to advantages of this procurement vs. "off-the-shelf" procurement of Beech trainers. Mr. Barrows understood that Beech had a new trainer about the size of the Fairchild NQ, but which would cost about 1/3 to 1/2 as much as the Fairchild.

54. (U) R&R-1, 29 Dec. 1948
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: BuAer, Navy Dept.,
Central Dist.
(File: CF-B)

Airc. & Missiles Sect., Proc. Div., requested BuAer, Navy Dept. Central Dist., to initiate correspondence with the Navy Dept. to ascertain the availability of new Lycoming R-680-13 engines in Navy stock. Proc. Div. personnel had been advised that 40 of these new engines were in Navy stock.

55. (U) R&R-1, 29 Dec. 1948
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles
Sect., Proc. Div.
To: Aero. Equip. Sect.,
Proc. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Airc. & Missiles Sect., Proc. Div. requested that Aero. Equip. Sect., Proc. Div., investigate the availability and prices to the Govt. for the R-680-13 Lycoming engine which various commercial supply companies had purchased as war surplus engines from WAA. Also the possibilities of WAA reclaiming these new engines was to be investigated.

56. (U) Memo., 30 Dec. 1948
Fr: Brig. Gen. D. L. Putt,
Dir., R&D, Wash.
To: Asst. Dep. C/S, Mat., Wash.
(File: R&D, Wash.)

R&D, Mat. submitted a comparison of the Fairchild T-31 and the Beech-45 to the Asst. Dep. C/S, Mat. on 30 Dec. 1948. It was estimated that the total over-all airframe cost figure including spares for the 100 Fairchild trainers would be $82,000 whereas the figure for the Beech-45 would be $18,900. AMC had indicated that Fairchild's backlog on current military orders of C-119 would utilize practically all of Fairchild's existing production capacity. It was also anticipated that Fairchild's mobilization capacity would be utilized to produce combat transports which would be required in large numbers. However, Beechcraft was not producing

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combat military aircraft, and thus could in event of an emergency, devote its efforts to trainers. Delivery of the Beech trainer could be expected within six months at the rate of 16 aircraft per day, or in event of emergency at the rate of 30 to 40 per day by subcontracting. Fairchild, however, would require one year to begin deliveries, with peak capacity of 50 per month, although by subcontracting, the quantity would increase considerably. R&D was of the opinion that training in tricycle gear type aircraft would eliminate a large number of landing accidents inherent in any training program where conventional type gear was used. R&D did not feel that it could support any arguments in favor of direct procurement of the XNQ aircraft. However, the ATC program at that time called for a trainer of 3,500 to 4,000 lbs. with a conventional type gear, and the Beech aircraft did not meet these specifications. R&D recommended that a committee be appointed to evaluate existing and available aircraft of this type, and the best article be procured as a result of this comparative evaluation.

57. (U) Wire, 30 Dec. 1948
Fr: Fairchild Airc. Div.
To: Airc. & Missiles Sect., Proc. Div.
(File: CF-B)

Fairchild submitted an estimate of $4,800,000 for procurement of 100 NQ trainers at a maximum production rate of 25 per month. The airplanes were to be built to Navy Specification SD-400C dated 1 April 1948 and were to incorporate Lycoming R-680-13 engine.

58. (U) R&R-1, 30 Dec. 1948
Fr: Lt. Col. D. W. Graham, Chief, Tng., Trans., & Special Airc. Br., Proc. Div.
To: Airc. & Missiles Sect., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Hq. USAF had requested AMC to furnish information regarding comparative prices and delivery schedules for the Fairchild AF version of the XNQ Navy trainer and the Beech Mentor proposal, and ultimate mobilization plant peak rate for both. Beech Aircraft had quoted a price of $15,000 each based on 100 articles, with first delivery six months following date of authority to proceed, and an estimate of ultimate plant peak rate of 30 to 40

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a day. Fairchild quoted a price of $40,000 based on 100 articles, with first delivery 12 months from authority to proceed, and ultimate peak plant capacity of 50 per month.

59. (U) R&R-1, 31 Dec. 1948
Fr: Col. F. I. Funk,
Chief, Airc. & Missiles
Sect., Proc. Div.
To: Airc. Req. Br., Airc. Sect.,
Maint. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Proc. Div., AMC, requested Maint. Div. to check the availability of new and serviceable R-985-1 engines in AF stock which could be used on the T-31A airplane.

60. (U) R&R-2, 4 Jan. 1949
Fr: Col. E. G. Kiehle,
Chief, Maint. Tech. Sect.,
Maint. Div.
To: Tng., Trans. & Special
Airc. Br., Proc. Div.
With: R&R-1, 29 Dec. 1948
(File: CF-B)

Airc. & Missiles Sect., Proc. Div., asked Power Plant Br., Maint. Div. for their opinion regarding the quality of the R-680-13 engine from the maintenance viewpoint. Selection of this engine for the T-31A trainer was dependent on whether the engine required a high or low amount of maintenance. By R&R-2, Maint. Div. advised that they had reviewed the records of the R-680 engine and from a maintenance viewpoint it was a practical engine requiring a comparative moderate amount of maintenance in comparison with engines of relative horsepower. However, the R-680-13 Lycoming engine had several modifications which were not included in the engines sold by War Assets. Therefore, Maint. Div. stated that if these engines were repurchased by the Govt. and rebuilt by the manufacturer, they should have the additional modifications incorporated at the time of the reconditioning. Maint. Div. believed the R-680 engine a desirable engine for the T-31A from a maintenance point of view.

61. (U) Wire, 3 Jan. 1949
Fr: Dep. C/S, Mat., Wash.
To: CG, AMC
(File: CF-B)

Dep. C/S, Mat., Wash., notified AMC that personnel from BuAer, Tng. Div., Req. Div., R&D [Mat.], Tng. & Req. [Ops.], and Flying Safety of Hq. USAF, would attend the T-31 inspection at Fairchild plant on 5 Feb. 1949.

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62. (U) Ltr., 4 Jan. 1949
Fr: Fairchild Airc. Div.
To: Airc. & Missiles Sect., Proc. Div.
(File: CF-B)

Fairchild submitted a proposed cost estimate of $4,755,554 for the procurement of 100 Model NQ-1 trainers, spare parts, and data. A separate quotation of $824,530 was submitted for incorporating in the basic tool design and manufacture such features as would permit a maximum production rate of 50 airplanes a month. Delivery of the first NQ-1 was estimated for Nov. 1949, with deliveries of all articles to be made by July 1950. Engines, propellers, instruments, and other items normally furnished as Govt. furnished equipment (GFE) were to be furnished by the contractor, without charge. Also the contractor was to accomplish only Phase I flight testing.

63. (S) (Fairchild Board)
Bd. of Officers Rpt., 6 Jan. 1949
(File: Hist. Office)

At the direction of the Secy. of the AF a board of officers, composed of General Muir S. Fairchild, Vice C/S, USAF, General Joseph T. McNarney, CG, AMC, Lt. Gen. H. A. Craig, Dep. C/S, Mat., USAF, Lt. Gen. Lauris Norstad, Dep. C/S, Ops., USAF, met to review and make recommendations for changes in composition of the 48 Group Program, the Aircraft Production Program, and the Research and Development Program of the USAF. As a result of the review of the Aircraft Procurement Program, the board recommended that the following action be taken on the Training Program: (1) AMC and ATC should evaluate the Fairchild and Beech primary-basic trainer and the trainer of any other company in that category which could be in production in the allotted time, and (2) AF should withhold the procurement of the 110 trainers from FY 1948 Supplemental funds and 209 trainers from FY 1950 funds pending the results of the evaluation.

64. (C) Ltr., 6 Jan. 1949
Fr: President Harry Truman, White House, Wash.
To: Secy. of Defense, Natl. Mil. Estab., Wash.
(File: Hist. Office)

President Truman approved the change in the proposed use of $109,220 aircraft procurement funds for the Dept. of the AF as requested by the Secy. of Defense on 22 Nov. 1948.

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65. (U) Wire, 7 Jan. 1949
Fr: Dir. of Proc. & Indust. Plan., Dep. C/S, Mat., Wash.
To: Proc. Div.
(File: CF-B)

Proc. & Indust. Plan., Dep. C/S, Wash., notified Proc. Div., AMC, that the President had approved the release of funds in amount of $109,220,000 for procurement of 48 F-89's, 110 F-94's, and 100 T-31 trainers.

66. (U) Wire, 7 Jan. 1949
Fr: Proc. & Indust. Plan., Dep. C/S, Mat., Wash.
To: Proc. Div.
(File: CF-B)

Dep. C/S, Mat., Wash., informed Proc. Div., AMC, that procurement directive for the 100 T-31 trainers was being temporarily withheld.

67. (U) R&R-1, 7 Jan. 1949
Fr: Brig. Gen. H. A. Shepard, Chief, Proc. Div.
To: Airc. & Missiles Sect., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Proc. Div., AMC, advised Airc. & Missiles Sect., Proc. Div., regarding message from Dep. C/S, Mat., which stated that the President had approved the release of $109,220,000 for procurement of F-89's, F-94's, and T-31 aircraft. Also a later message had been received from Hq. USAF which stated that the procurement directive for the 100 T-31 trainers was being temporarily withheld. Proc. Div. also stated that no action would be taken at that time on the procurement of the trainers.

68. (U) Ltr., 10 Jan. 1949
Fr: BuAer, Navy Dept., Wash.
To: BuAer, General Rep., Central Dist., W-PAFB
(File: Airc. & Missiles Sect., Proc. Div.)

BuAer, Navy Dept., stated that 40 R-680-13 engines could be transferred to the USAF without reimbursement.

69. (U) Ltr., 10 Jan. 1949
Fr: Fairchild Airc. Div.
To: Tng., Trans., & Special Airc. Br., Proc. Div.
(File: CF-B)

During the procurement inspection held on 5 Jan. 1949 on the T-31 Fairchild trainer, the Procurement Inspection Committee resolved that the contractor should take certain action on specific items. Thus, on 10 Jan. 1949 Fairchild indicated the action it would take on these items. Also, Fairchild stated that the XNQ model specification would be revised and resubmitted for AMC approval.

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70. (U) R&R-1, 11 Jan. 1949
Fr: Maj. Gen. K. P. McNaughton, Dir. of Tng. & Req., Wash.
To: Dep. C/S, Mat., Wash.
(File: R&D, Wash.)

It had been the decision of the Bd. of General Officers in early Jan. 1949 that the Fairchild T-31A aircraft, Navy XNQ, should not be procured until all existing aircraft of that type in industry had been evaluated. The Dir. of Tng. & Req. requested Mat., Wash. to direct AMC to circularize industry for all existing models of this type of aircraft. These models were to be assembled at W-PAFB for full evaluation, including flight, by a board consisting of members of AMC, USAF Hq., and ATC. The board was to be instructed to evaluate competing aircraft against minimum requirements of the military characteristics for this type trainer and to weigh the performance of this aircraft against the mission, cost of operation, producibility, ease of maintenance, and unit cost.

71. (U) Memo., 12 Jan. 1949
Fr: Maj. Gen. E. M. Powers, Asst. Dep. C/S, Mat.
To: Under Secy. of the AF
(File: R&D, Wash.)

The Asst. Dep. C/S, Mat., answered the questions raised by the Under Secy. of the AF on 28 Dec. 1948 regarding the Fairchild XNQ and Beech trainers. The total over-all airframe cost figure including spares for 100 Fairchild trainers was estimated at $82,000, whereas the figure for the Beech trainer was $1d,900. AMC had indicated that Fairchild's backlog on current military orders of C-119 would utilize practically all of Fairchild's existing production capacity. It was also anticipated that Fairchild's mobilization capacity would be utilized to produce combat transports which would be required in large numbers. However, Beech was not producing combat military aircraft, and thus could, in event of an emergency, devote its efforts to trainers. Delivery of the Beech trainer could be expected at the rate of 16 aircraft per day beginning within six months, or in event of emergency at the rate of 30 to 40 per day by subcontracting. Fairchild would require one year to begin deliveries with peak capacity of 50 per

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month, although by subcontracting, the quantity would increase considerably. Mat. was of the opinion that training in tricycle gear type aircraft would eliminate a large number of landing accidents inherent in any training program where conventional type gear was used. The Dep. C/S, Mat., did not feel that it could support any arguments in favor of direct procurement of the XNQ aircraft. However, that office had already taken action to circularize industry for all existing models of this type aircraft for evaluation by a board, consisting of members of Hq. USAF, ATC, and AMC. Competing aircraft were to be evaluated against the minimum requirements of military characteristics for this type of trainer and performance of the aircraft was to be weighed against the mission, cost of operation, producibility, ease of maintenance, and unit cost.

72. (U) Memo. Rpt. MCREXA-24-4154-22-1
/Airc. Lab., Eng. Div./
13 Jan. 1949
Design Prop. Model M-92D
Trainer Aircraft
(File: CF-B)

Airc. Lab., AMC, had reviewed Fairchild Aircraft's Model Specification No. R-92D-000. Comments on the design were submitted, and it was recommended that Fairchild be advised of these comments and requested to comply with the action indicated.

73. (U) Request for Model or Type Designation Chg.,
14 Jan. 1949
Fr: Col. P. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Airc. & Missiles Sect., Proc. Div., requested that the Fairchild XNQ-1 trainer be classified as a standard item as authorized by the Navy Dept. This trainer was a two-place monoplane equipped with R-680-13 engine, retractable gear, one piece cockpit enclosure, night flying instruments, and having a range of 880 miles. It was to be used to train pilots for primary stage up to 130 hours, with 20 hours of instrument flying and cross country.

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74. (U) Ltr., 13 Jan. 1949
Fr: Maj. Gen. E. M. Powers,
Actg. Dep. C/S, Mat., Wash.
To: CG, AMC
(File: Office, CG for Ops.)

Actg. Dep. C/S, Mat., Wash., advised AMC that the procurement of the Fairchild T-31A was being held in abeyance pending the complete evaluation of all existing aircraft capable of performing the basic training mission of the AF. Dep. C/S, Mat., directed AMC to canvass industry for all existing models of trainers and assemble them at W-PAFB for full evaluation by a board composed of members from AMC, ATC, and Hq. USAF. Competing aircraft were to be evaluated against the minimum requirements of military characteristics for a basic trainer which were to be submitted at a later date by Hq. USAF.

75. (U) Ltr., 19 Jan. 1949
Fr: Brig. Gen. H. A. Shepard,
Chief, Proc. Div.
To: Dep. C/S, Mat., Wash.
(File: Airc. & Missiles Sect.,
Proc. Div.)

AMC submitted its plan to Dep. C/S, Mat., Wash., for the evaluation of the various existing aircraft suitable for primary training. The plan was to have a board consisting of representatives of Proc. and Eng. Divisions, AMC, ATC, and possibly representatives from the Navy to make the final selection of the trainer which was to be procured. This selection would be based on Eng. and Maint. Div. comments, flight tests, delivery, and cost of the competing airplanes. However, AMC requested Hq. USAF to furnish information as to whether the trainer should be required to meet AF strength criteria or if CAA strength criteria would be acceptable; whether military characteristics requirements were to be met; and as to whether TEMCO or Beech trainer airplanes were to be evaluated or whether a simplified version of the Fairchild XNQ-1 and a modernized version of the North American AT-6 were to be considered. AMC stated that as soon as the military characteristics and additional information were made available, the evaluation and inspection of the aircraft would be undertaken.

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76. (U) Mil. Characteristics (Basic Trainers), 1 Feb. 1949
Fr: Maj. Gen. Carl A. Brandt, Chief, Req. Div., Directorate of Tng. & Req., USAF, Wash.
(File: Airc. & Missiles Sect., Proc. Div.)

The Directorate of Tng. & Req., USAF, stated that a requirement existed for a basic pilot trainer which could be produced in quantity without "overtaxing the economy and natural resources of the United States." This trainer was to be used for the first 130 hours of flying in the pilot training program. It would replace the old PT-13 and BT-14, and combine the capabilities of both. It was to be a single engine, conventionally powered land plane to serve as a basic trainer for AF student pilots prior to commencing training in advanced types. The requirements specified: performance at a high of 150 knots (minimum) at tactical operating altitude of 7,500 ft. (minimum), and service ceiling of 12,000 ft. (minimum); crew of two (instructor and student pilot), tandem cockpit arrangement; retractable tricycle or conventional landing gear (both acceptable although tricycle was desirable). Experience had also proved that an aircraft to fill requirements of the PT-BT class should weigh approximately 3,000 to 4,000 lbs. The flying characteristics requirements specified that the aircraft was to be capable of performing basic acrobatic maneuvers and was to be inherently stable under all normal conditions of flight.

77. (U) Ltr., 2 Feb. 1949
Fr: Brig. Gen. D. L. Putt, Dir., R&D, Office, Dep. C/S, Mat., Wash.
To: CG, AMC
(File: CF-B)

Dep. C/S, Mat., Wash., forwarded the military characteristics for the basic pilot trainer to AMC. These characteristics were to be used in the evaluation of the basic trainers.

78. (C) Memo., 2 Feb. 1949
Fr: Brig. Gen. T. P. McDonald, Chief, Maint. Div., AMC
To: Chief, Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Maint. Div. submitted a detailed report of their evaluation of the Fairchild, Beech, and Texas Engineering airplanes which were being considered for procurement as basic pilot trainers. That division considered the Fairchild aircraft as desirable. However, it was believed that if the recommendations

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outlined for the TEMCO and Beechcraft airplanes were incorporated, their efficiency would be comparable to that of the Fairchild XNQ from a maintenance viewpoint.

79. (U) Memo., 3 Feb. 1949
Fr: Lt. Col. D. W. Graham, Chief, Tng., Trans., & Special Airc. Br., Proc. Div.
To: Mr. N. Silverston, /Trainer Unit, Tng., Trans., & Special Airc. Br., Proc. Div./
(File: Airc. & Missiles Sect., Proc. Div.)

Tng., Trans., and Special Airc. Br., Proc. Div., directed the Trainer Unit to prepare the letter inviting industry to participate in the evaluation of the basic trainer. The date of 14 Feb. 1949 was set for assembling the aircraft at W-PAFB. Tng., Trans., & Special Airc. Br. believed that there were only two or three aircraft within the category outlined by the basic trainer military characteristics. Although the characteristics specified a desired weight of 3,000 lbs., no aircraft was to be excluded from consideration because of this factor.

79A. (U) Ltr., 4 Feb. 1949
Fr: Col. B. I. Funk, Chief, Airc. & Missiles Sect., Proc. Div.
To: Fairchild Engine & Airplane Corp., Fairchild Airc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Airc. & Missiles Sect., Proc. Div., wrote to 36 major and minor aircraft companies outlining the USAF's intention of procuring 100 single engine, tandem, two-place basic trainers. The technical evaluation was to be held at AMC on 14 Feb. 1949.

80. (C) TI-2231, Add.#1, 7 Feb. 1949
(File: Hist. Office)

TI-2231, Add. #1 initiated action for AMC to canvass the aircraft industry for all existing aircraft which could meet the minimum requirements of a basic pilotage trainer and to assemble them at W-PAFB for evaluation. The Evaluation Board was to consist of one member from the following: Dep. C/S, Ops., Hq. USAF; Dep. C/S, Mat., Hq. USAF; Hq. Tactical Using Agency (ATC); and AMC. This board was to be responsible for reviewing all existing models of this type and for weighing it against the mission cost of operation, producibility, ease of maintenance, and unit cost.

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81. (U) Wire, 7 Feb. 1949
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: Dep. C/S, Mat., Wash.
(File: CF-B)

Airc. & Missiles Sect., Proc. Div., informed Dep. C/S, Mat., Wash., that action had been taken to invite aircraft industry to submit existing aircraft of a single-engine, tandem, two-place basic trainer type requiring the minimum of modification. This action was in accordance with directive from Dep. C/S, Mat.

82. (U) R&R-1, 7 Feb. 1949
Fr: Lt. Col. B. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: Flight Test Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Airc. & Missiles Sect., Proc. Div., advised Flight Test Div. of the trainer airplane evaluation which was to be held at W-PAFB. Previously, Flight Test Div. had agreed verbally to conduct a very limited test program and judge the airplanes not as basic trainers but solely for their general flying characteristics.

83. (U) Ltr., 8 Feb. 1949
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: Fairchild Airc. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

AMC advised Fairchild that the invitation to submit a single-engine basic trainer for evaluation was conditioned by the following AMC policy:

1. Article was to be submitted at no cost to the Govt.

2. AMC would assume no responsibility for loss or destruction or any damage to the article.

3. Examination and/or testing of the article would not obligate the Govt. to procure either experimental or production quantities of the article.

4. Report giving results of the evaluation of the respective airplane was to be furnished upon request to party submitting the article.

5. Govt. was exempt from liability arising from confidential disclosure and inclusive of intervening rights when the submitted devices did not bear notice of patent or patent pending.

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84. (U) Ltr., 11 Feb. 1949
Fr: Texas Eng. & Mfg. Co., Inc.
To: CG, AMC
(File: Contr., Proc. Div.)

Texas Eng. stated that it would submit its single engine basic trainer Model TE-1A in response to AMC's inquiry on basic trainers. That company proposed to furnish 100 of these single engine basic trainers at a fixed price of $9,285.00 each. Delivery could be made in accordance with AMC specified dates. However, Texas Eng. believed that design, development, engineering, and tooling were complete enough to permit delivery of first article in June 1949 and the last 29 articles in Nov. 1949.

85. (U) Amend. #2 to Blanket Bailment Agree. W33-038 ac-11023, 12 Feb. 1949
(File: Contr., Proc. Div.)

Amend. #2 to Blanket Bailment Agree. W33-038 ac-11023, authorized Fairchild to fly Navy Model XNQ-1 aircraft, Serial No. 75726 to Wright Field /W-PAFB/ for the technical evaluation of basic trainer aircraft which was to be held on 14 Feb. 1949.

86. (U) Ltr., 12 Feb. 1949
Fr: Fairchild Airc. Div.
To: Airc. & Missiles Sect., Proc. Div.
(File: CF-B)

Fairchild submitted a proposal of $3,952,200 for procurement of the 100 Model T-31 aircraft, with delivery of first unit in Mar. 1950 and final delivery of the last 17 articles in Nov. 1950.

87. (U) Wire, 14 Feb. 1949
Fr: Dep. C/S, Mat., Wash.
To: CG, AMC
(File: CF-B)

Dep. C/S, Mat., Wash., notified AMC that the evaluation of technical data and performance figures on basic trainers could best be accomplished by AMC laboratories. No observers would be invited to participate in the initial phase where data were being assembled for board usage. All aircraft competing were to be made available for flight by the members of the board or their representatives.

88. (U) Wire, 15 Feb. 1949
Fr: Brig. Gen. H. A. Shepard, Chief, Proc. Div.
To: Dep. C/S, Mat., Wash.
(File: CF-B)

AMC notified Dep. C/S, Mat., Wash., Dep. C/S, Ops., Wash., and ATC that the evaluation of all the technical data on competing aircraft for basic trainers would be completed by AMC that week. A comprehensive report of this evaluation was to be available for the Evaluation Board meeting on 25 Feb. 1949.

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89. (U) R&R-1, 15 Feb. 1949
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: Prog. Plan. Sect.,
Indust. Plan. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Proc. Div. requested Indust. Plan. Div. to compare the TEMCO Trainer TE-1A, Beechcraft trainer (Bonanza Mod.), Fairchild XNQ trainer, and Aero. Flight Streak 165 for the following: suitability of design and production; facilities and tooling required; production breakdown contemplated; strategic and nonstrategic materials to be used; and extent of interchangeability.

90. (U) Memo. Rpt. MCREXB-720-2-1
/Propeller Lab., Eng. Div./
"Tech. Evaluation of Single Engine Basic Trainer Airplane Propeller Installations," 15 Feb. 1949
(File: Airc. & Missiles Sect., Proc. Div.)

Propeller Lab., AMC, submitted results of its evaluation of the Fairchild XNQ-1, Beech Model 45, and TEMCO Model TE-1A. That laboratory concluded that from propeller installation standpoint the Fairchild XNQ-1 was preferred, with the TEMCO TE-1A second and Beech Model 45 third. Desirable changes to propellers of each aircraft were outlined.

91. (U) Memo. Rpt. MCREXD-720-131
/Aero. Med. Lab., Eng. Div./
"Trainer Airplane Evaluation Inspection," 16 Feb. 1949
(File: Airc. & Missiles Sect., Proc. Div.)

Aero-Medical Lab. comments on the Fairchild, Texas Eng., and Beech trainers were presented on 16 Feb. 1949. Beech Model was given first rating, with Fairchild model as second, and Texas Eng. model third. Detail comments were given.

92. (C) Memo. Rpt. MCREXE-720-36
/Equipment Lab., Eng. Div./
"Evaluation of Single Engine Basic Trainer Airplanes," 17 Feb. 1949
(File: Airc. & Missiles Sect., Proc. Div.)

Equip. Lab. reported on the evaluation of the single basic trainer airplanes insofar as items of equipment were concerned. That laboratory allocated various points for instruments, electrical mechanical, ground equipment, and parachute equipment. The following credit points were earned by the various models:

Fairchild Model M-129 - 77.85
Beech Model 45 - 64.5
Texas Eng. Model TE-1A - 34.15

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93. (U) R&R-1, 18 Feb. 1949
Fr: Maj. Gen. F. M. Hopkins, Jr., Chief, Indust. Plan. Div.
To: Airc. & Missiles Sect., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Indust. Plan. Div. presented its evaluation of various factors of producibility of the aircraft of the T-31 basic trainer competition. These statements were based on information from sales representatives and special requests from manufacturers' engineering departments. Indust. Plan. Div. estimated that it would require the following labor hours to produce one model of each: Temco "T.E. Swift" - 850 hrs.; Beechcraft Bonanza - 1600 hrs; Fairchild XNQ - 7,200 hrs. As a result, that division recommended that the model requiring the minimum production hours be considered to have greatest producibility.

94. (U) Ltr., 18 Feb. 1949
Fr: Texas Eng. & Mfg. Co., Inc.
To: Airc. & Missiles Sect., Proc. Div.
(File: CF-B)

On 18 Feb. 1949 Texas Eng. advised AMC that some changes had been made in the single-engine basic trainer, including a change in over-all cost from $9,285 to $11,486. These changes would also change the delivery schedule considerably, delaying delivery of the first trainer until Oct. 1949.

95. (U) Ltr., 18 Feb. 1949
Fr: Beech Airc. Corp.
To: Hq. AMC
(File: Contr., Proc. Div.)

Beech submitted its proposal for the Model 45 Mentor basic trainer together with Detail Specification 104 for this aircraft. /The cost quotations are contained in a separate brochure and were not included with this document./ The price quoted was for the basic airplane without radio equipment. Delivery of the first airplanes was estimated at seven months after receipt of the definitive contract.

96. (C) Memo. Rpt. MCREXA-24-4154-23-1
/Aircraft Lab., Eng. Div./
18 Feb. 1949
"Eng. Evaluation Comments Basic Trainer Airplane Competition--Fairchild Aircraft Division Fairchild Model No. M-129"
(File: Airc. & Missiles Sect., Proc. Div.)

Airc. Lab., AMC, presented its engineering evaluation of the Fairchild Model M-129 on 18 Feb. 1949. That lab. concluded that this model received Order of Merit 2 and a final grade of 86.05 per cent. That laboratory recommended that if procurement was made of one or more of the designs entered in the basic trainer competition, Fairchild Model M-129 should be considered

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in accordance with that laboratory's conclusions. Also, if this procurement were made, Airc. Lab. wished to be given an opportunity of reviewing the design data in order to present more detailed comments prior to the procurement action.

97. (U) R&R-1, 21 Feb. 1949
Fr: Lt. Col. R. E. Horner, Chief, Test Eng. Sub-Div., Flight Test Div.
To: Airc. & Missiles Sect., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Flight Test Div. submitted its compilation of the pilots' observations relative to the Texas Eng. TEMCO, Beechcraft /Mentor/ and the Fairchild /XNQ/ airplanes which were being considered in the T-31 trainer procurement. These comments referred only to the flying qualities of the aircraft, with no effort made to justify the airplanes as trainers. It was the opinion of that division that the Beechcraft airplane had the most reasonable flying characteristics, and had no pecularities of flight which would require correction. The Fairchild airplane was classed second, with the TEMCO a "rather poor third." However, Flight Test pointed out that it was difficult to evaluate between the three aircraft because they represented almost three different classes of aircraft and each had advantages peculiar to the particular airplane and power plant configuration.

98. (U) Memo. Rpt.
22 Feb. 1949
/Trainer Unit, Proc. Div./
"Technical Evaluation - Single-Engine Basic Trainer"
14 Feb. 1949
(File: Airc. & Missiles Sect., Proc. Div.)

Although a canvass was made of the aircraft industry by AMC on 4 Feb. 1949, Beech Aircraft Model 45, Fairchild Aircraft Div. Model XNQ-1, and Texas Engineering Model TE-1A were the only models submitted in the competition held at AMC beginning 14 Feb. 1949. Each of these was all metal, low-wing two-place, tandem type. The Beech Model 45 had a gross weight of 2,650 lbs., horsepower of 185, nosewheel type landing gear, and would use either the Continental Motor E-185-3 or Aircooled Motor Model 6AG-4-190-B12 engine and nosewheel type landing gear. The Fairchild XNQ-1

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had a gross weight of 3,790 lbs., horsepower of 280 at 2,200 rpm., Lycoming R-680-13 engine, and conventional, tail wheel type landing gear. The TEMCO TE-1A had a gross weight of 1,840 lbs., horsepower of 145 at 2,700 rpm., Continental Motors Corp. C-145-2 engine, and a conventional tail wheel type landing gear. The Proc. Div. concluded that Fairchild XNQ-1 showed first, Beech Model 45 second, and TEMCO TE-1A third in the over-all order of merit established for the competing aircraft from the technical viewpoint. Also the over-all unit cost for the 100 airplane program by model, "in ascending order of magnitude and based on assumptions" of the findings of the different laboratories showed cost of the various models as follows: Temco $24,249, Beech $31,366 and Fairchild $66,458. Proc. Div. recommended that:

1. The board consider that any one of the three articles evaluated could be made into a technically acceptable aircraft by making minor changes.

2. Aircraft selected be subjected to a further review of specification requirements to insure incorporation of all desirable items.

3. Evaluation Board consider possibility of utilizing simplified radio equipment.

4. Board establish a policy with regard to compliance with USAF standards vs. commercial or CAA standards if Beech or TEMCO model were selected for procurement.

5. Selection of the final model be based on over-all long range costs and suitability for the prescribed mission.

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Estimates for the over-all cost to procure 751 trainers as scheduled on the 5 Year Program, and to maintain and operate an average inventory of 400 airplanes for 4 years showed Temco at $18,765,450, Beech at $26,342,282, and Fairchild at $33,288,547.

99. (C) Summary Minutes of Meeting of Basic Trainer Evaluation Bd., 23 Feb. 1949 (File: Airc. & Missiles Sect., Proc. Div.)

The basic trainer evaluation board composed of Maj. Gen. K. P. McNaughton, Dep. C/S, Ops., Hq. USAF; Maj. Gen. J. H. Stowell, Hq. ATC; Brig. Gen. A. H. Alexander, Hq. ATC; Brig. Gen. R. P. Swofford, Jr., AMC; and Capt. L. R. Standifer, Dep. C/S, Mat., Hq. USAF, met at AMC on 23 Feb. 1949 to evaluate the Beech Model 45, Fairchild Model XNQ-1, and Texas TEMCO TE-1A trainers. Other members of Tng. Div. USAF, Req. Div. USAF, ATC, and AMC acted as advisors. The following percentages were allowed for various considerations in the evaluation: Ability to perform mission - 40%; technical considerations - 20%; maintenance - 25%; costs - 15%. The airplanes were graded by being given an appropriate portion of the allocated percentage as a score for the considerations involved. All percentages for the considerations were then totalled and the airplane with the highest total was considered as the winner to be recommended for procurement. Prior to rating the various airplanes, each member of the board flew each model submitted. Four board members voted for Beech as first choice, Fairchild as second choice, and TEMCO third; whereas, one member voted Fairchild as first, Beech as second, and TEMCO as third. The board recommended the Beech Model 45 for procurement. However, it was also recommended that: (1) prior to the procurement of the Model 45 a pre-procurement modification inspection be held; (2) the AF develop and procure a small simplified ultra high frequency radio suitable for installation in the trainer, liaison, helicopter, small utility, and rescue type of aircraft; (3) and that two articles of Fairchild XNQ-1, revised to incorporate the Lycoming GSO-580

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engine and tricycle landing gear, be procured to provide for possible inadequacy of the Beechcraft and/or T-28.

100. (U) Memo., 24 Feb. 1949
Fr: Fairchild Airc. Div.
To: Airc. & Missiles Sect., Proc. Div.
(File: CF-B)

Fairchild presented its proposed sales prices for T-31 aircraft and figures representing the estimated savings on continued production of the C-119B concurrent with T-31 production. On the first 100 T-31 airplanes, Fairchild proposed price of $45,892 each with estimated savings on C-119's of $11,085 or an estimated net cost of $34,807 to the Govt. However, on the 751 airplanes /for the 5 Year Program/ the T-31 would be $20,929, estimated savings on C-119B of $4,100, and estimated net cost to Govt. of $16,829.

101. (U) Amend. #3 to Blanket Bailment Agree. W33-038 ac-11023, 28 Feb. 1949
(File: Contr., Proc. Div.)

The bailment period for Navy Model XNQ-1 aircraft, Serial Nos. 75726 and 75725, was extended to 30 June 1949.

102. (C) Memo., 17 Mar. 1949
Fr: Maj. Gen. K. P. McNaughton, Dir. of Tng. & Req., Wash.
To: C/S, USAF, Wash.
(File: R&D, Wash.)

Gen. McNaughton, Dir. of Tng. & Req., Ops., presented a summarization of the basic trainer aircraft evaluation and his recommendations on the program. It had been the consensus of the board that the Temco aircraft was too light and too deficient in several flying characteristics to perform the training mission. Therefore, consideration had been given to the Fairchild XNQ and Beech Model 45 aircraft. The board voted 4 to 1 to procure the Beech model, and Gen. McNaughton stated that he cast the dissenting vote, his choice being Fairchild XNQ. It appeared that one of the main deciding factors in selecting the Beech 45 had been the use of the tricycle landing gear. Gen. McNaughton did not feel that it was advisable to go to the tricycle landing gear at that time because a pilot could be transitioned from a conventional type gear to a tricycle gear with no difficulty, whereas the reverse was difficult and time

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consuming. Numerous other factors were outlined. Gen. McNaughton stated that it was his "considered opinion after careful analysis of the Air Materiel Command's evaluation and after having flown the aircraft and listened to the arguments pro and con at the board meeting that the Air Force will be in a much sounder position by purchasing the Fairchild aircraft." Tng. & Req. recommended that: (1) the Fairchild XNQ in its existing conventional configuration and with Lycoming R-680-13 be procured and continued in the production line until it was known that there would be no more conventional type aircraft utilized by the USAF; (2) two articles of the Fairchild XNQ incorporating the Lycoming GSO-580 engine and tricycle landing gear be developed in order that it might be incorporated in production at the proper time; and (3) the AF develop and procure a small simplified ultra high frequency radio suitable for installation in the trainer, liaison, helicopter, small utility, and rescue types of aircraft.

103. (C) Air Staff Summary Sheet, 17 Mar. 1949
Fr: Maj. Gen. K. P. McNaughton, Dir. of Tng. & Req., Wash.
To: Dep. C/S, Ops., Wash.
Dep. C/S, Mat., Wash.
C/S, USAF, Wash.
(File: R&D, Wash.)

This summary sheet from Dir., Tng. & Req. summarized the results of the basic trainer aircraft evaluation. Three contractors, Beech, Fairchild, and Texas Eng., had submitted aircraft for competition in this evaluation. As a result of evaluation of the three models by the different laboratories of AMC, the Fairchild XNQ-1 had been rated first in the over-all order of merit, with Beech Model 45 second and TEMCO TE-1A third. However, the basic trainer evaluation board recommended by a vote of 4 to 1 for procurement of the Beech Model 45. The Dir. of Tng. & Req. had cast the dissenting vote. The Dir. of Tng. & Req., Ops., now recommended that the Fairchild aircraft be procured and that the recommendations of his letter to the C/S dated 17 Mar. 1949 be approved. Note at the bottom of this document

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indicates Gen. Vandenberg's concurrence with Gen. McNaughton's recommendation.

104. (C) Memo., 21 Mar. 1949
Fr: Maj. Gen. E. M. Powers,
Asst. Dep. C/S, Mat., Wash.
To: C/S, USAF, Wash.
(File: R&D, Wash.)

Asst. Dep. C/S, Mat. informed C/S, USAF, that on the long range program on trainers, Fairchild XNQ would be more expensive although there was not much difference from the viewpoint of productive ability and capacity between Fairchild and Beechcraft. The office of Dep. C/S, Mat., felt that the decision on the basic trainer should be in favor of the airplane selected by the using agency. However, since the CG, Tng. Com. felt that the Fairchild could do the best job, Mat. offered no objection to changing the majority recommendation of the Evaluation Board.

105. (U) Memo. Rpt. MCPPXA66-M-119
/Tng., Trans. & Spec. Airc. Br., Proc. Div./
23 Mar. 1949
"Engineering Inspection, XNQ-1 Trainer Airplane,"
5 & 6 Jan. 1949
(File: Airc. & Missiles Sect., Proc. Div.)

An inspection board composed of personnel from AMC, Tng. Com., Ops., Hq. USAF, and Materiel, Hq. USAF, met at Fairchild 5 and 6 Jan. 1949 to examine the Fairchild XNQ-1 airplane for requirements as a primary-basic trainer of 130 hours. This board concluded that the airplane would be acceptable if certain changes to the radio and instruments were incorporated in the airplane and included in Model Specification R-129-000. The board also recommended that if procurement of the airplane were made, a 689 inspection should be conducted on the first production article to insure compliance with the model specification.

106. (C) Ltr., 24 Mar. 1949
Fr: Maj. Gen. E. M. Powers,
Asst. Dep. C/S, Mat., Wash.
To: CG, AMC
(File: Office, CG for Ops.)

Asst. Dep. C/S, Mat., Wash., issued Procurement Directive 49-33 on 24 Mar. 1949 authorizing AMC to proceed with procurement of 100 T-31 (Fairchild XNQ) aircraft. The President had approved the release of $8,261,500 from Supplemental 1948 funds for this procurement. AMC was to keep initial spares to a minimum and have contractor keep adequate spare stocks. Also the contractor was to furnish all possible equipment normally supplied as GFP at a cost not to exceed two to three per cent of cost of such equipment.

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107. (U) R&R-1, 30 Mar. 1949
Fr: Col. M. J. Coffield,
Chief, Aero. Equip. Sect.,
Proc. Div.
To: Airc. & Missiles Sect.,
Proc. Div.
(File: CF-B)

Aero. Equip. Sect., Proc. Div., listed the GFP items contained in Fairchild Model Specification R-129-000 which were available in Supply Div. stocks. An engine inventory conducted on 1 Feb 1949 revealed that enough were available in War Assets storage to fulfill T-31 requirements.

108. (C) TI-2249-12,
13 Apr. 1949
(File: Hist. Office)

TI-2249-12 dated 13 Apr. 1949 initiated action for Proc. and Indust. Plan. to procure 100 T-31 aircraft and initial spares. This procurement was in accordance with Procurement Directive 49-33 dated 24 Mar. 1949 from Hq. USAF.

109. (U) Ltr., 15 Apr. 1949
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: Fairchild Airc. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Airc. & Missiles Sect., Proc. Div., forwarded CFP and GFP equipment lists for T-31A airplane to Fairchild with instructions that they were to be incorporated in the revised model specification, No. R-129-000.

110. (U) Request for Model or
Type Designation Change of
Status Equipment,
15 Apr. 1949
(File: Airc. & Missiles Sect.,
Proc. Div.)

Airc. & Missiles Sect., Proc. Div., initiated a Request for Model or Type Designation Change of Status of Equipment on 15 Apr. 1949 to place the Fairchild XNQ-1 (Navy Trainer) in standard classification. Eng. Standards Sect., Eng. Div., indicated that type designation T-31A-FA had been assigned to this aircraft, and an Authority for Change of Status of Equipment was being initiated.

111. (U) R&R-1, 18 Apr. 1949
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: Airc. Sect., Supply Div.
With: R&R-2, 22 Apr. 1949
(File: CF-B)

Airc. & Missiles Sect., Proc. Div., requested Supply Div. to investigate the availability of Hamilton Standard Propellers (Hub 2-B-20, Blade 6135A-9, constant speed control 1-Q-12G) in WAA stock, WAA surplus consignees, AF supply, or any other source in the quantity of 100, plus spares for the T-31A trainer. In reply Supply Div. stated that Aero. Equip. Sect., Proc. Div., had initiated action to determine the quantity of T-31 propeller assemblies available for recall from War Assets Administration.

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112. (U) R&R-1, 18 Apr. 1949
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles
Sect., Proc. Div.
To: Test Eng. Subdiv.,
Flight Test Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Airc. & Missiles Sect., Proc. Div., requested Flight Test Div. to recommend a flight test program for the XNQ-1 which would insure the airplane as satisfactory for use in the Training Program. This aircraft had already been subjected to more than 800 hours of flight testing in addition to successfully passing the Navy static test. However, Proc. Div. believed an additional flight test program necessary because the Fairchild T-31A was to incorporate some changes recommended by the 689 inspection and the evaluation boards.

113. (U) Ltr., 19 Apr. 1949
Fr: Fairchild Airc. Div.
To: Chief, BuAer, Wash.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Fairchild requested that the loan of the two Model XNQ-1 airplanes from BuAer be extended for an additional period of approximately one year. Changes or modifications requested as a result of the USAF trainer evaluation were to be incorporated in the Model XNQ-1 for testing purposes.

114. (U) Ltr., 21 Apr. 1949
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles
Sect., Proc. Div.
To: Fairchild Airc. Div.
(File: CF-B)

Proc. Div. requested Fairchild to submit price quotations covering 100 T-31A airplanes in accordance with the revised model specification based on all 689 Board approved changes, study items, and trainer evaluation changes not in conflict with the 689 approved changes. The contractor had been advised that the R-680-13 engine was to be CFP with the propeller retained as CFP and all other equipment as CFP, as outlined in AMC letter of 15 Apr. 1949. Also Fairchild was requested to outline a recommended flight test program for the first production article.

115. (R) R&R-2, 22 Apr. 1949
Fr: Lt. Col. R. E. Horner,
Chief, Test Eng. Subdiv.
Flight Test Div.
To: Tng., Trans. & Special Airc.
Br., Proc. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Test Eng. Sub-div., Flight Test Div. recommended that three Fairchild trainers be obtained for flight test purposes. The first production model would be instrumented for performance, cooling, and stability tests; and the other two standard production models used to obtain accelerated service tests. Phase I, Phase II, Phase III,

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and Phase IV testing programs were outlined.

116. (U) Ltr., 26 Apr. 1949
Fr: Col. B. I. Funk, Chief, Airc. & Missiles Sect., Proc. Div.
To: BuAer, Gen. Rep., Central Dist., W-PAFB
(File: CF-B)

Airc. & Missiles Sect., Proc. Div., requested BuAer to forward copies of Navy reports on flight tests, structural static tests, engineering acceptance inspection, and vibration and buffetting of the XNQ-1 Fairchild trainer. The Fairchild XNQ-1 Navy trainer had been given the AF designation of T-31A.

117. (U) Ltr., 26 Apr. 1949
Fr: W. P. Rogers, Senate Investigations Sub-committee, U. S. Senate
To: Maj. Gen. T. D. White, Dir. of Logislation & Liaison, Dept. of AF
(File: R&D, Wash.)

The Senate Investigations Subcommittee of the U. S. Senate stated that a compliant had been forwarded to them alleging that the AF had recently purchased Fairchild training airplanes at a price in excess of $80,000 each. At the same time allegations had been made that other planes capable of equal performance were available at less than one-fourth that price. The subcommittee requested copies of the contracts involved and an explanation of the purchase.

118. (U) R&R-1, 27 Apr. 1949
Fr: N. Silverston, Trainer Unit, Airc. Sect., Proc. Div.
To: Office of Proc. Comm.
(File: Airc. & Missiles Sect., Proc. Div.)

Trainer Unit, Proc. Div., submitted a total estimated program cost of $8,214,004 for the 100 Fairchild XNQ trainers to the Proc. Committee. A breakdown of program costs for the pending procurement was listed.

119. (U) R&R-1, 28 Apr. 1949
Fr: Col. M. J. Coffield, Chief, Aero. Equip. Sect., Proc. Div.
To: Tng., Trans. & Special Aircraft Br., Proc. Div.
(File: CF-B)

Aero. Equip. Sect., Proc. Div. informed Trainer Unit, Proc. Div., that 123 each 2B 20-251/6135A-9 propeller assemblies were available in WAA stock. That section proposed that these assemblies be made available to Fairchild for the T-31 with the understanding that they would be overhauled and modified on agreement between Fairchild and Hamilton Standard.

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120. (U) R&R-2, 29 Apr. 1949
Fr: Col. B. I. Funk, Chief, Airc. & Missiles Sect., Proc. Div.
To: Aero. Equip. Sect., Proc. Div.
With: R&R-3, 3 May 1949
(File: CF-B)

Airc. & Missiles Sect., Proc. Div., instructed Aero. Equip. Sect. to withdraw the 123 propeller assemblies from WAA stock and place them in AF stock until the Govt. could make a commitment with Fairchild. Aero. Equip. Sect. stated on 3 May 1949 that action had been initiated to have the propeller assemblies withdrawn from WAA stock and shipped to Middletown Air Materiel Area as GFP stock.

121. (U) Ltr., 29 Apr. 1949
Fr: Col. B. I. Funk, Chief, Airc. & Missiles Sect., Proc. Div.
To: Fairchild Airc. Div.
(File: CF-B)

Airc. & Missiles Sect., Proc. Div., requested Fairchild to submit a proposal covering the flight test program which was to be performed on the first production airplane. This program was outlined for the contractor. Fairchild was also requested to: submit test program proposal with recommendations relative to additions or revisions to AMC program; prepare and submit drawings showing proposal locations of the test equipment; and notify AMC of date on which GFP instrumentation would be required.

122. (U) Memo., 29 Apr. 1949
Fr: /Maj./ Gen. McNaughton, /Dir. of Tng. & Req., Dep. C/S, Ops./
To: Mr. Symington, /Secy. of the AF/
(File: R&D, Wash.)

Tng. & Req. of Dep. C/S, Ops., submitted to Secy. of the AF an analysis of the reasoning which prompted the Air Staff to select the Fairchild XNQ as the future basic trainer. Tng. & Req. pointed out that the selection of the Fairchild XNQ over the Beechcraft and TEMCO models had been dictated by superiority of its technical evaluation by AMC's Technical Evaluation Board, its adaptability to the training program, and the possibility of joint AF-Navy procurement.

123. (U) R&R-2, 2 May 1949
Fr: Col. B. I. Funk, Chief, Airc. & Missiles Sect., Proc. Div.
To: Chief, Aero. Equip. Sect., Proc. Div.
With: R&R-1, 2 May 1949
(File: Airc. & Missiles Sect., Proc. Div.)

Aero. Equip. Sect. informed Trainer Unit, Airc. Sect., of the availability of /39/ R-680-9 and R-680-13 engines through WAA at no cost to the Govt. On 2 May 1949 Airc. & Missiles Sect. instructed Aero. Equip. Sect. to have the 39 Lycoming engines (11 R-680-9 and 28 R-680-13's) withdrawn from WAA stocks and placed in AF stock. AMC planned to have Fairchild

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subcontract the overhauling and modification of these engines to Lycoming Div.

124. (U) Ltr., 3 May 1949
Fr: Col. B. I. Funk,
Chief, Airc. & Missiles
Sect., Proc. Div.
To: Fairchild Airc. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Proc. Div. informed Fairchild that the 123 propeller assemblies had been located in surplus stock. These assemblies were to be furnished to Fairchild, who would arrange with Hamilton Standard Co. for overhaul and modification. Also, 39 R-680-9 and R-680-13 engine had been located in surplus stock and were to be supplied to Fairchild for overhaul and modification by Lycoming Div. Fairchild was to supply these engines to the AF as partial fulfillment of the spare engine requirements.

125. (U) P. R. 57544,
4 May 1949
(File: Airc. & Missiles
Sect., Proc. Div.)

Brig. Gen. H. A. Shepard, Chief, Proc. Div., approved P. R. 57544 in the amount of $7,370,000 for procurement of 100 AF T-31A trainers, spare parts, special tools and ground handling equipment, technical data, and flight testing. This procurement was to be made from Fairchild.

126. (U) Ltr., 5 May 1949
Fr: Maj. Gen. T. D. White,
Dir., Legislative & Liaison
USAF, Wash.
To: Mr. W. P. Rogers,
Chief, Counsel, Senate
Investigations Subcommittee,
U. S. Senate, Wash.
(File: R&D, Wash.)

The Dir., Legislation & Liaison, Dept. of the AF, advised the Senate Investigations Subcommittee that several similar complaints relative to the Fairchild trainer procurement had been made to the C/S, USAF, by the two competitors, Beech and Texas Eng. However, a thorough review of the Fairchild trainer evaluation and contemplated procurement had been made by C/S, USAF before authorization of the procurement was made. It had been the opinion of the Air Staff and the CG, ATC that the Fairchild trainer was best qualified to accomplish the required training mission. The contract with Fairchild was in the process of negotiation, and a copy was to be forwarded to the Senate Investigations Subcommittee when executed.

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127. (U) Ltr., 5 May 1949
Fr: Brig. Gen. H. A. Shepard, Chief, Proc. Div.
To: Under Secy. of the AF, Wash.
(File: Contr., Proc. Div.)

Gen. Shepard, Chief, Proc. Div. presented a statement of findings and determination to the Under Secy. of the AF requesting permission to negotiate Purchase Request 57544 for procurement of 100 T-31 (Fairchild XNQ-1) aircraft. This procurement was to be made from Fairchild at an estimated cost of $7,276,100 and was to be chargeable to Supplemental Fiscal Year 1948 funds. Facts substantiating this procurement were presented. Gen. Wolfe, Dir. of Proc. & Indust. Plan., AMC, recommended approval of this procurement and Mr. Barrows, Under Secy. of the AF, approved the procurement on 13 May 1949.

128. (U) Ltr., 6 May 1949
Fr: Fairchild Airc. Div.
To: Airc. & Missiles Sect., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Fairchild submitted a list of items which Fairchild and Lycoming Div. considered necessary to properly prepare the R-680-13 engine for use in the T-31 aircraft. Fairchild suggested that these items be discussed by AMC and the contractor and decisions of this conference put into effect so that the engines could be modified for T-31 airplanes.

129. (U) Memo., 9 May 1949
Fr: Col. J. W. Sessums, Asst. Dep. C/S, Mat., Wash.
To: File
(File: R&D, Wash.)

The Asst. Dep. C/S, Mat., briefly outlined the main events of the basic trainer competition from the time the Actg. Dir. of Tng. & Req., Ops., recommended the procurement of the Fairchild XNQ in Sept. 1948 to date.

130. (U) R&R-2, 11 May 1949
Fr: Col. I. I. Funk, Chief, Airc. & Missiles Sect., Proc. Div.
To: Electrical Br., Equip. Lab., Eng. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Proc. Div. advised Equip. Lab., Eng. Div., that the only items of equipment for the T-31 which were to be GFP were those which were currently in stock in excess to existing program requirements. The model specification being prepared by Fairchild was to list all the equipment recommended by Equip. Lab. as to type designation, nomenclature, specification, and drawing numbers.

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131. (C) Memo., 20 May 1949
Fr: Maj. Gen. K. B. Wolfe,
Dir., Proc. & Indust. Plan.
To: A. S. Barrows,
Under Secy. of the AF
(File: R&D, Wash.)

In a memo. to Mr. Barrows, Gen. Wolfe questioned the feasibility of having Fairchild furnish all possible equipment normally furnished as GFP as had been directed by Proc. Directive 49-33 dated 24 Mar. 1949. The normal procedure for procuring the 100 XNQ aircraft (with Government furnishing GFP) would cost $6,219,657 with G. & A. expense at 4.5% and profit of 7% included in this cost. However, Fairchild had submitted an estimate of $7,191,229 for the 100 aircraft which included contractor furnishing the GFP and stocking spares for the 5 Year Program. The profit for G. & A. expense at 4.5% and profit of 7% was included in the Fairchild estimate. Also a cost of $340,000 had been included by Fairchild for the construction of a warehouse by the Govt. at Hagerstown. Gen. Wolfe felt that there were other criticisms of the policy suggested by the procurement directive, and believed the USAF could buy a better airplane cheaper and with less confusion through the normal procurement procedure. He recommended that Procurement Directive 49-33 be rescinded, and a directive be issued specifying procurement of the T-31 in the normal manner.

132. (C) Ltr., 23 May 1949
Fr: Mr. A. S. Barrows,
Under Secy. of the AF, Wash.
To: Lt. Gen. H. A. Craig,
Dep. C/S, Mat., Wash.
(File: R&D, Wash.)

In writing to Gen. Craig, Dep. C/S, Mat., on 23 May 1949 Secretary Barrows mentioned the difference in the normal procurement figure and the proposed procurement figure Fairchild had submitted for 100 T-31 aircraft. Also it was his understanding that Fairchild had been willing to furnish the "CFP Items" for about a 2% to 3% handling charge. Mr. Barrows asked for Gen. Craig's reaction to the contractor's idea of 4.5% handling charge plus a profit on the "CFP Items" if he were required to furnish them. Mr. Barrows believed the Fairchild quotation excessive and wished it were possible to reopen the competition to find out what kind of a proposition Beech would offer.

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133. (U) Ltr., 24 May 1949
Fr: Col. E. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: Fairchild Airc. Div.
(File: CF-E)

Proc. Div. stated that a conference had been held between Lycoming, Fairchild, and AMC representatives to discuss R-680-13 engine modifications. AMC informed Fairchild that the items listed in the Fairchild letter of 6 May 1949 were approved by AMC for inclusion in the modified R-680-13 engine.

134. (U) Ltr., 25 May 1949
Fr: Hamilton Standard Propeller Div., United Aircraft Corp.
To: Airc. & Missiles Sect.,
Proc. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Hamilton Standard Propeller Div., United Aircraft Corp., presented its comments on the use of converted surplus 2B 20/6135A-9 propellers for use on T-31 aircraft. That company stated that it did not have any knowledge of the condition of the 123 used propellers, and that inspection of the assemblies would be a costly job. However, that company agreed to accept these propellers as GFE (GFP) subject to acceptance by their inspection department. The cost of this modification work would be only about 6% below the cost of new 2B 20/6135-A assemblies. It was also pointed out to AMC that ratio of remaining service life of the 123 used propellers to their total modification price might not be as favorable as ratio of total service life of 123 new propellers to their total purchase price.

134A. (U) Wire, 31 May 1949
Fr: Col. E. I. Funk,
Chief, Airc. & Missiles Sect., Proc. Div.
To: Dep. C/S, Mat., Wash.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Proc. Div. notified Dep. C/S, Mat. that Beech had quoted a price of $17,000 each for "off the shelf" procurement of Model 45 in quantities of three with delivery three to four months from date of the contract. Texas quoted $11,000 each for "off the shelf" procurement of Temco trainer in quantities of three, with delivery five to six months from date of contract. The quotations were for complete airplanes and included radio equipment, although they did not include 20% spare parts requirements. The Beech trainer was to be designated T-34, and the Temco trainer the T-35. Total cost of the six airplanes including 20% spare would be $100,800.

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134P. (U) Wire, 3 June 1949
Fr: Col. F. I. Funk,
Chief, Airc. & Missiles
Sect., Proc. Div.
To: Proc. & Indust. Plan.,
Dep. C/S, Mat., Wash.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Proc. Div. furnished Proc. & Indust. Plan., Mat., with the revised quotations submitted by Beech & Texas Eng. Temco trainer without engine, would be $9,000 each, but with AN rear case, 24 volt system installed, and spare parts the trainers would be $30,519.00. The Beech trainer was estimated at $15,500 without the engine, whereas if AN rear case, 24 volt system installed and spare parts furnished, the total cost would be $38,717. These estimates were on the basis of procurement of a quantity of three trainers. The total for six airplanes including 20% spares would be $207,708. The airplanes in this configuration would provide the AF with trainers which would substantially meet evaluation recommendations with the exception of commercial radio installation.

135. (C) Ltr., 7 June 1949
Fr: Maj. Gen. F. H. Griswold,
Actg. Dep. C/S, Mat., Wash.
To: A. S. Barrows,
Under Secy. of the AF,
W-PAFB
(File: Proc. & Indust. Plan. Div.)

Gen. Griswold, Actg. Dep. C/S, Mat., informed Mr. Barrows, Under Secy. of the AF, that he and Gen. Craig had discussed the Fairchild trainer proposal. They both agreed that the Fairchild proposal was "out of line" because of the inclusion of the 4.5% handling charge and 7% profit for furnishing the GFP. It had been the intent of the AF to have Fairchild stock a minimum of spares which could be purchased on a call contract as the AF requirements demanded. Gen. Griswold believed the new Govt.-furnished warehouse at a cost of $340,000 proposed by Fairchild as unreasonable. It was also stated that Fairchild should be able to maintain a minimum of spare stock without such an outlay or guarantee by the AF. Therefore, three courses of action appeared feasible at that time: (1) accept Gen. Wolfe's recommendation and follow the usual procurement practice; (2) circularize industry (including Fairchild) for the construction of the 100 T-31 aircraft on the basis of the procurement directive; and (3) reopen negotiations with high level Fairchild personnel with view to reducing or eliminating the 7% profit

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proposed by Fairchild for furnishing GFP. Gen. Griswold thought that circularization of industry for construction of the models would cause a strong adverse reaction from the aircraft industry; and therefore, recommended that the possibilities of reopening negotiations with Fairchild should be exhausted before a final decision was made. If this effort proved unsuccessful, he recommended that they follow the usual procurement practice "for the present." Gen. Shepard, AMC, had been requested to discuss the matter with Mr. Ward of Fairchild.

136. (U) Ltr., 8 June 1949
Fr: Navy Dept., BuAer
Wash.
To: Fairchild Airc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

BuAer agreed to continue the loan of the two Fairchild XNQ-1 trainers to the AF for a period of approximately one year, and presented no objections to the modification of the XNQ-1 airplanes for testing possible production design changes.

137. (U) Ltr., 17 June 1949
Fr: William P. Rogers, Senate Investigations Subcommittee, U. S. Senate, Wash.
To: Maj. Gen. T. D. White, Dir., Legislation & Liaison Dept. of the AF, Wash.
(File: R&D, Wash.)

The Counsel of the Senate Investigations Subcommittee asked the Dir., Legislation & Liaison, Dept. of the AF, for the details of the factors which had been considered in the evaluation of the three trainers /Beech 45, Fairchild XNQ, and Texas Eng. TE-1A/ by the AF prior to awarding the contract to Fairchild.

138. (U) Office Memo., 21 June 1949
Fr: Lt. Col. S. W. Bishop, Chief, Tng., Trans., & Special Airc. Br., Proc. Div.
To: N. Silverston, Tng., Trans., & Special Airc. Br., Proc. Div.
(File: CF-B)

Tng., Trans., & Special Airc. Br. had been advised by the Chief, Proc. Div. that an early decision from the Office of the Secy. of the AF as to method of procuring the T-31 aircraft was unlikely. Consequently, negotiations on procurement of the primary trainer were to be held in abeyance.

139. (C) TI-2249-12, Amend. #1, 29 June 1949
(File: Hist. Office)

This amendment changed the procurement directive of the original TI-2249 to read: "Procurement Directive No. 49-55 (T-31 Aircraft)."

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140. (U) R&R-1, 1 July 1949
Fr: Col. W. A. Davis,
Actg. Chief, Airc. &
Missiles Sect., Proc. Div.
To: Aero. Equip. Sect.,
Proc. Div.
With: R&R-2, 7 July 1949
(File: CF-B)

Originally, Fairchild was to supply equipment as CFP, but because of difficulties encountered by the contractor in obtaining commitments from vendors on delivery dates of equipment, consideration was being given to changing the CFP back to GFP. Airc. & Missiles Sect. requested Aero. Equip. Sect. to submit an estimate of time required for GFP delivery to the contractor. The Aero. Equip. Sect. replied on 7 July 1949 that a survey of the GFP for this trainer revealed that a complete GFP complement would not be available until 18 mos. after the Aero. Equip. Sect. received a release to procure.

141. (U) Ltr., 25 July 1949
Fr: Fairchild Airc. Div.
To: Airc. & Missiles Sect.,
Proc. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Fairchild submitted a detailed summary of T-31 airplane price which had been negotiated between representatives of that company and AMC on 18 July. That company agreed to accomplish the following work:

100 T-31A airplanes at cost of	$5,286,123.00
Spare parts in amount of	2,365,322.00
Special tools & ground handling equipment	52,861.23
Handbooks & Data	95,899.19
5,000 cycle test of production landing gear	17,355.59
Phase II Flight Testing	16,609.07

The total price was $7,834,170.08. Fairchild had pointed out that their costs for procuring the equipment formerly furnished by the Govt. (GFP) would be 10% to 12% higher than for AMC to buy it. The company would be buying in smaller lots, and, also, possibly there had been increases in the prices since AMC had bought the materials. It had been agreed by AMC that the over-all price for these items appeared reasonable in view of these conditions. Fairchild also had agreed to accept the 3% profit rate on the CFP with the understanding that no precedent was being established. If contractual coverage were given Fairchild by 1 Aug. 1949, that company

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estimated delivery of the first T-31A by 1 Oct. 1950 and delivery of the last 17 articles by June 1951.

142. (U) R&R-1, 25 July 1949
Fr: Legal Assistants, Airc. & Missiles Sect., Proc. Div.
To: Tng., Trans., & Special Airc. Br., Proc. Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Legal assistants of Airc. & Missiles Sect. submitted their review of Fairchild's cost breakdown and stated that it was apparent that Fairchild's quotation had been figured very closely in order that it would be in a good competitive position. The price analyst considered the contractor's quotation of $39,522 for the basic airplane, quotations on miscellaneous items, and total cost of $11,617.02 per airplane for GFP as acceptable.

143. (U) Ltr., 26 July 1949
Fr: Mr. A. S. Barrows, Under Secy. of the AF, Wash.
To: Lt. Gen. H. A. Craig, Dep. C/S, Mat., Wash.
(File: Airc. & Missiles Sect., Proc. Div.)

The Under Secy. of the AF informed Gen. Craig, Dep. C/S, Mat., that in accordance with instructions from that office negotiations on the T-31 had been reopened with Fairchild. A breakdown of the lowest price which could be obtained for the T-31 was outlined. The total airframe price, which included 100 articles, spare parts, special tools and ground handling equipment, handbooks, and technical data, 5,000 cycle test, and Phase II flight test was $5,073,243.55. Cost of GFP items for the 100 articles totaled $1,259,960. However, with Fairchild furnishing the items normally furnished by the Govt. (GFP) at an estimated cost of $1,565,519.00, the total airplane cost would be $5,633,782. Thus, the Under Secy. believed that two alternatives existed for procurement of these trainers:

1. Circularize industry for construction of 100 T-31 aircraft on the basis of the procurement directive, or

2. Discard all previous negotiations relative to the XNQ and circularize industry for quotations on a design based on military characteristics.

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144. (S) Memo., 29 July 1949
Fr: Maj. Gen. F. H. Griswold,
Asst. Dep. C/S, Mat., Wash.
To: /Maj./ Gen. McKee,
Asst. Vice C/S, USAF, Wash.
(File: Proc. & Indust. Plan.,
Wash.)

The Asst. Dep. C/S, Mat. advised General McKee, Asst. Vice C/S, USAF, that Generals Craig, Wolfe, Cook, Smith, Brandt, Burns, McNaughton, Boatner, Carroll and Griswold had met on the 29th of July to consider the training aircraft and changes to all aircraft. The following decisions of this meeting were to be submitted for approval:

a. The Fairchild trainer would not be procured.

b. The T-6 aircraft would be used to carry out the existing pilot training program until approximately 1955. An adequate number of T-6's were available for this purpose.

c. The T-6 should be overhauled to provide an airplane that would be essentially equal to a new one and also would have improved handling characteristics. The cost for this overhauling would be $16,000 for each aircraft.

These decisions were based on the reduction from 6,100 pilot program to 3,000 and the reduction in National Guard units and the Reserve program. These reduced programs would fully meet the needs of the ATC.

145. (S) Memo., 5 Aug. 1949
Fr: Maj. Gen. William F. McKee,
Asst. Vice C/S, USAF, Wash.
To: Dep. C/S, Mat., Wash.
(File: Proc. & Indust. Plan.,
Wash.)

The Asst. Vice C/S, USAF, informed the Dep. C/S, Mat. that the Vice C/S, USAF had approved the changes in the Training Program as outlined in the memorandum dated 29 July 1949 from Gen. Griswold. These proposals had also been cleared with the Secy. of the AF and the Under Secy., both of whom concurred. The Dep. C/S, Mat. was to notify AMC that the AF did not intend to procure more than three T-37 Fairchild trainers. The Vice C/S felt that, subject to review by the Senior Officers Board, the AF should procure three each service test models of the Temco, Beech, and Fairchild trainers.

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Because there were the only existing new trainers available that could promise any suitability for mass production in event of an emergency, the Vice C/S felt that these types should be thoroughly evaluated in actual service test training, and as a result determination made of the type to be placed in production in event of emergency. Also any modifications found essential as a result of this service test should be incorporated in the production drawings. AMC was to be instructed to plan on the overhaul of the necessary T-6's then in storage to meet the requirements of the ATC. Also Dep. C/S, Mat. was to have the necessary certifications prepared to accomplish the overhaul of the required T-6's.

146. (R) Ltr., 8 Aug. 1949
Fr: Brig. Gen. A. A. Kessler, Jr., Dir., Proc. & Indust. Plan., Dep. C/S, Mat., Wash.
To: CG, AMC
(File: Office, CG for Ops.)

Proc. & Indust. Plan., Dep. C/S, Mat., Wash., directed that the procurement of the 100 T-31 trainers authorized by Procurement Directive 49-55 be terminated.

147. (S) Ltr., 8 Aug. 1949
Fr: Brig. Gen. A. A. Kessler, Jr., Dir., Proc. & Indust. Plan., Office, Dep. C/S, Mat., Wash.
To: CG, AMC
(File: Airc. & Missiles Sect., Proc. Div.)

The Director, Proc. and Indust. Plan., Mat., Wash., informed AMC that authority to procure 100 T-31 Fairchild trainers as directed by Procurement Directive 49-55 dated 24 Mar. 1949 was rescinded. However, that office directed AMC to request cost quotations and delivery dates on three articles each of Fairchild trainer T-31, Beech T-34 trainer, and Temco (Texas Engineering) T-35 for evaluation and service testing.

148. (S) R&R-1, 11 Aug. 1949
Fr: W. E. Donnelly, Asst. to Dir., Proc. & Indust. Plan.
To: Airc. & Missiles Sect., Proc. Div.
With: R&R-2, 12 Aug. 1949
(File: CF-P)

The Asst. to the Dir., Proc. & Indust. Plan., AMC, forwarded the letter of 8 Aug. 1949 from Proc. & Indust. Plan., Mat., Wash., to Airc. & Missiles Sect., Proc. Div., AMC for compliance. The information requested in that letter was to be furnished as soon as possible in order that it could be presented for consideration of the Senior Officers Board. By R&R-2, Airc. & Missiles Sect. directed Tng., Trans., & Special Airc.

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Br. to implement the details of the procurement outlined in R&R-1. However, Airc. & Missiles Sect. offered some comments for consideration in complying with the directive.

149. (U) Ltr., 12 Aug. 1949
Fr: Maj. Gen. T. D. White,
Dir. Legislation & Liaison
Dept. of the AF, Wash.
To: William P. Rogers,
Chief Counsel, Senate
Investigations Subcommittee,
U. S. Senate, Wash.
(File: R&D, Wash.)

The Dir., Legislation & Liaison of the Dept. of the AF, advised the Chief Counsel, Senate Investigations Subcommittee, that changes made in the planned AF group strength had resulted in a substantial reduction in pilot training requirements. This decrease had eliminated the need for additional basic type aircraft since those already in the AF inventory would be adequate for the task after minor modernization. Thus, it had been decided that only special test quantities of Beech, Temco, and Fairchild trainers would be procured at "the present time," specifically three each of the foregoing. Thus, it was assumed by Dir., Legislation & Liaison that the information requested on 17 June 1949 regarding this procurement was no longer required by the Senate Investigations Subcommittee.

150. (R) Memo., 12 Aug. 1949
Fr: Col. Bryan L. Davis, AG
To: Dir., Proc. & Indust. Plan.
Dir., Supply & Maint.
(File: Hist. Office)

This memo. notified Proc. & Indust. Plan., and Supply & Maint. that TI-2249 dated 13 Apr. 1949 [authorizing procurement of 100 T-31 aircraft and spares], and Amendment No. 1 to TI-2249 dated 29 June 1949 [which changed the procurement directive number only] had been cancelled by Procurement Directive 49-65 dated 8 Aug. 1949.

150A. (U) Wire, 15 Aug. 1949
Fr: Col. P. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: Texas Eng. & Mfg. Co., Inc.,
Dallas, Tex.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Proc. Div. requested Texas Eng. to furnish quotation on three trainers designated YT-35, contractor's Model TE-1A, or the configuration as it had been presented in the Technical Evaluation. No GFP was to be furnished for these trainers. Also best delivery was requested.

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151. (U) Memo., 15 Aug. 1949
Fr: Mr. N. Silverston,
Buyer, Trainer Unit
Airc. Sect., Proc. Div.
To: File
(File: Airc. & Missiles Sect.,
Proc. Div.)

Trainer Unit, Proc. Div., stated that in accordance with the recent directive from Hq. USAF, Fairchild, Beech, and Texas Eng. had been requested to submit quotations for a quantity of three each of their models T-31, YT-34, and XT-35 trainers. The contractors had indicated that the quotations could be furnished by 24 Aug. 1949.

152. (U) Ltr., 19 Aug. 1949
Fr: Col. P. I. Funk,
Chief, Airc. & Missiles Sect.,
Proc. Div.
To: Fairchild Airc. Div.
(File: CF-B)

Airc. & Missiles Sect., Proc. Div., advised Fairchild that the procurement action for the 100 T-31 trainers was cancelled. However, Proc. Div. requested Fairchild to submit cost information for three newly manufactured T-31 (XNQ-type) aircraft in accordance with the following:

1. Three T-31's (in the "as is" condition, XNQ configuration (Navy)).

2. The XNQ with changes as determined by 689 and Evaluation Board with conventional gear.

3. The XNQ with changes recommended by 689 and Evaluation Board, but with tricycle landing gear and Lycoming GSO 580 engine. The airplanes were to be completely GFE with exception of the ARC-3 and BC-453 radio equipment.

Also cost and delivery dates were requested on the basis of 10 each in these configurations.

153. (C) Ltr., 24 Aug. 1949
Fr: Maj. Gen. K. B. Wolfe,
Dir., Proc. & Indust. Plan.
To: Dir., Proc. & Indust. Plan.,
Dep. C/S, Mat., Wash.
(File: CF-B)

Proc. & Indust. Plan., AMC, submitted cost quotations and delivery dates for T-31, T-34, and T-35 aircraft in quantities of three each in accordance with a request from Proc. & Indust. Plan., Mat. The prices and delivery dates submitted for the T-31 and T-34 varied because of deviations in the different configurations of each.

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154. (S) Rpt. of Fourth Meeting of Board of Senior Officers, 29 Aug. 1949
(File: Hist. Office)

The Board of Senior Officers met on 29 Aug. 1949 to review for planning purposes the procurement and research and development programs for FY 1950 based on the estimated minimum funds which would be made available as a result of appropriations by the 81st Congress for FY 1950. The board considered the proposal to utilize FY 1949 money previously planned for production of 100 T-31 aircraft for modernization of T-6 aircraft and procurement of 3 T-31's, 3 T-34's (Beech trainers), and 3 T-35's (Temco trainers). Gen. Kessler, Proc. & Indust. Plan., Mat., recommended that the AF utilize the two XNQ's which had been loaned to the AF by the Navy for the evaluation purposes in lieu of the procurement of the three T-31's. The board concluded that the procurement of the three T-31 (Fairchild) aircraft at a high cost was unwarranted because of the availability of the two prototype XNQ trainers. Thus, the board recommended that the funds proposed for the procurement of the three T-31 be utilized to modernize additional T-6's, and that the two XNQ Navy aircraft serve in the competitive evaluation with the T-34 (Beech trainer) and the T-35 (Temco trainer) which were planned for procurement. Also, the Navy was to be invited to participate in the evaluation of the three types of trainers with a view to common procurement of trainer aircraft.

155. (S) Memo., 5 Sept. 1949
Fr: J. S. Imirie,
Spec. Asst., Office of Under Secy. of the AF
To: Gen. McKee,
[Asst. Vice C/S, USAF]
(File: Hist. Office)

The Office of the Under Secy. of the AF informed the Asst. Vice C/S, USAF that the Under Secy. concurred in the report of the Fourth Meeting of the Senior Officers Board, and considered the report "well done." However, some exceptions were enumerated.

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156. (S) Ltr., 22 Sept. 1949
Fr: Lt. Gen. K. B. Wolfe,
Dep. C/S, Mat., Wash.
To: CG, AMC
(File: Hist. Office)

Gen. Wolfe, Dep. C/S, Mat., forwarded copies of the report of the Fourth Meeting of the Senior Officers Board to AMC. Action taken by this board had been approved by the C/S, and the Under Secy. of the AF. Gen. Wolfe stated that directives implementing the action recommended by this board would be issued in the near future.

157. (C) Memo., 4 Oct. 1949
Fr: W. Stuart Symington,
(Secy. of the AF, Wash.)
To: Secy. Johnson,
Secy. of Defense, Wash.
(File: Office, Under Secy. of AF, Wash.)

Mr. Symington briefed Secy. of Defense Johnson on the T-6 trainer modernization program. In the "initial flight training program" after termination of World War II the T-31 (Fairchild XNQ) had been selected for the first phase training and the T-28 (North American) for the second phase. Procurement of each type was to be made annually until the wartime built T-6 was phased out. A total of 1,690 T-31's and 1,903 T-28's would have been required to support the 70-Group Program of 6,160 pilots per year. The initial procurement of 266 T-28's and 100 T-31's had been certified for procurement from FY 1948 Supplemental funds. However, limitations of the FY 1950 and proposed level of FY 1951 for aircraft procurement had necessitated lowering the AF pilot training program to a level of 3,000 pilots per year. This reduced program would require an active inventory of 1,234 trainers (822 T-31 type and 412 T-28 type) exclusive of attrition and modernization requirements. Also a corresponding reduction to the Air Reserve and other programs had made available an increased quantity of T-6 trainers applicable to the training program. Although the T-6 configuration was not considered to be the most suitable or economical for the early stages of the AF pilot training, it was believed that a modernized version would be capable of satisfactorily performing the mission. Thus, the Secy. of the AF believed it to be in the best interests of the AF to

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forego the introduction of the T-31 at that time and to modernize 700 T-6's. No termination costs would be involved on the T-31 because no procurement had been made. The Secy. of the AF requested that $7,630,000 of the $5,261,500 originally certified for procurement of the 100 T-31's be recertified for modernization of 700 T-6's plus additional spare requirements.

158. (U) R&R-1, 5 Oct. 1949
Fr: Col. W. A. Davis, Actg. Chief, Airc. & Missiles Sect., Proc. Div.
To: Budget & Fund Management Sect., Budget & Fiscal Div.
(File: Airc. & Missiles Sect., Proc. Div.)

Trainer Unit, Proc. Div., returned Purchase Request 57544 in the amount of $7,370,000 (FY Supp. 1948 110 Funds) to Budget & Fiscal Div. for cancellation.

159. (U) Wire, 3 Nov. 1949
Fr: Lt. Col. S. W. Bishop, Chief, Tng., Trans., & Special Airc. Br., Proc. Div.
To: Dir., Proc. & Indust. Plan., DCS/M, Wash.
(File: Airc. & Missiles Sect., Proc. Div.)

Tng., Trans., & Special Airc. Br., AMC, requested Proc. & Industrial Planning, USAF, to furnish information relative to configuration and procurement status of the T-34 (Beech) and T-35 (Temco) trainers. Both contractors of these trainers had indicated willingness to incorporate in three service test articles AMC desired changes with no effect on the basis (off the shelf) costs. Also it was understood that three each of the T-34 and T-35 trainers would be procured and placed on service test together with the existing two T-31 (XNQ) aircraft. However, no action had been taken by AMC pending receipt of a directive from Hq. USAF. AMC requested disposition action which was to be taken on the two XNQ Navy trainers if no further procurement action were contemplated on the T-31 by the USAF.

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160. (U) Wire, 3 Nov. 1949
Fr: Mr. E. G. Barber,
Proc. & Indust. Plan.,
Dep. C/S, Mat., Wash.
To: Tng., Trans., & Special
Airc. Br., Proc. Div.
(File: Airc. & Missiles Sect.,
Proc. Div.)

Proc. & Indust. Plan., Mat., advised Tng., Trans., & Special Airc. Br., AMC that the procurement of three each Beech and Temco (T-34 and T-35) trainers had been presented to the fifth meeting of the Senior Officers Board on 17 October. These minutes had not yet been approved by the C/S or the Secy. of the AF. However, the recommendations of the board had been to go ahead with this procurement as originally planned. (The procurement directive on this action was to be forwarded to AMC as soon as possible.) Also the two XNQ's were to be retained. Hq. USAF was trying to get clearance from the Navy to allow Fairchild to perform certain changes to the airplanes.

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EXHIBITS

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FAIRCHILD T-31 TRAINER
(Navy XNQ Trainer)

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BELOW T-34 TRAINER

3/4 Front View

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TEXAS ENGINEERING (TEMCO) T-35 TRAINER

3/4 Front View

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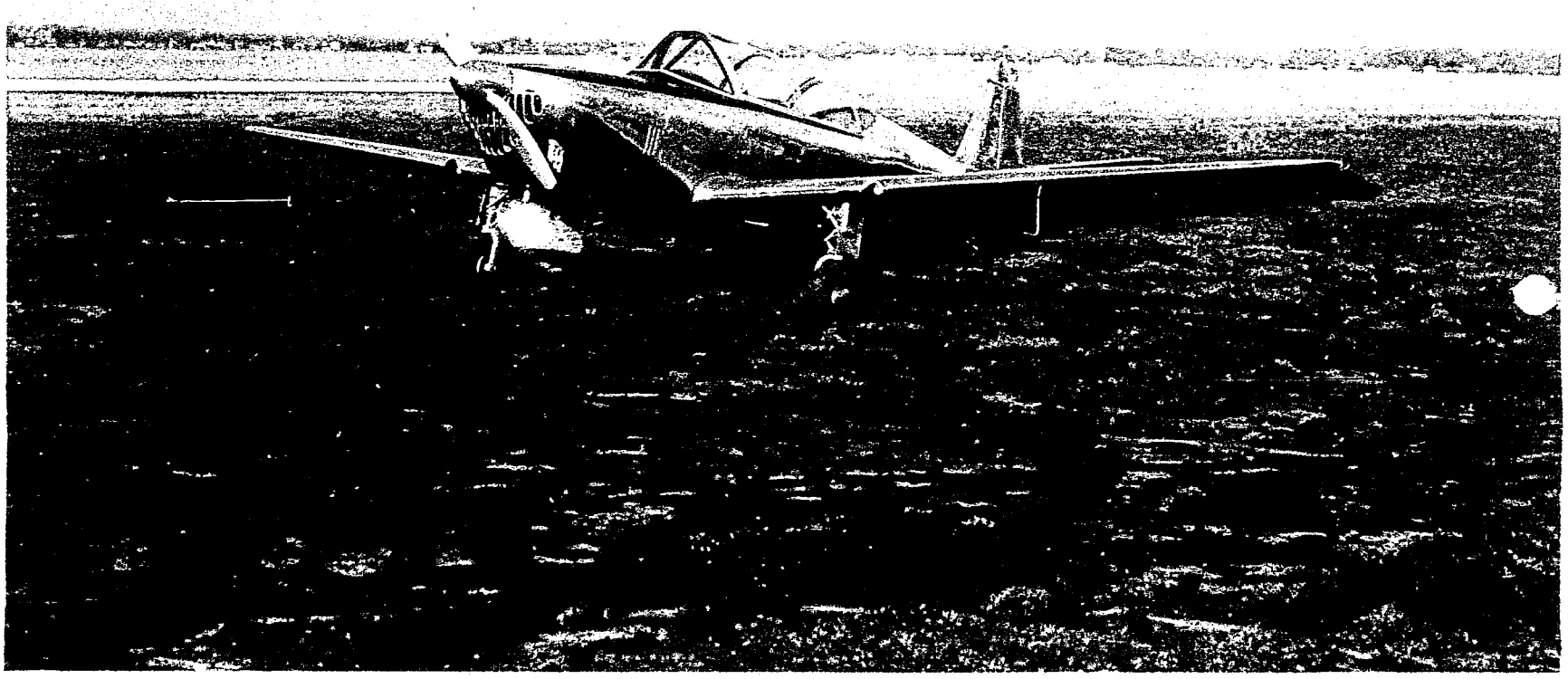

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CASE HISTORY
OF
THE T-31 TRAINER

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Vol II
March 1950

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CG, AMC
M.C.S.
Date: 3-6-50

CASE HISTORY OF

THE T-31 TRAINER

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authority AFLC (mckit) 13 Jun 64
by [illegible] date 24 Jun 64

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CASE HISTORY OF
THE T-31 TRAINER
DOCUMENT FILE

Prepared by
Historical Office
Executive Secretariat
Air Materiel Command
Wright-Patterson Air Force Base
March 1950

By

Amy C. Fenwick
Historian

Prepared under provisions of AF Regulation No. 210-3 as a part of the USAF Historical Program.

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NAVY DEPARTMENT
Bureau of Aeronautics
Washington 25, DC

Aer-AC-63

3 May 1946

From: Chief, Bureau of Aeronautics
To: Bureau of Aeronautics General Representative, Central District

Subject: Navy Training Plane Program.

Reference: (a) BAGR-CD letter FAO(5047)eh, dated 29 April 1946.

Enclosure: (A) Detail Specification NAVAER SD-400 for Model XNQ Airplane.
(B) Detail Specification NAVAER SD-405 for Model XSN2J Airplane.
(C) Detail Specification NAVAER SD-420 for Model XTE-1 Airplane.

1. Enclosure (A) covers detail specifications of the XNQ-1 Primary Trainer being manufactured by Fairchild. The first airplane is expected to be flown in July with the R-680-13 engine installation. Final corrected data will not be available until early 1947 due to delay in delivery of the XR-680-10 engine.

2. Enclosure (B) covers detail specifications of the XSN2J Intermediate Trainer being manufactured by North American. First test flights are expected to be made in August 1946.

3. Enclosure (C) covers preliminary detail specifications of the XTE-1 seaplane trainer being manufactured by Edo Aircraft Corporation. Delivery of the first flight article is scheduled for December 1946. It should be noted that the specification has not as yet been completed, pending changes made by the Mock-Up Board. Performance figures will be comparable with the XOSE-1 airplane.

4. At the present time studies are being conducted on the F4U and the F6F, to determine the feasability of modification to a two place Operational Trainer. Studies have also been made on the requirements for a jet Transitional Trainer. However, until the feasibility of present types of aircraft under development has crystallized into a definite trend, a specific trainer will not be developed. Immediate planning calls for a study of the feasibility of modifications of presently developed jet combat types to two place Transitional Trainers.

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Aer-AC-63

Subject: Navy Training Plane Program.

5. It is requested that the Bureau of Aeronautics General Representative, Central District, obtain similar data on Army development and plans on Trainer Aircraft from the Air Material Command, and forward it to this Bureau.

34025

/s/ C. A. NICHOLSON
C. A. NICHOLSON
Capt., U. S. N.
By Direction Chief of Bureau

RESTRICTED

End-1 8 May 1946 . FAO(5407)eh VV (on Buaer ltr. Aer-AC-63 34025 dated 3 May 1946)

To: TSBPA5 (Aircraft Section, Procurement Division)

Subj: Navy Training Plane Program.

1. Forwarded with enclosures in reply to ANC letter TSBPA5/TB/dh of 25 April 1946.

2. It is requested that information as desired in paragraph 5 of the basic letter be furnished this office for transmittal to the Bureau of Aeronautics.

/s/ R. J. H. COHN
R. J. H. Cohn
Captain, USN,
By direction RACE-CO.

CC: Buaer,
Attn: AC-63

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COORDINATION
CO OR ASST CO

ADJUTANT GENERAL

CHIEF OF AIR

AIR INSPECTOR

PUBLIC RELATIONS

JUDGE ADVOCATE

PERSONNEL

INTELLIGENCE (T-2)

ENGINEERING (T-3)

SUPPLY

PLANS (T-5)

BASE C. O.

OTHER

ATSC Form No. 16-500
(Rev. 22 Oct 45)
(PRINT SYMBOL AND INITIALS IN APPROPRIATE BLOCK)

Subject: Army Air Forces Training Plane Program.

2nd Indorsement TSEPAS/TS/4h - 22206

Headquarters, Air Materiel Command, Wright Field, Dayton, Ohio. 14 May 1946.

To: Bureau of Aeronautics General Representative, Central District, Wright Field, Dayton, Ohio.

1. The AAF projected training plane program is still in a tentative status as of this date. Requirements have been set up in the AAF JX-4 Aircraft program for new primary, basic and advanced type trainers but data on the military characteristics of these planes are not yet available to this Command.

2. Jet transition studies in the Air Forces parallel those of the Navy. Present trend in jet training is toward development of present jet types, such as the Bell P-59, into transitional trainers. No new type jet trainers have been developed or are proposed at the present time.

3. As soon as detailed information regarding military characteristics and/or specifications of proposed new trainer planes become available, copies will be furnished the BAGR for transmittal to the Bureau of Aeronautics.

FOR THE COMMANDING GENERAL:

for [signature]
GEORGE E. SCHAETZEL
Colonel, Air Corps
Chief, Aircraft Section
Procurement Division

Incls:
SUPPLY w/d

[signature]

-3-

T-5/3L-6B

1 of 2

WT-1-6 NOV 45 500M

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1 452.1 Fairchild XT-31A

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NAVY DEPARTMENT
BUREAU OF AERONAUTICS
Washington 25, D. C.

Address reply to
and refer to
Aer-AC-63

15 July 1940

From: Chief of the Bureau of Aeronautics
To: Recorder, Aeronautical Board

Subject: Training Airplane Development.

Enclosure: (A) Detail Specification SD 400.
(B) Mock-Up Photographs.

1. The Bureau of Aeronautics has under development a new Primary Training airplane. In general this airplane conforms to specifications as visualized by joint conferences of the A.A.F. and Naval Training Commands.

2. In view of the desirability of standardized Primary Training airplanes suitable to both services, enclosures (A) and (B), which describe the Fairchild XNQ-1 Primary Trainer, are enclosed for forwarding to the A.A.F. for information, comment and suggestions. It is requested that the A.A.F. Commands be invited to inspect this airplane at the contractor's facility. This airplane is expected to make preliminary test flights in August.

3. In order to conduct thorough evaluation studies by both services, it is believed that additional procurement in excess of the two test articles presently on contract to the Navy, would be required.

4. This bureau would be pleased to discuss arrangements for joint procurement of XNQ-1 airplanes for the Army as well as for the Navy.

L. C. Stevens
Rear Admiral, USN
By Direction Chief of Bureau

cc:
AMC, Wright Field
Aeronautical Board

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18 July 1946

ORDINATION
ECTOR OR DEP.
AIR INSPECTOR
MGT. CONTROL
CHIEF OF ADMN.
SPECIAL STAFF

1st Endorsement to BuAer Serial 52198 dated 15 July 1946

From: Secretariat, Aeronautical Board.

To: Chief, Engineering Division, TSENG
Wright Field, Dayton, Ohio

SUBJECT: Training Airplane Development.

1. Forwarded for information, comment and suggestions.

The Secretariat:

CHIEF, ENG. & PROC.
CHIEF, SUPPLY & MAINT.

G. B. H. HALL
Captain, USN
Navy Member.

H. G. MONTGOMERY JR
Colonel, Air Corps
Army Member.

PERS. & BASE SERV. DIV.

GER/ec

MAINT. DIV.

2nd Ind. TSEPA/GES/mm

Hq AMC, Wright Field, Dayton, Ohio. 16 August 1946.

SUPPLY DIV.

To: Navy Department, Bureau of Aeronautics, Washington, 25, D. C.
Attn: The Secretariat, Aeronautical Board.

1. Representatives of AC/AS-4, Training Command, and Air Materiel Command have inspected the Fairchild XAC-1 Primary Trainer. As a result this headquarters has been advised that the airplane does not meet the requirements of the Training Command and that, therefore, it will not be included on the Army's requirement schedule.

ENGINEERING DIV.

PROCUREMENT DIV.

FOR THE COMMANDING GENERAL:

READJUST DIV.

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Detached

OTHER

cc:
TSENG - Ch. Eng. Div.

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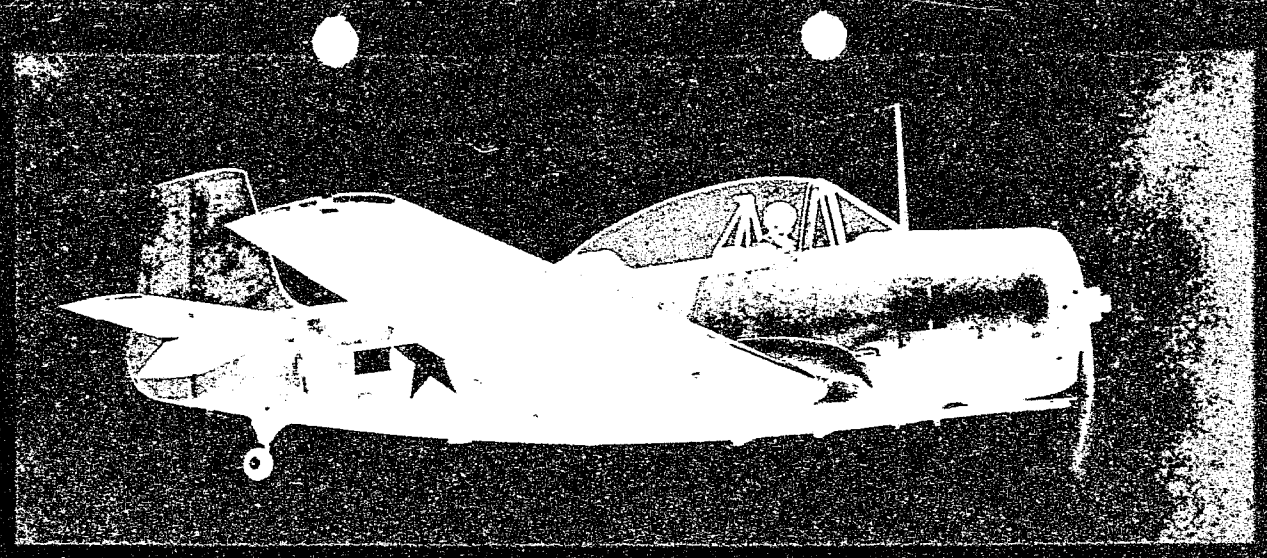

NAVY'S NEWEST PRIMARY TRAINER, FAIRCHILD XNQ-1, SHOWN DURING ITS FIRST TEST FLIGHT
Has an Electrically Retractable Landing Gear and a Hamilton Standard Propeller. Dick Henson, Chief Test Pilot of Fairchild, at Controls. This Plane Represents a Notable Advancement in Naval Primary Trainers

New Navy Fairchild Primary Trainer

A NEW NAVY PRIMARY TRAINER, the Fairchild XNQ-1, was successfully tested, recently, at the Fairchild Aircraft Division of the Fairchild Engine and Airplane Corporation, Hagerstown, Md.

It is a low-wing, all-metal, two-place monoplane with tandem seating, powered by a Lycoming nine-cylinder engine rated at 320 hp., the installation of which utilizes a new and improved power package principle developed by Fairchild's power plant division. The airplane is equipped with flaps and has an electrically operated retractable landing gear. It is also the first primary trainer equipped with a Hamilton Standard controllable pitch propeller.

Another feature is the functional safety cockpit design, which the Bureau of Aeronautics sponsored to provide a standard for all carrier-based aircraft. The cockpit is enclosed by an unobstructed one-piece bubble canopy, offering all-round visibility to instructor and student to reduce collisions.

The new trainer has a gross weight of 3,700 pounds. Its rate of climb is expected to be more than 1,000 feet a minute, and its maximum speed is estimated at 170 mph. Adequate stall characteristics are incorporated into its design. Emphasis has been placed on stability and control, important for carrier-based aircraft. The wing span is 41 feet, 5 inches; over-all length 27 feet, 11 inches, and height 9 feet, 10 inches.

Contract was awarded to Fairchild following a design competition. In establishing its requirements, the Bureau of Aeronautics made exhaustive studies of records of accidents resulting from pilot error, pilot proficiency reports, opinion of veteran pilots and flight instructors, as well as Army and Navy training command records and recommendations of psychologists.

Well-known before the war for its light planes, Fairchild designed and produced thousands of PT-19 primary trainers for AAF. PT-19 earned a reputation in World War II and was adopted as standard equipment for the British Empire training program, the Chilean Air Force, Royal Norwegian Air Force, Brazilian Air Force, and for similar activities elsewhere.

❖

Admiral Settle Predicts New Uses for Airships

REAR ADMIRAL THOMAS G. W. SETTLE, head of the Navy's Lighter-than-Air division, believes that passenger airships some day will fly over the ocean and the Arctic and Antarctic. He made this statement following the new world record made on November 4, when a Navy blimp, with crew of 13 men, had remained aloft for 170 hours without refueling. The Admiral said that the Navy's new military ideas are still secret but that a large dirigible could be used offensively to carry airplanes within easy reach of a long distance target. He added that airships would also be particularly useful in the Arctic regions as weather ships.

The new record was set when the Navy blimp landed at the Naval Air Facility, Glynco, Ga., after being aloft seven days and nights, two hours and 18 minutes.

Longest previous sustained flight of any type of aircraft without refueling was claimed by the Russians in 1936, when their V-6 stayed aloft 130 hours. The new record, set by the Navy's XM-1, is 170.3 hours.

The announcement was made at a press conference by Admiral Settle, at the Naval Air Station, Lakehurst, N. J. Admiral Settle did not participate in the actual flight.

The feat of the nonrigid XM-1, Admiral Settle said, was conducted as an experiment in developing the seakeeping and habitability features of airships and not primarily to seek a new record. At no time, he said, was the ship "idled down" to conserve fuel in order to remain aloft longer.

Take-off was made Sunday afternoon, October 27, from Lakehurst, with Lieut. Howard R. Walton, USNR, of Ames, Iowa, in command; a medical officer was a member of the crew and conducted medical tests throughout the flight. Two crew members gained weight and none lost any during the experiment, he reported. Both airship and crew were reported in excellent condition and ready to get under way again as soon as the ship could be replenished with fuel, helium and stores.

All of which is relished by our old friend, Admiral Rosendahl.

❖

General Electric's Aviation Divisions

GENERAL ELECTRIC COMPANY has announced the establishment of Aviation Divisions under which will be the Aircraft Accessories and Ordnance Division at Schenectady, with Robert A. Averitt as manager, and the Aircraft Gas Turbine Division at the General Electric River Works, Lynn, Mass., with E. S. Thompson as manager. John C. Miller, who has been associated with the company's aviation activities since 1930, has been appointed manager of the Aviation Divisions. Edward G. Haven has been named assistant manager in charge of application engineering, and J. C. Wheeler, assistant to the manager.

The Aviation Divisions will be responsible for the sales and application engineering of aircraft equipment and instruments manufactured by General Electric. These include jet engines, turbosuperchargers, electric motors, generators, ignition systems, automatic control devices, automatic pilots and other aircraft electrical equipment.

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CONFIDENTIAL

HEADQUARTERS, ARMY AIR FORCES

WASHINGTON

12 December 1946

SUBJECT: Review of Aircraft for Air Training Command

TO: Commanding General
Air Materiel Command
Wright Field, Dayton, Ohio

1. This Headquarters is reviewing proposed Military Characteristics of new training aircraft that are to replace the trainers now used in the training program. The Training Command has recommended the development of a PT-BT combination type trainer with tricycle landing gear to replace both the PT-13 and the AT-6 type aircraft.. They are also considering an advanced multiple crew trainer. Because of budgetary cutbacks the costs of these trainers must be kept at a minimum. In order to complete the trainer aircraft study, some estimated production costs are needed.

2. In view of the above, the following is requested:

a. Provide this Headquarters with an estimate of the comparative costs to develop an aircraft and procure 100 articles with military characteristics generally as attached, as compared with procuring 100 tactical aircraft (less combat equipment) which have already been developed and which will be utilized as training aircraft in the Training Command.

b. Provide this Headquarters with an estimate of comparative costs to develop a trainer similar to the AT-6 as compared to the cost to develop the same aircraft with a tricycle landing gear.

c. Prepare an estimate of savings and/or advantages in developing an aircraft and procuring 200 articles of such similar to the AT-6, as compared to the cost to develop two separate aircraft (similar to an AT-6 in one case and a PT-13 in the other) and procure 100 articles of each type. What advantages, if any, would be gained with regards to the following?

(1) Procurement, Stockage and supply of spare parts for one aircraft instead of two.

(2) Implications with regard to maintaining a healthy aircraft industry if one aircraft instead of two different types are developed and procured.

d. What implications in the way of economy would arise if the military characteristics of a combination PT-BT type trainer specified a turbo-jet engine instead of conventional reciprocating engine? Is this logistically possible at this time? Would this reflect a savings?

[redacted]

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Letter to AMC, subject: Review of Aircraft for Air Training Command

e. What are the prospects of constructing training aircraft from a plastic substance or some material other than aluminum components? Would this reflect a savings? From the standpoint of conserving strategically critical materials in case of emergency, are we justified in compromising the quality of trainer aircraft by building subject trainers of a plastic or of a wood substance?

3. Further, it is requested that you review the attached chart of operational costs of various types of aircraft, and wherein the data is not valid, revise the chart and bring it up to a current status.

4. It is desired that you add any suggestions, recommendations or information which will assist in establishing the most economical aircraft training types for future procurement, bearing in mind that the Tactical Units of the AAF are earmarked for jet-powered equipment.

BY COMMAND OF GENERAL SPAATZ:

/s/ Alden R. Crawford
A. R. CRAWFORD
Brig. General, U.S.A.
Chief, Research & Eng'g Div
AC/AS-4

2 Incls:
Incl 1: Mil Char of a/c
Incl 2: Chart of Operational Costs

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HEADQUARTERS
AIR DEFENSE COMMAND
MITCHEL FIELD, NEW YORK

IN REPLY REFER TO:
Z 452.1

17 MAR 1941

X 452.1 Training Planes

SUBJECT: Replacement of AT-6 Aircraft with New Type Trainer

TO: Commanding General, Army Air Forces, Washington 25, D. C.

1. Inclosed herewith is a study prepared by this Headquarters, comparing the AT-6 type aircraft with a new all purpose trainer manufactured by the Fairchild Corp, Hagerstown, Maryland, known by its Navy designation as the XNQ-1, and further comparing it with a hypothetical trainer of the same initial cost as the AT-6 but with undoubtedly higher performance characteristics than the XNQ-1 or the AT-6.

2. The XNQ-1 was chosen for this study rather than some other trainer being manufactured or contemplated being manufactured by any one of the many aircraft companies for the following reasons:

a. The XNQ-1 has already been purchased in small quantities by the Navy and is currently undergoing exhaustive tests to determine its suitability as an all purpose trainer for their use.

b. Because of the foregoing, considerable factual data is available for study purposes.

c. The close proximity of the Fairchild plant to this Headquarters rendered it convenient to visit this plant, study the plane fully, and test it in flight.

3. It is not the purpose of this study to "sell" the Fairchild trainer, or even to imply that it is the best plane available for possible substitution for the AT-6. Such a decision is not within the province of this command. But, as a result of this study, I can unhesitatingly state that the Fairchild XNQ-1 appears to be a highly satisfactory plane to supplant the AT-6, whether or not it is the most satisfactory. (See Exhibit A of attached study.)

4. The most important disclosure of the study is that the yearly cost of operating with AT-6 aircraft is considerably higher than the yearly cost of operating with the XNQ-1, or the hypothetical trainer of same initial cost as the AT-6. (See Exhibit B of attached study.)

5. The conclusions reached in par 4 above do not take into consideration the fact that, as far as the Air Reserve program is concerned, the AT-6 aircraft and a large percentage of the spare parts are non-reimbursable, or "free issue". From an overall point of view, or from the view-

Exhibit I 1-1559 [redacted]

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point of the taxpayer, this fact should not be considered. Whether "free issue" or not, the costs have been, or will be borne by the government. However, the study also shows the exact cost of the AT-6 aircraft to the Air Reserve, taking into consideration all "free issues". (See Exhibit C of attached study.) It will be noted that the cost of operating AT-6 aircraft is still higher than the XNQ-1, or the hypothetical trainer.

6. The study seems to leave no doubt that from an operational and economic standpoint, the AT-6 should be supplanted as rapidly as possible with a new type all purpose trainer, for the Air Reserve program as well as for the whole Air Force program. To further emphasize the desirability of taking these steps, I should like to stress three very important attributes of a new trainer in addition to its lower cost:

a. In comparison with the AT-6, a new type trainer would be practically noiseless. This may seem to be a minor attribute but it definitely is not. Every day complaints roll in on the annoyance caused by the excessive noise created by AT-6 aircraft flying around inhabited areas, particularly near large cities.

b. Supplanting the AT-6 aircraft with a new type trainer would immeasurably increase the morale of the whole Air Force, but particularly the morale of the Air Reservists. They would be flying and maintaining aircraft of latest design, increased safety, and increased ease of maintenance. Even if one were to point out that the AT-6 is a safe, dependable, and excellent trainer, the fact still exists that most Air Reservists consider it an old beaten up "clunker" - a "cast off", in other words. And the mere fact that it is very prone to ground loop (200 ground loops per year for the Air Reserves out of a total of 911 AT-6 aircraft in the program at the present time) leads one to question its relative safety.

c. The greatest single factor which renders the AT-6 aircraft so much more expensive than a new type trainer is the high cost of labor to maintain the AT-6. A new type plane would effect such a saving in manpower that the cost of the Air Reserve program could be materially reduced, or what would be far better, the program could be greatly expanded, even to include the activation of many more bases. Certainly our recent forced cutback in the number of Air Reserve bases is a most disheartening and undesirable thing.

d. For the Air Reserve program, whatever the new trainer that might be decided upon to replace the AT-6, it could and should be used exclusively. The P-51 aircraft have already been eliminated from the program, and the elimination of the AT-7s and AT-11s would even further reduce the cost of the program, since these planes, having a higher initial cost than the AT-6, higher maintenance and supply costs, compare even more unfavorably with the new type trainer. Since this fact is obvious, the attached study does not show a comparative cost analysis between these planes and a new type trainer.

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7. In view of the foregoing remarks, and based on the facts disclosed in the attached study, I strongly recommend and urge that the AT-6 aircraft currently in service be replaced as rapidly as possible with a new type all purpose trainer of the best design and operational characteristics obtainable consistent with economy of initial cost and cost of operation. Since this replacement of AT-6 aircraft would of necessity be a gradual process, I further recommend that we use up our replaced AT-6 aircraft by cannibalization until the supply is exhausted.

GEORGE E. STRATEMEYER
Lieutenant General, U. S. Army
Commanding

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452-1 Rejected T-34

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ADDRESS REPLY TO
Aer-AC-61
AND REFER TO
.NOa(s) 6662

NAVY DEPARTMENT
BUREAU OF AERONAUTICS
WASHINGTON 25, D. C.

26216

RECD APR 2
31 MAR 1947

From: Chief of the Bureau of Aeronautics
To: Commanding General, Army Air Force,
Air Materiel Command
Wright Field, Dayton, Ohio

Via: Bureau of Aeronautics General Representative
Central District, Wright Field, Dayton, Ohio

Subject: Model XNQ-1 Airplane - Experimental
Primary Trainer.

1. Test schedules on subject airplane now indicate that it will be sent to the Naval Air Test Center, Patuxent River, Maryland, to begin Final Demonstration and Service Acceptance Trials during the first week in May 1947. The Air Materiel Command will be informed of the actual commencement date of the XNQ-1 Final Demonstration as soon as that date is firm.

2. In view of their stated interest in a modern primary trainer of this type, the Air Materiel Command is invited to send a Representative Board to the Test Center to attend and participate in the Final Demonstration and Service Acceptance Trials.

C. A. Nicholson
Rear Admiral, USN
By direction Chief of Bureau

CC: NATC Patuxent River
ComGen, AAF Hq
(Attn. Training Div. AC/AS-3)

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18 Apr 1947

SUBJECT: Replacement of AT-6 Aircraft with New Type Trainer

TO: Commanding General, Air Defense Command, Mitchel Field, N.Y.

1. Reference is made to your letter, above subject, dated 27 March 1947, inclosing the study "Advantages of Procuring the XBT-1 Navy Trainer." This Headquarters, with the Air Training Command, has thoroughly investigated the aircraft in question and has determined that it does not fulfill the military characteristics established for a trainer which can be utilized in a new concept of a combined primary-basic training program. A copy of the approved military characteristics for a basic training airplane is attached for your information (Inclosure #1).

2. Your attention is invited to the fact that the Navy evaluation tests, which include both flying and engineering tests, are not completed on the Fairchild trainer. In addition it appears that, considering current fiscal limitations and the time-consuming task of manufacturing and accepting a new type of trainer aircraft, any procurement objectives must be necessarily postponed at least until the FY 1949.

3. Considerable numbers of aircraft, to include P-51, P-47, B-25, A-26 and C-47 types, are now excess to overall AAF requirements. These aircraft must be utilized by the Air Reserve, be "cocooned" or declared surplus and be lost to the AAF. This Headquarters considers the replacement of AT-6 type aircraft with a similar type of training aircraft or the continuation of the use of AT-6 aircraft for Air Reserve pilot training to be undesirable. It is believed that pilot training with AT-6 aircraft will not be of adequate value for mobilization assignments of Air Reservists. It is fully realized that any use of tactical aircraft will increase hourly flying costs and reduce the numbers of personnel to receive pilot training but it is believed that more return to the AAF will be received in this realistic approach to Air Reserve training.

4. It is requested that representatives of your Headquarters attend a conference at this Headquarters on Monday, 28 April 1947, concerning utilization of the tactical aircraft mentioned herein for Air Reserve training in FY 1948.

BY COMMAND OF GENERAL SPAATZ:

(sgd)

E. E. PARTRIDGE
Major General, USA
Assistant Chief of Air Staff-3

1 Incl:
Military Characteristics
for Basic Trng Airplane..

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HEADQUARTERS, ARMY AIR FORCES
WASHINGTON

IN REPLY REFER TO:

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24 APR 1947

MEMORANDUM FOR COMMANDING GENERAL, ARMY AIR FORCES:

SUBJECT: Replacement of Air Reserve Aircraft

X3526

1. In letter dated 27 March 1947 (Tab "A") General Stratemeyer recommended that AT-6 aircraft being used for Air Reserve training be replaced as rapidly as possible with a new type all purpose trainer and that the Fairchild XNQ-1 Navy trainer be considered.

2. Several conferences, which included representatives of Air Training Command, Air Materiel Command and Training Division of this office, have resulted in a new set of characteristics for a primary-basic type training aircraft. The Fairchild XNQ-1 is too light and too slow and there is no existing type which will satisfy the military characteristics required.

3. In a recent conference, the Deputy Commander expressed the opinion that AT-6 Reserve pilot training is of doubtful value and suggested that a revised program be developed before 30 June to replace AT-6's with service types, to include A-26, B-25, C-47, P-47 and P-51 aircraft. Such types are now available in sufficient numbers and, unless utilized by the Air Reserve, must be "cocooned" or declared surplus and lost to the Army Air Forces. Replacement of AT-6's with service type aircraft will, of course, increase flying costs and reduce the number of Reserve personnel to receive pilot training, but the effectiveness of the training will be greatly improved.

4. Air Defense Command has been advised of the foregoing by letter dated 18 April 1947 (Tab "B") and has been requested to have representatives meet at this Headquarters on 28 April 1947 concerning the utilization of tactical aircraft for Air Reserve training in FY 1948.

2 Incls
(1) Tab "A"
(2) Tab "B"

[redacted]
Brigadier General, USA
Deputy Asst. Chief of Air Staff

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ADDRESS REPLY TO COMMANDING GENERAL, ARMY AIR FORCES, WASHINGTON 25, D. C.

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CONGEN AAF AC /TTY TRAINING DIV/

CG NATC PAX RIV

INSURV NATC PAX RIV

MODEL XNJ-1 EXPERIMENTAL PILOTLESS TRAINER WILL BE FLOWN UNDER

PERMITTING BY CONTRACTOR TO NATC PATUXENT RIVER MARYLAND 17 MAY 1947

FOR FINAL DEMONSTRATION

2244/29 MAY 47 2922447 XNJ-1 12 1947

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JUDGE ADVOCATE
PERSONNEL (T-1)
INTELLIGENCE (T-2)
ENGINEERING (T-3)
SUPPLY (T-4)
PLANS (T-5)
BASE C O.
OTHER

AMC Form No. 10-598
(Rev 12 Aug 46)
(PRINT SYMBOL AND INITIALS IN APPROPRIATE BLOCK)

TSEOA-5:ATC:rjw

3 June 1947

XNQ-1 Evaluation

Naval Air Test Center
U. S. Naval Air Station
Patuxent River, Maryland

Attention: Captain C. E. Giese
Commander J. A. Ferguson

1. It is desired to express the appreciation of this headquarters for your whole-hearted cooperation in making the XNQ-1 available for our evaluation and for the warm hospitality extended to members of the Air Forces who visited your base.

2. It is hoped that you may be able to pay us a return visit in the not too distant future, at which time we will be glad to show you items of interest at Wright Field.

FOR THE COMMANDING GENERAL:

GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

ALMAN T. CULBERTSON
Colonel, Air Corps
Chief, Engineering Division

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OTHER

AMC Form No. 10-508
(Rev 12 Aug 46)

(PRINT SYMBOL AND INITIALS IN APPROPRIATE BLOCK) 7 Jun 4 15:53

TSEOA-5:ATC:rjw

4 June 1947

XNQ-1 Trials

Commanding General
Army Air Forces
Washington 25, D. C.

Attention: AC/AS-4

1. In compliance with TWX AFACC 704 dated 23 May '47, Colonel A. T. Culbertson and Mr. W. A. Summerfelt proceeded to Patuxent River Naval Station on 28 May '47, to witness XNQ-1 Navy trials, reporting thereat to Commander J. A. Ferguson, Senior Project Officer for non-carrier aircraft.

2. Upon arrival, it was learned that Navy contractual acceptance tests had been completed; and that their equivalent of our tactical suitability tests were being delayed pending the completion of the AAF evaluation. No AAF headquarters representative appeared, but Lt. Colonel O'Keefe and Major Paulin were present from the Training Command.

3. A review of the Navy test program indicated that their test data will be adequate to meet AAF requirements. In the absence of Military Characteristics for this class of aircraft or specific instructions on which to base an evaluation, the AAF personnel present elected to look over the technical details of the aircraft and to fly it to determine its general handling characteristics.

4. The design of this airplane appears extremely clean, with emphasis on ease of maintenance. The engine and its accessories are readily accessible through hinged upper cowling. The effectiveness of the emergency landing gear system was demonstrated during one flight when a microswitch malfunctioned. The cockpits are clean and well arranged, and the field of vision through the bubble canopy is unusually good.

5. Although Colonel Culbertson has not flown this class of airplane during the last ten (10) years he was very favorably impressed

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AMC Ltr to CG, A Wash. 25, D.C., Attn: AC/AS-4, ubject - "XNQ-1 Trials."
Dated 4 June '47.

Para. 5. Cont'd.

with its handling qualities. The only deficiency appeared to be insufficient dihedral which is being corrected in the second flight article.

6. While this airplane is considered satisfactory from an engineering standpoint, its value as an AAF trainer is questioned owing to its light weight, low power and conventional landing gear. However, for Air Reserve or Air National Guard training or as an emergency expedient to meet Training Command requirements, it should receive serious consideration. This being a matter for A-3 Requirements Section and the Training Command to resolve, it is recommended in case such a need arises, that the Navy be requested to release one (1) airplane to the Training Command for an evaluation at one of their bases.

7. The above mentioned AAF personnel returned to their home stations on 29 May '47.

FOR THE COMMANDING GENERAL:

GEORGE F. SMITH
Colonel, Air Corps
Chief, Aircraft Projects Section
Engineering Division

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ATSC Form No. 10-508 (3 Jan 45)
(OM ATSC Form No. 43)

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[redacted]

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MGT. CONTROL
CHIEF OF ADMN.
SPECIAL STAFF
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CHIEF, SUPPLY & MAINT.
PERS. & BASE SERV. DIV.
MAINT. DIV.
SUPPLY DIV.
ENGINEERING DIV.
PROCUREMENT DIV.
READJUST DIV.
OTHER

Ref: Ltr from AC/AS-4 dtd 12 Dec 46, subj: Review of Aircraft for Air Training Command

1st Ind: MEP/h E/cs

Hq, Air Materiel Command, Wright Field, Dayton, Ohio, 21 July 1947

TO: Commanding General, Army Air Forces, Washington 25, D. C., Attn: AC/AS-4

1. This will refer to details of the basic communication and subsequent telephone conversations with members of your Headquarters, regarding the review of training aircraft by this Command. The following discussion will be broken down into four categories, (a) "PT"-"BT" Trainer, (b) 2-Place Jet Trainer, (c) Multi Engine Conventional Advanced Trainer, and (d) General.

a. "PT" - "BT" Trainer

There are no training aircraft being produced at this time either commercially or for the services, which will meet the proposed "PT" - "BT" military characteristics. To attain the desired high speed of 275 miles an hour at tactical operating altitude will necessitate a power plant of at least 700 hp which in turn will require a rather large fuel capacity for four hours endurance with internal fuel provisions only. The aircraft will as a result be larger and considerably more expensive than either the "PT" or the "BT" airplanes of the war era. It is anticipated that the maintenance of such an aircraft will be approximately double that of the present AT-6 because of the more complicated equipment installed, higher engine horsepower, and greater weight.

The most economical approach to insure at least an interim trainer would be to purchase an aircraft which has been built and flown. Until such time as the desirable airplane described in Military Characteristics dated 13 August 1946 can be designed, tested, and placed into production, this would mean a PT-13, AT-6, or the Navy Fairchild XNQ airplane. For maximum utility and minimum initial cost, it would appear that the Fairchild XNQ is the most desirable of the three models. This airplane can be obtained for approximately $45,000 per unit for the first 75 airplanes, $35,000 for 150, $28,000 for 300 or $22,000 for quantities of 600. The latest aircraft which in a revised form would meet the proposed characteristics appears to be the Douglas "Cloudster". This airplane would cost approximately $115,000 in quantities of 100. The above airplane prices are airframe costs and should be increased by 25 or 30 percent to include GFE. The Navy has indicated verbally they would participate in a program for procurement of the XNQ airplane which would

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WF-L-6 AUG 46 450M

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ATSC Form No. 10-508 (3 Jan 45)
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COORDINATION:
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AIR INSPECTOR
MGT. CONTROL
CHIEF OF ADMIN.
SPECIAL STAFF

Ltr from AC/AS-4 dtd 12 Dec 44, subj: Review of Aircraft for Air Training Command

further reduce the costs as the tooling and engineering would be shared by the two services. It is difficult for this Command to compare operating costs of these airplanes since no data are available for a service comparison. However, it is anticipated that the operating costs of the proposed trainer would be two to three times greater than the PT-13, AT-6 or BC.

CHIEF, ENG. & PROC.
CHIEF, SUPPL. & MAINT.
PERS. & BASE SERV. DIV.

To further answer questions set forth in basic communication, the substitution of a turbo jet engine for the conventional reciprocating type would result in increased cost for the "PT-" type. Jet engines are more expensive and the operational and maintenance costs are drastically higher because the amount of fuel burned is greater and the life of the engine between overhaul periods is exceedingly low. The incorporation of the turbo jet is logistically possible at this time depending to some extent upon the model engine selected. A savings, therefore, would not result in the installation of this engine in the "PT-" type. Further, if an emergency would arise in the next few years, it might become difficult to supply jet engines for a training program since the same power plants would be used in tactical designs.

MAINT. DIV.

The procurement, maintenance, and supply of spare parts would be adversely affected if two models of a type were procured. The degree of affectation is difficult to establish but it does not appear feasible from a purely command standpoint and it is the recommendation of this Command that any future procurement be concentrated in one design.

SUPPLY DIV.

Information quotations from two of the leading aircraft companies indicate that an experimental program represented by two articles and a static test would cost approximately two and a half to three million dollars. In summary, the following points are pertinent:

ENGINEERING DIV.

(1) The initial cost of the airplane built to the proposed military characteristics would be between two and three times as great as the PT-13 or BC, or approximately 30% greater than the AT-6 were this airplane placed in production again.

PROCUREMENT DIV.

(2) The operating costs of the desired airplane would be between two and three times as great due to the higher horsepower required, more complicated structure, and greater weight.

READJUST DIV.

(3) It would be approximately fiscal year 1950 before

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Basis: Ltr from AC/AS-4 dtd 12 Dec 46, subj: Review of Aircraft for Air Training Command

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MAINT. DIV.
SUPPLY DIV.
ENGINEERING DIV.
PROCUREMENT DIV.
READJUST DIV.
OTHER

production could be started on the proposed "PT" - "BT" airplane, if a development program is carried out and production engineering and tooling subsequently established. Either the PT-13, AT-6, or the XNQ production could be started in 1948.

(4) The "PT" - "BT" type airplane should be constructed from metal, although it is anticipated that non-strategic plastic materials might become available as result of research and development being carried on at this Command.

(5) The substitution of a jet engine for the reciprocating type would result in a higher cost, both initially and during operation in the service.

(6) The production of only one model of the subject type is recommended as it would be more economical from a procurement as well as a maintenance and supply standpoint.

b. 2-Place Jet Trainer

This Command has made some preliminary studies on the 2-Place Jet Fighter based on Military Characteristics dated 15 April 1946, as revised 15 March 1947. The most economical approach to securing airplanes to meet those characteristics is to revise a current fighter airplane which is, or has been, in production. Your headquarters was furnished details regarding this study in letter from this Command dated 20 June 1947, subject, "Fighter Jet Trainer Study". This study showed that Lockheed P-80, Republic P-84, and the McDonnell Navy XFD-1 airplanes could be converted to the 2-place trainers. The Lockheed Company indicates that the P-80 airplane could be redesigned retaining approximately 50% of the original P-80 construction and meet the desired military characteristics except for stall speed. This airplane would be powered with the J-33-23 engine equipped with water injection and would have a normal gross weight of 11,700 pounds. This engine is the latest design of the J-33 series and it is anticipated that its dependability will greatly exceed that of any current American jet engine. These airplanes could be procured for approximately $150,000 each for the airframe in quantities of 100, or approximately $310,000 complete with GFE and spare parts. The Lockheed Company has also a conversion of the P-80B airplane utilizing a minimum of change for maximum utility as a 2-place fighter trainer. This airplane would be priced at approximately

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AAF-Area B-1-1-45-500M

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MAINT. DIV.
SUPPLY DIV.
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PROCUREMENT DIV.
READJUST DIV.
OTHER

WF-L-4 AUG [illegible] 450M

Ltr from AC/AS-4 dtd 12 Dec 46, subj: Review of Aircraft for Air Training Command

$100,000 for the airframe in quantities of 100 and would include the following performances and changes over the P-80B airplane:

(1) Performance

Weight empty - 8,081 pounds

Normal Gross - 12,014 pounds

Landing Weight - 11,067 pounds

High Speed at Sea Level - 560 miles and hour

High Speed at 25,000 feet - 547 miles and hour

Stalling Speed at 11,067 pounds with full flaps - 102 miles per hour

Takeoff over 50 foot obstacle at 12,000 pounds - 2,500 feet

Landing distance over 50 foot obstacle at 11,067 - 2,900 feet

Maximum duration for training mission - 3-1/4 hours

(2) Differences from P-80B

(a) Fuselage fuel tankage decreased from 207 to 90 gallons and the tanks are changed to the nylon type. An additional tank is installed under the cockpit.

(b) A pressure bulkhead is incorporated aft of seat.

(c) Four guns are eliminated and batteries and radio reinstalled in the nose.

(d) A 50 gallon nylon bag is inserted in the space formerly occupied by the battery and radio.

(e) Nylon bags are substituted for bulletproof tanks

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MAINT. DIV.

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PROCUREMENT DIV.

READJUST DIV.

OTHER

in wings (Pick up 60 gallons)

(f) New canopy with openings hinged on the side.

(g) Seat, pedals, stick, flight instruments, throttle, and light indicators are added for instructor's compartment.

(h) 500 pounds of ballast lead is incorporated in the nose.

(i) Armor plate is deleted and the bulkhead aft of pilot is revised.

(j) Instructor's seat and canopy will be made jettisonable.

(k) K-14 gun sight with slave sight for instructor is installed.

(l) Intercommunication system is added.

This airplane does not meet the military characteristics, however, it approaches them very closely and has the advantage of maintenance and supply experience in the service on the P-80 airplane. Either of the above models could be produced beginning October 1948 provided approval for their purchase is obtained in the immediate future.

A trainer conversion of the Republic P-84 airplane would meet the military characteristics except for takeoff distance and stall speed. The biggest disadvantage in the redesign of this airplane would be that it does not have the background and service experience, when compared to the P-80, the J-35 engine is not as reliable as the J-33-23, and the cost is considerably greater. No definite costs are available for this revised P-84, although it is anticipated they would be higher since the rework necessary would be greater and the original cost of the airplane is higher than that of the P-80B.

Another possible conversion would be the McDonnell XFD-1 (Phantom). This airplane is powered with two Westinghouse 19B engines which are in limited production at this time and on which costs are approximately $100,000 each. The development of this airplane has been a Navy project and, therefore, supplies are not available in our service and maintenance "know-how" is non-existent. As was shown in referenced

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Ltr from AC/AS-4 dtd 12 Dec 46, subj: Review of Aircraft for Air Training Command

AIR INSPECTOR

MGT. CONTROL

CHIEF OF ADMN.

letter dated 20 June 1947, this airplane does not meet characteristics with respect to high speed and takeoff and climb performance. The Navy has indicated that they would join the AAF in a production program on the XFD-1 airplane.

SPECIAL STAFF

In the event that a modified standard jet fighter would not be satisfactory, it would require the procurement of an experimental quantity of a new design. It is anticipated that two experimental articles will cost approximately $3,500,000 and based on present planning, the airplane would be obtainable in production in 1950.

CHIEF, ENG. & PROC.

c. Multi Engine Conventional Advanced Trainer

CHIEF, SUPPLY & MAINT.

The conventional multi engine advanced trainer and light utility transport will require an experimental prototype since there is no airplane either military or commercial which meet the proposed military characteristics. It is anticipated that two experimental airplanes of this design would cost approximately three and a half million dollars and that production could not be started before 1950.

PERS. & BASE SERV. DIV.

A minimum of research has been conducted on this type at AEC. However, some penalty must be paid for the compromise which will result in an airplane that will fulfill the requirement of five separate types of trainers, together with its use as a light transport. The desirability of installing the latest type of radar and bombing equipment, the necessity of cabin pressurization, the requirement of a high speed of 325 miles per hour at 25,000 feet when added to the compromise as discussed above will result in an increase in weight, and a relatively high basic airframe and GFE costs. An attempt was made during the war to construct an all purpose "Crew Trainer" which would be used for training student pilots, gunners, bombardiers, radio men, and navigators. The resulting Boeing AT-15 and Fairchild AT-13 airplanes were never successful and both were discontinued. Every effort should be made to simplify the military characteristics for the proposed advanced trainer and light utility transport to guard against expanding the mission of this type where the compromises required in the design would be adversely reflected in weight, performance, efficiency, maintenance, and initial and operating costs.

MAINT. DIV.

SUPPLY DIV.

ENGINEERING DIV.

PROCUREMENT DIV.

d. General

READJUST DIV.

This Command does not consider wood as a suitable substitute for metal in the fabrication of training aircraft. Extremely unsatisfactory maintenance was experienced with wood on training airplanes

OTHER

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WP, Area B-1-1-46-600M

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SPECIAL STAFF
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CHIEF, SUPPLY & MAINT.
PERS. & BASE SERV. DIV.
MAINT. DIV.
SUPPLY DIV.
ENGINEERING
PROCUREMENT DIV.
READJUST DIV.
OTHER

Subj: Ltr from AC/AS-4 dtd 12 Dec 46, subj: Review of Aircraft for Air Training Command

During the last war and since that period a minimum of facilities are available in the service for maintaining wood. Plastic materials in the laminated sandwich form for use in aircraft structures are now in the experimental stages. Present aircraft structural components fabricated from laminated glass fabric have compared favorably in most cases to aluminum alloy structures in laboratory tests and limited service. The experience to date is very limited, however, it appears that in the case of an emergency, a suitable trainer could be fabricated with structural efficiency approximately equal to metal. The art of fabricating plastics has not advanced to such a stage at the present time to allow for its application as a high production detail. This Command is continuing its research in the development of plastics for aircraft structures.

The incorporation of tricycle gear rather than the conventional gear will not appreciably influence the cost of the "PT"-"BT" type airplanes, provided this feature is anticipated in the original design. The tricycle gear would reduce the number of ground accidents, particularly from ground loops, and therefore safety should be improved, although maintenance of the retracting mechanism would be slightly higher.

Revisions have been made to the attached chart "Estimated Cost of Operating Aircraft for One Hour". As shown on pages "A" and "B" attached, the initial costs of the aircraft have not been included except as discussed in the body of the above letter. None of the aircraft listed are now in production and, therefore, procurement costs of these aircraft are no longer available. It will be noted that operating costs have increased for those airplanes on which total information is included on these charts.

2. It is requested that your Hq advise this Command of decisions reached regarding the type of training aircraft to be procured in the future so that plans can be formulated for this anticipated production.

FOR THE COMMANDING GENERAL:

Dist: PSTEX
J. S. STOWELL SEOA
Brigadier General, U.S.A.
Chief of Administration
TSBPA 5

3 Incls
(1) Bill Chas of Acft dtd 8/9/46
(2) Chart - Estimated Cost of Operating Acft for 1 Hour
(3) Chart - Estimated Cost of Operating Acft for 1 Hour

[redacted]

- 9 -

WP, Area H-1-1-45-4004M

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Excerpt from Section I - Report of the Chief of Staff, United Stated Air Force to the Secretary of the Air Force for Fiscal Year Ending 30 June 1948.

Deputy Chief of Staff, Operations

Training Division

Flying Training.- The Air Force, up to the time Japan surrendered, had trained over 190,000 pilots. It was decided at that time to cease pilot training temporarily because of the large surplus of well-trained pilots on hand. This surplus is rapidly dwindling as pilots pass the effective combat age, or as their availability is lost through death, retirement, relief from active duty, or physical incapacity.

In order to remedy anticipated shortages in pilot personnel, the pilot-training program was revived in 1946. In fiscal year 1948, 716 pilots were trained and at the end of that period the yearly output rate had been increased to 984. This rate will not be sufficient to man and provide replacements for a 70-group Air Force. It will not provide the reserve necessary to allow immediate expansion of the Air Force in case of war. It will not replace early war-time combat losses for which no other source of replacement would be available until the training output could be increased to take care of these losses.

During fiscal year 1949 the pilot training will be increased to 3,000 per year. The training rate will be increased each year thereafter until the ultimate objective of approximately 6,000 pilots per year is reached. This number will be sufficient to support the 70-group program and provide trained pilots as replacements in our National Guard and Air Reserve squadrons following their active duty tours with regular Air Force units.

The newly graduated pilotsmust now be prepared to fly types which yesterday would have been reserved for those of long experience and great technical knowledge. Tomorrow's crews will guide aircraft far advanced over World War II types. They will fly much higher, faster, and farther than the aircraft of the past few years. To meet this change, many of the phases of former training have been consolidated.

16 A

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The primary phase of training has been eliminated. The student now begins his flying and completes the basic course in what was once the advanced trainer--the AT-6. The new basic trainer, the T-28, is being developed. It is not expected, however, that the first of these will be in use by the Training Command before fiscal year 1950. Advanced training of student pilots is accomplished in recent and current tactical types, the F-51, F-80, and the B-25."

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9 September 1948

In reply please refer
to: GA-W-1L0

Subject: Navy Contract NOa(s)-6662
Loan of Model XNQ-1 airplane, Serial #75725

To: Chief of Staff
United States Air Force
Pentagon Building
Washington 25, D. C.

1. In accordance with the requirements of the subject contract, the Fairchild Aircraft Division has designed, manufactured and delivered to the Bureau of Aeronautics, Navy Department, two (2) flight articles of an experimental primary training airplane designated as the Model XNQ-1.

2. The XNQ airplane has been evaluated by both Bureau of Aeronautics, Navy Department and United States Air Force personnel. As a result of these evaluation tests, comments from both the Air Force and Navy Department indicate that it may be desirable to increase the performance characteristics of the airplane by installing a higher powered engine.

3. In the interest of developing a trainer airplane that will more nearly meet the requirements of both the Air Force and the Navy Department, Fairchild Aircraft is desirous of initiating a development program covering the installation of a higher powered engine in a Model XNQ airplane. This program will be accomplished without any increase in the subject contract price. It is requested, however, that in the event the subject program results in future procurement of the NQ or similar airplane, the development costs incurred in this program be considered as allowable costs in the negotiation of such a contract. In order that such a program can be started, however, it is essential that one of the Model XNQ-1 airplanes now in the custody of the Bureau of Aeronautics, Navy Department, be loaned to Fairchild Aircraft Division for a period of approximately four (4) months. Fairchild Aircraft has been in contact with the manufacturer of the Lycoming engine which is to be used in the airplane and has been advised that an engine can be secured on a consignment basis. Arrangements have also been made to secure the necessary propeller on a consignment basis.

4. In the event your Office agrees with the above proposed program and arrangements can be made for the loan of one (1) Model XNQ-1 airplane, it is requested that Model XNQ-1 airplane bearing

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Subject: Navy Contract NOa(s)-6662
Loan of Model XNQ-1 Airplane, Serial #75725

Bu&er Serial #75725 be loaned. After tests of this aircraft have been accomplished, it will be returned to its original configuration prior to re-delivery to the Air Force. It is possible that the loan of such aircraft may be accomplished through bailment of the airplane to Fairchild under an existing blanket bailment agreement which the Fairchild Aircraft Division has entered into with the United States Air Force. This blanket bailment contract is designated as Contract # 33-038 ac-11023.

5. The Fairchild Aircraft Division respectfully requests your consideration of the above proposal and would appreciate hearing from you at the earliest possible date as to when it would be possible to secure the loan of the Model XNQ airplane.

Very truly yours,

FAIRCHILD AIRCRAFT Division of
FAIRCHILD ENGINE & AIRPLANE CORPORATION

Kenneth P. Bowen
Assistant General Manager

KPB:hkb

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Y

BrigGen:AAKessler,Jr/dn/2936
Prep: 9/13/48

SUBJECT: Loan of Model XNQ-1 Airplane, Serial #75725

TO: Bureau of Aeronautics
Department of the Navy
Washington 25, D. C.

1. Reference is made to attached copy of letter, dated 9 September 1948, from the Fairchild Aircraft Division of Fairchild Engine and Airplane Corporation, Subject: "Navy Contract NOa(s)-6662, Loan of Model XNQ-1 Airplane, Serial #75725".

2. It is requested that Model XNQ-1 airplane, serial #75725 be loaned to the U. S. Air Force for loan by the Air Force to Fairchild under an existing blanket bailment agreement between Fairchild and the Air Force. The purpose of the loan is to permit Fairchild to increase the performance characteristics of the airplane by installing a higher powered engine.

3. In paragraphs 3 and 4 of the attached letter, Fairchild has offered to make this change without any increase in the contract price and after tests of this aircraft have been accomplished, will return the aircraft to the Air Force in its original configuration, at which time it will be returned to the Bureau of Aeronautics by the Air Force.

4. It is understood that this project has been coordinated with Captain Moss, Director of Naval Air Training.

FOR THE COMMANDING GENERAL:

E. M. POWERS
Major General, USAF
Asst. Deputy Chief of Staff, Materiel

Incl:
Cy ltr dtd 9 Sep 48
fm Fairchild

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AF AO-12 HEADQUARTERS

ROUTING SLIP

TO:

1. OFFICE DCAS	DATE 24 Nov
ATTENTION	
2. OFFICE	DATE
ATTENTION	
3. OFFICE	DATE
ATTENTION	

FOR: FOLLOWING ACTION(S) AS CHECKED

X COORDINATION	NOTE AND RETURN	✓ INFORMATION ok
NECESSARY ACTION	RECOMMENDATION	FILE Can be Destroy
SEE OR PHONE ME	APPROVAL	SIGNATURE

COMMENT

FROM:

OFFICE

INDIVIDUAL PHONE

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APR 24 11 58 AM '47

25 apr 47

Dlee CG & DC/AS have noted this.

Terry

E. V. R. SCHUYLER 3E1015
Lt. Colonel, AC
Executive, Deputy Chief 5285
of Air Staff

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HEADQUARTERS, ARMY AIR FORCES
OFFICE OF THE COMMANDING GENERAL

DATE 5/2/

MEMORANDUM FOR: A-3

Patton

Gen. [illegible]

[illegible]

CARL SPAATZ
Commanding General, Army Air Forces

6-5796, AF

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Ref: Col Disosway/Ast/71425
29 Sept 48

CONFIDENTIAL

30 SEP 1948

MEMORANDUM FOR THE DEPUTY CHIEF OF STAFF, MATERIEL

SUBJECT: Procurement of Primary-Basic Training Aircraft

1. A new pilot training program has been approved. It requires the procurement of a PT-BT airplane in the 3500-4000 pound weight class to be delivered according to the following schedule:

By Jan 1950 - 44
Apr 1950 - 116
Jul 1950 - 175

2. The Navy developed Fairchild XNQ airplane meets the requirements for this aircraft.

3. Recommend that the XNQ be delivered in the numbers as shown in paragraph 1.

4. The above schedule will require the allocation of fiscal year 1949 funds for this project.

1 Incl:
Tab "A"

4-5-2-1

Training Requirements

since all FY 49 procurement funds have been earmarked, FY/BT procurement from 49 money will require diversion. this office coordinates with the proviso that the necessary diversion be conducted by HQ's?

OFFICE SYMBOL	1 AFOTG	2 AFOTR	3 AFORQ	4 AFORQ-A	5 AFPPR	6
SIGNATURE OF RESPONSIBLE OFFICER						
NAME OF OFFICE OF COORDINATION						

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D. C.

2 October 1948

MEMORANDUM FOR GENERAL POWERS

SUBJECT: Procurement of NQ Trainers from Fairchild

20

1. All funds in the Supplemental 1948 budget defended before Congress for the procurement of aircraft are committed or earmarked.

2. Funds for the introduction of NQ production at Fairchild could be provided as follows:

a. The present schedule for the North American T-28 shows that the current order of 266 T-28's will not be delivered until November Fiscal Year 1951.

Fiscal Year 1950													Fiscal Year 1951					
1949			1950									12 Mo.						
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total	Jul	Aug	Sep	Oct	Nov	Dec
1	2	3	5	7	10	12	15	20	24	24	24	147	24	24	24	24	23/3	30

Once production has started, trainers can be built normally on a lead time of 12 months, thus it would be possible to reduce this contract by approximately 76 aircraft without adversely affecting availability from production of the T-28, providing additional funds were made available from Fiscal Year 1950 budget.

b. The funds made available from the reduction of approximately 76 T-28's would enable procurement of approximately 100 NQ trainers sufficient to get this line started and carry it through Fiscal Year 1950, as shown below:

Fiscal Year 1950													Fiscal Year 1951					
1949			1950									12 Mo.						
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total	Jul	Aug	Sep	Oct	Nov	Dec
			1	1	3	6	8	10	15	25	25	94	6/19	25	25	25	25	25

Additional funds would have to be made available from Fiscal Year 1950 budget to satisfy the number required.

ALFRED K. KESSLER, JR.
Brigadier General, U.S.A.F.
Director, Procurement & Ind.
Planning, DCS/Material

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NAVY DEPARTMENT

BUREAU OF AERONAUTICS

Aer-AC-62

73067

4 October 1948

From: Chief of the Bureau of Aeronautics
Headquarters, United States Air Force
Department of the Air Force
Attention: Assistant Deputy Chief of Staff, Materiel

Subject: Loan of Model XNG-1 Airplane

Reference: (a) Air Force ltr. dated 13 Sept. 1948

1. The referenced letter requested loan of subject airplane, bureau number 75725, for the purpose of permitting Fairchild to install an engine of higher power.

2. The Bureau of Aeronautics is pleased to fulfill this request and, unless otherwise directed, this aircraft will be ferried from the Naval Air Test Center, Paturent River, Maryland, on or about 1 October 1948 and will be delivered into the custody of the Air Material Command Representative at the Fairchild Factory at Hagerstown, Maryland.

3. It is understood that this agreement in olves no costs chargeable to the Bureau of Aeronautics.

C. A. NICHOLSON
BY DIRECTION

CC:
CNO (Attn: OP-542)
BIS, Paturent
NATC, Paturent
BAR Baltimore
AMC Representative at Fairchild
Addressee (2)

21

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[illegible] 3 Oct 1950

[illegible]

3. [illegible]

RECOMMENDATION

4. It is recommended that the Plant [illegible] as follows:

a. [illegible]

b. [illegible]

2 Encls.
Tab A & B

OFFICE SYMBOL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
GRADE AND SURNAME OF COORDINATING OFFICERS	Lt. E.G. Barber	Lt. Kessler			

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON

18 DEC 1948

MEMORANDUM FOR GENERAL POWERS

SUBJECT: Revision of the Flying Training Program

1. The current Flying Training Program faces two serious problems:

a. Our present curriculum is believed to be unduly expensive. All basic flying training is given in the T-6 aircraft. The current plan is to replace this aircraft, as it wears out, with the T-28, a 6,000 lb., 800 horsepower trainer of relatively high performance. This trainer, while desirable, will not fit into the economy program made necessary by coming budget limitations, if used as the all-through trainer. Furthermore, in the event of mobilization, the procurement of as large an aircraft as the T-28 in the numbers required would aggravate the wartime shortage of strategic materials.

b. The present program will result in earlier shortages of B-25 aircraft. No suitable substitute has been developed for the B-25 as a twin-engine trainer, nor could one be developed and procured in less than 3½ to 4 years.

2. The Pilot Training Program has recently been revised in such a manner as to accomplish a solution to both of these problems. This revision has been approved by the Chief of Staff, and a directive is now being sent to the Air Training Command putting the new program into effect.

3. The following is a brief statement of the new program:

a. The ultimate ratio of single-engine to twin-engine trained graduates is changed from 67% twin-engine and 33% single-engine to 20% twin-engine and 80% single-engine. The resulting reduction in twin-engine aircraft requirements will prolong the availability of the B-25 by approximately one year. The increased single-engine training requirement will bring earlier shortages in single-engine training aircraft, but there are replacements already scheduled for these aircraft, and single-engine training aircraft can be procured at less cost than the twin-engine aircraft.

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b. The above steps will reduce the cost of the training program, since training in single-engine aircraft is less expensive than in twin-engine. To further reduce the cost of training, a lighter basic trainer (3,500-4,000 lbs.) is introduced into the program. The first 130 hours of flying will take place in this trainer.

c. The program adopted is identical with Plan C in the attached Annex 1 (Comparison of Proposed Flying Training Systems). Annex 2 (Aircraft Availability Chart) shows dates at which present stocks of aircraft would be depleted under Plan C.

3. The introduction of a basic trainer of the XNQ type into the program would release T-6's and T-28's for use in the advanced phase. These, in turn, would eliminate P-51 shortages. Combined procurement of the XNQ and the T-28 in fiscal years 1950 and 1951 will relieve all single-engine training aircraft shortages; and the additional year of availability will allow time to develop the new twin-engine trainer.

2 Incls
1 - Annex 1 - Comparison of Proposed Flying Tng Systems
2 - Acft Availability

G. P. DISOSWAY
Colonel, USAF
Acting Chief, Training Division
Directorate of Training and Requirements

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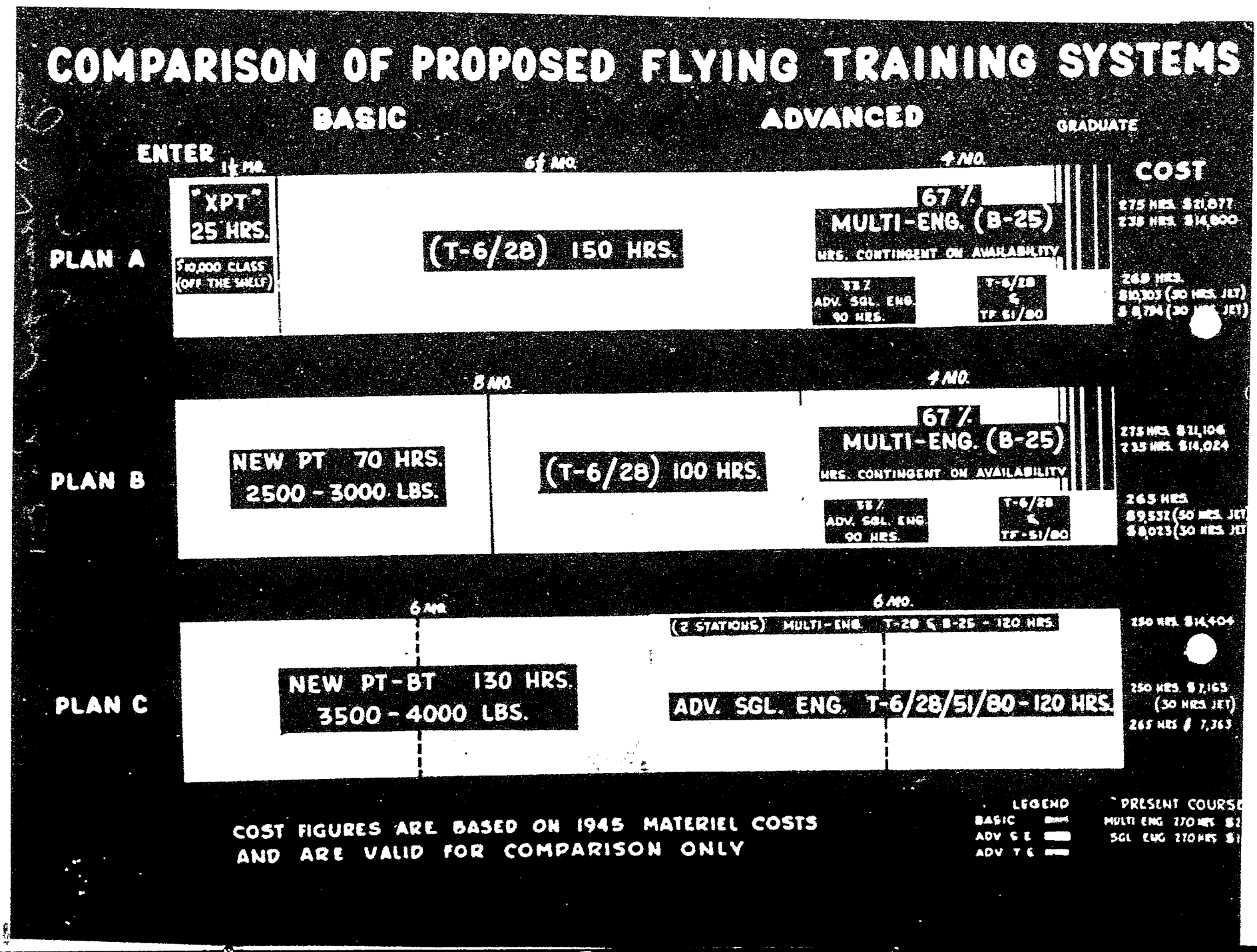
COMPARISON OF PROPOSED FLYING TRAINING SYSTEMS



COST FIGURES ARE BASED ON 1945 MATERIEL COSTS AND ARE VALID FOR COMPARISON ONLY

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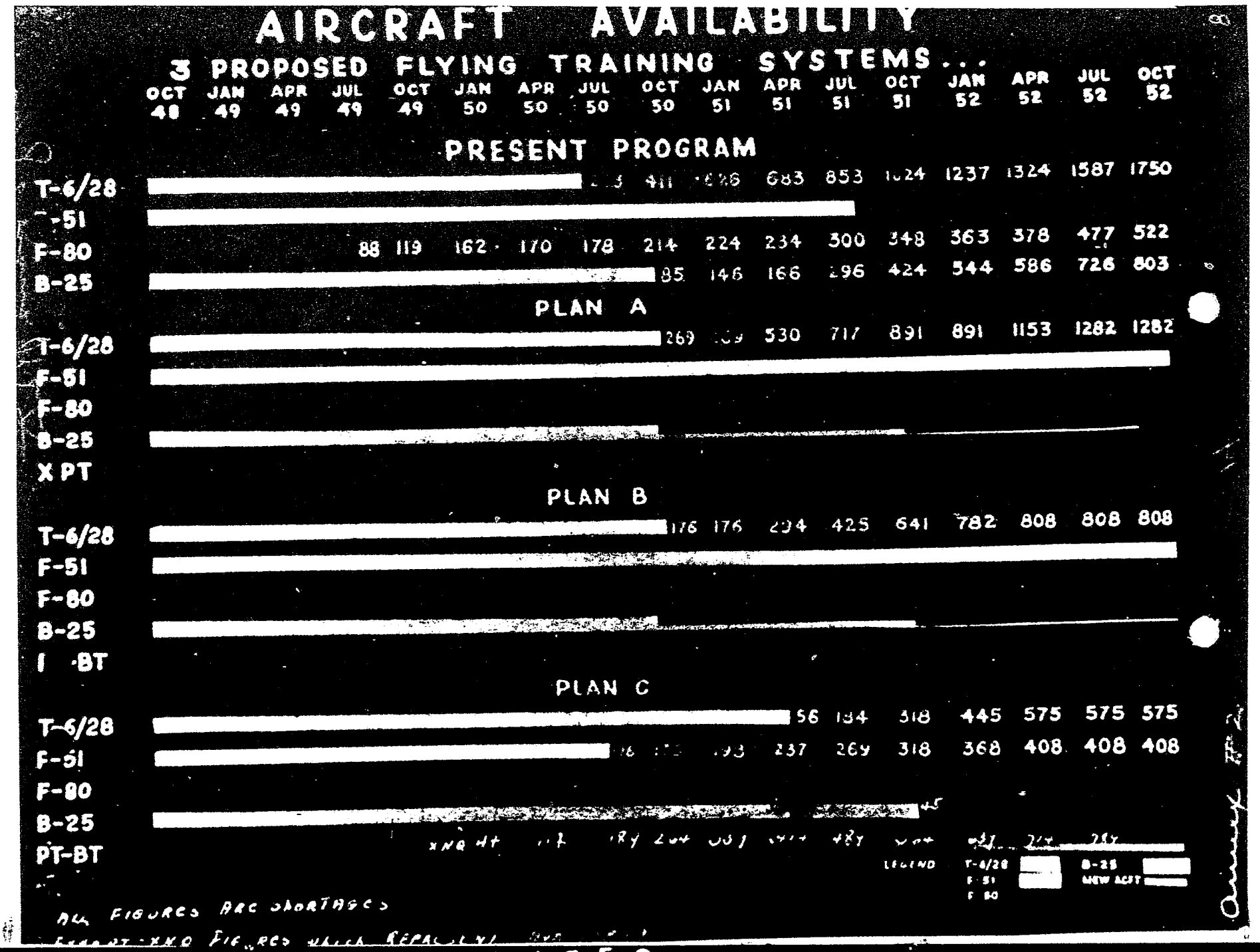
AIRCRAFT AVAILABILITY

3 PROPOSED FLYING TRAINING SYSTEMS . . .



ALL FIGURES ARE SHORTAGES

EXCEPT XNQ FIGURES WHICH REPRESENT SURPLUS

Annex #2

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C
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OCT 19, 1948

MEMORANDUM FOR: Deputy Chief of Staff, Operations
Deputy Chief of Staff, Materiel
The Comptroller

Subject: Aircraft Procurement Program

1. The Secretary of the Air Force has this date approved for implementation the following proposals submitted by the Chief of Staff concerning the Aircraft Procurement Program:

a. Plans will be made to hold a design competition on a new all-weather fighter under revised military characteristics. The funds for this competition will be made available from FY 1949 authorizations.

b. One hundred (100) C-54's recently certificated will not be placed on contract. This will reduce C-54 procurement with FY 1947 funds to 409 articles. No plans will be made for the procurement of C-54's with FY 1950 funds.

c. No procurement of B-36's or additional Constellations (C-121's) is contemplated at this time.

d. The Air Force will not buy American Airlines C-54's, Capital Airlines C-54's, or Northwest Airlines Boeing Strato-Cruisers.

e. The Air Force will procure enough Fairchild M-62's as a primary-basic trainer to establish a production line which may be followed with FY 1950 funds. This is estimated to be approximately 150 articles costing approximately 9 or 10 million dollars.

f. With any savings resulting from the actions indicated above, the Air Force will plan to procure a few C-97's by increasing the recent contracts. These C-97's are required to offset the recent cut in troop carriers required for overseas and tactical strategic lift in the Air Force.

2. The Secretary of the Air Force gave formal confirmation to previous verbal decisions [illegible] Chief of Staff as follows:

[illegible]

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[illegible] and the F-80 will be accelerated [illegible] an interim all-weather fighter. These aircraft will be equipped [illegible] radar, and production will be in the numbers dictated by the [illegible] of radar equipment and funds made available by termination [illegible]. The proportion of each aircraft will be determined by [illegible] and all other requirements.

[illegible] production plans will be made for procuring the Douglas F3D.

[illegible] of tanks, material will obtain from the Army and [illegible] Navy [illegible], the aircraft production schedule based on [illegible] 1 1/4 tanks. When [illegible] will permit an accurate base for [illegible] production schedule [illegible] reasonable rate.

[illegible] action to implement these actions [illegible] will be made of any new [illegible] offense.

signed

[illegible]
General, U.S. Air Force
[illegible] Staff

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OCT 20 22 42

"Paraphrase not required. Handle ... Conf correspondence per paragraph 51 i and 60a (4), AR 380-5"

PP JEQAB

FM JEQ 43C/HQ USAF WASH D C 2017182

TO JEQAB/COMGENAMC WRIGHT PAT AFB OHIO

AF GRNC

PRIORITY

//C O N F I D E N T I A L// FROM AFMPI 52477

THE FOLLOWING DIRECTIVE CMA SUBJECT AIRCRAFT PROCUREMENT PROGRAM CMA FROM THE VICE CHIEF OF STAFF CMA DATED NINETEEN OCTOBER FORTY EIGHT CMA FORWARDED FOR YOUR INFORMATION AND APPROPRIATE ACTION CLN QUOTE ONE PD THE SECRETARY OF THE AIR FORCE HAS THIS DATE APPROVED FOR IMPLEMENTATION THE FOLLOWING PROPOSALS SUBMITTED BY THE CHIEF OF STAFF CONCERNING THE AIRCRAFT PROCUREMENT PROGRAM CLN PAREN ABLE PAREN PLANS WILL BE MADE TO HOLD ABLE DESIGN COMPETITION OF ABLE NEW ALL WEATHER FIGHTER UNDER REVISED MILITARY CHARACTERISTICS PD THE FUNDS FOR THIS COMPETITION WILL BE MADE AVAILABLE FROM FISCAL YEAR FORTY NINE AUTHORIZATIONS PD PAREN BAKER PAREN ONE HUNDRED FOX EIGHTY FOURS RECENTLY CERTIFICATED WILL NOT BE PLACED ON CONTRACT PD THIS WILL REDUCE FOX EIGHTY FOUR PROCUREMENT OF FOX EIGHTY FOURS WITH FISCAL YEAR FIFTY FUNDS PD PAREN CHARLIE PAREN NO PROCUREMENT OF DOG CHARLIE SIXES OR ADDITIONAL CONSTELLATIONS PAREN CHARLIE ONE TWENTY ONES PAREN IS CONTEMPLATED AT THIS TIME PD PAREN DOG PAREN THE AIR FORCE WILL NOT BUY THE AMERICAN AIRLINES CHARLIE FIFTY FOURS CMA CAPITAL AIRLINES CHARLIE FIFTY FOURS CMA OR NORTHWEST AIRLINES BOEING STRATO DASH CRUISHERS PD PAREN EASY PAREN THE AIR FORCE WILL PROCURE ENOUGH FAIRCHILD NAN QUEENS AS A PRIMARY DASH BASIC TRAINER TO

ESTABLISH ABLE PRODUCTION LINE WHICH MAY BE FOLLOWED WITH FISCAL YEAR FIFTY FUNDS PD THIS IS ESTIMATED TO BE APPROXIMATELY ONE HUNDRED FIFTY ARTICLES COSTING APPROXIMATELY NINE OR TEN MILLION DOLLARS PD PAREN FOX PAREN WITH ANY SAVINGS RESULTING FROM THE ACTIONS INDICATED ABOVE CMA THE AIR FORCE WILL PLAN TO PROCURE ABLE FEW CHARLIE NINETY SEVENS BY INCREASING THE PRESENT CONTRACTS PD THESE CHARLIE NINETY SEVENS ARE REQUIRED TO OFFSET THE PRESENT SITUATION IN EUROPE AND ARE REQUIRED TO PROVIDE ADDITIONAL STRATEGIC LIFT TO THE AIR FORCE PD PARE TWO THE SECRETAY OF THE AIR FORCE GAVE FORMAL CONFIRMATION TO PREVIOUS VERBAL DECISIONS MADE BY HIM AND THE CHIEF OF STAFF AS FOLLOWS CLN PARE ABLE PAREN THE EXISTING CONTRACTS RELATING TO THE PROCUREMENT OF THE FOX EIGHTY SEVEN WILL BE TERMINATED IMMEDIATELY PD NO FURTHER PLANS WILL BE MADE FOR THE PRODUCTION OF THIS AIRCRAFT PD THE DEVELOPMENT AND TEST OF THE EXPERIMENTAL ARTICLES WILL CONTINUE AS IN THE EXISTING CONTRACT UNLESS UNDUE COSTS ARE INVOLVED PD PAREN BAKER PAREN PROCUREMENT OF THE FOX EIGHTY NINE AND THE TARE FOX EIGHTY CHARLIE WILL BE ACCELERATED TO PROVIDE AN INTERIM ALL WEATHER FIGHTER PD THESE AIRCRAFT WILL BE EQUIPPED WITH THE ABLE PETER GEORGE THREE RADAR CMA AND PRODUCTION WILL BE IN THE NUMBERS DICTATED BY THE AVAILABILITY OF RADAR EQUIPMENT AND FUNDS MADE AVAILABLE BY TERMINATION OF FOX EIGHT SEVEN PROCUREMENT PD

PAGE THREE JEQ 43C

THR PROPORTION OF EACH AIRCRAFT WILL BE DETERMINED BY BALANCING PRODUCTION CAPABILITIES AGAINST REQUIREMENTS PD PAREN CHARLIE PAREN NO FURTHER PLANS WILL BE MADE FOR PROCURING THE DOUGLAS FOX THREE DOG PD PARE THREE THE DUPUTY CHIEF OF STAFF CMA MATERIEL WILL OBTAIN FROM THE COMMANDING GENERAL CMA AIR MATERIEL COMMAND A NEW AIRCRAFT PRODUCTION SCHEDULE BASED ON THE DECISIONS OUTLINED ABOVE FOR THE PROCUREMENTS WITH FISCAL YEAR FORTY NINE FUNDS PD WHEN THE FISCAL YEAR FIFTY BUDGET LIMITATION IS KNOWN THIS WILL PERMIT AN ACCURATE BASE FOR ESTIMATION OF THE FISCAL YEAR FIFTY AIRCRAFT PROCUREMENT PD THIS PRODUCTION SCHEDULE WILL BE SUBMITTED AT THE EARLIEST PRACTICABLE DATE PD PARE FOUR STAFF AGENCIES CONCERNED WILL TAKE ACTION TO IMPLEMINT THE DECISIONS OUTLINED ABOVE WITHIN THE FIELDS OF THEIR RESPONSIBILITY TO INCLUDE ANY NEW CERTIFICATIO REQUIRED TO THE SECRETAR OF DEFENSE PD UNQUOTE IT SHOULD BE NOTED THAT NO DECISION WAS REACHED ON THE FOX EIGHTY SIX CHARLIE PD IMMEDIATE ADVICE REQUESTED WHETHER THIS DIRECTIVE WILL CAUSE ANY CHANGE IN PROPOSED AIRCRAFT PRODUCTION SCHEDULE PHONED TO THIS OFFICE MONDAY NIGHT BY COLONEL COPELAND PD //

CNF 52499

20/2020Z OCT

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AMCAD Form No. 5 (4 APR 47)

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MCGOXT/6-5126

HEADQUARTERS
AIR MATERIEL COMMAND

Wright-Patterson
Air Force Base
Dayton, Ohio
27 October 1948

TECHNICAL INSTRUCTIONS

SERIAL NO: TI-2249, Addendum No. 4

SUBJECT: Aircraft Procurement Program

TO: Directorate, Procurement and Industrial Planning
Directorate, Research and Development
Directorate, Supply and Maintenance

1. Problem Presented:

a. To implement changes in the current aircraft procurement program and to present planning for future procurement programs as approved by the Secretary of the Air Force.

(1) Procurement of approximately 150 NQ type aircraft (Fairchild) at a cost of approximately $9,000,000 or $10,000,000. This procurement will establish a production line for primary-basic trainers which may be continued, utilizing FY 1950 funds when available.

(2) Procurement of additional C-97 aircraft, utilizing any savings resulting from non-procurement of additional F-84 aircraft, DC-6 aircraft, C-121 aircraft and Airlines' aircraft.

(3) Procurement and accelerated production of a quantity of F-87 (F-87A) and TF-80C (F-94A) aircraft. These aircraft will be equipped with the APG-3 radar. Production will be in the numbers dictated by the availability of radar equipment and funds made available by termination of F-87/RF-87 procurement (TI-2249, Addendum No. 3). The proportion of each aircraft will be determined by balancing production capabilities against requirements. This procurement will provide an interim all-weather fighter.

(4) Submission of a new aircraft production schedule to Hq USAF, attention DCS/M at the earliest practicable date.

(5) Development of ground and organizational equipment in sufficient time to allow procurement and delivery of these items concurrently with deliveries of the aircraft. Procurement and timely delivery of all ground and organizational equipment and maintenance

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spares required to insure adequate support of aircraft being procured in accordance with this directive.

2. Factual Data:

a. One hundred (100) F-84 type aircraft recently certificated will not be placed on contract.

b. No procurement of DC-6 aircraft or additional Constellations (C-121) is contemplated at this time.

c. No procurement of the American Airlines C-54 aircraft, the Captial Airlines C-54 aircraft or the Northwest Airlines Boeing Strato-cruisers will be made.

d. No further plans will be made for procuring the Douglas F-3D aircraft.

3. Authority:

a. DCS/M Hq USAF by teletype AFMPI 52499, dated 20 Oct 48.

4. Action Desired:

a. Directorate, Procurement and Industrial Planning will accomplish that which is required in paragraph 1a(1), (2), (3), and (4) of "Problem Presented."

b. Directorate, Supply and Maintenance will accomplish that which pertains to procurement and delivery as required in paragraph 1a(5) of "Problem Presented."

c. Directorate, Research and Development will furnish technical data and assistance as required and will accomplish the development of equipment as set forth in paragraph 1a(5) of "Problem Presented."

BY COMMAND OF GENERAL McNARNEY:

OFFICIAL:

BRYAN L. DAVIS
Colonel, USAF
Adjutant General

BRYAN L. DAVIS
Colonel, USAF
Adjutant General

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C O N F I D E N T I A L [redacted]

TI-2249, Addendum No. 4, Subject: "Aircraft Procurement Program."

DISTRIBUTION:

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DCS/A Wash	3
AFMSS Wash	4

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29 October 1948

MEMORANDUM FOR MR. FORRESTAL:

SUBJECT: Revised Authorization for Procurement of Aircraft

Completion of the flight tests of the XF-87 and the XF-89 indicate the F-89 is a superior airplane and the F-87 would require major redesign to make it operationally acceptable. Procurement of the F-87 and the RF-87 aircraft has been cancelled.

To fulfill the urgent requirement for an All Weather Fighter, we plan to place the F-89 in production on an accelerated basis and, as an interim measure, to procure a quantity of F-94's, which is a modified all weather version of the two-place F-80C.

A review of the Air Force flight training program and the evaluation of the Navy developed XMQ trainer, indicate that the utilization of the Fairchild MQ trainer in the first 130 hours of flight training and the T-28 in the succeeding 135 hours in lieu of the entire time on the T-28 will result in major economies in initial investment, maintenance, upkeep, and gasoline consumption. To effect these economies, we plan to procure a quantity of the Fairchild MQ trainer.

To initiate the program outlined in paragraph 2 and 3 above, we propose to procure the following:

48 F-89's	(Northrop All Weather Fighter)	$66,530,154
110 F-94's	(Lockheed All Weather Fighter)	34,428,346
100 MQ's	(Fairchild Trainer)	8,261,500
	Total	109,220,000

In order to make funds available for the above, it is proposed to use the monies resulting from the cancellation of the following:

58 F-87's 30 RF-87's	(previously approved by the President on 23 May 1948 in the release of $1,345,165,000 for 2201 aircraft)	$ 80,220,000
100 F-94's	(previously approved by the President on 16 Sept. 1948 in the release of $103,630,000 for 213 aircraft) These were never procured.	29,000,000
	Total	$109,220,000

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Memo for Mr. Forrestal

I hereby certify that the contracts to be let are necessary in the interests of the national defense, and that the contract specifications will insure the maximum utilization of improvements in the aircraft and equipment consistent with the defense needs of the United States.

/s/

W. STUART SYMINGTON

APPROVED
/s/
A.S.BARROWS
Under Secretary of the
Air Force

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COPY

29 October 1948

SUBJECT: Authorization for Procurement of Aircraft

TO: Chief of Staff
United States Air Force
Washington 25, D. C.

1. We request authorization to contract immediately for the following aircraft in accordance with the provisions of Public Law 547, 80th Congress.

48 F-89's	Unit Price	$1,386,045	Total Price	$ 66,530,154
110 F-94's	Unit Price	312,985	Total Price	34,428,346
100 MQ's	Unit Price	82,615	Total Price	8,261,500
			Total procurement	109,220,000

2. I hereby certify that the Contracts to be let are necessary in the interests of the national defense, and that the contract specifications will insure the maximum utilization of improvements in aircraft and equipment consistent with the defense needs of the United States.

JOSEPH T. McNARNEY
General, U.S.A.F.
Commanding General
Air Materiel Command

APPROVED:

/s/
HOYT S. VANDENBERG
General, U.S.A.F.
Chief of Staff

[redacted]

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In reply please refer to: CA-K-140

5 November 1948

Subject: Blanket Bailment Contract W 33-038 ac-11023
Request for Bailment Instructions on
XNQ-1 Airplane, Serial No. 75725

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPTA64

Through: AF Plant Representative
Hagerstown, Maryland

References: (a) FAD letter CA-K-140, dated 7 September 1948 to Chief of Staff, USAF (copy attached)
(b) Buaer Ltr. Aer-ac-62, dated 4 October 1948 (copy attached)

1. In Reference (a), the Contractor advised the Chief of Staff, USAF, that it was desirous of improving the performance of the XNQ-1 airplane developed by it for the Navy Department, Bureau of Aeronautics, by installing a higher powered engine in the airplane and requested Headquarters, USAF, to arrange with the Navy Department, Bureau of Aeronautics, for the loan of the airplane to the Contractor.

2. In Reference (b), the Bureau of Aeronautics, Navy Department, agreed to loan the aircraft to Fairchild through the USAF and on 12 October 1948, XNQ-1 airplane bearing Navy Serial No. 75725 was delivered to this Contractor for modification.

3. It will be noted that the Contractor's letter, Reference (a), requested that loan of the aircraft to Fairchild be accomplished through bailment under the provisions of a blanket bailment contract currently in existence between the Contractor and the Air Materiel Command and bearing the subject contract number. As of this date, however, bailment instructions covering the loan of the subject aircraft have not been received. In view of the fact that the Contractor will be ready to make a test flight of the airplane in approximately two (2) weeks, it is respectfully requested that action be taken at the earliest possible date to initiate bailment instructions covering the loan of the aircraft to Fairchild. The period of bailment to be covered by the bailment instruction should indicate that bailment is to extend from 12 October 1948 until approximately 12 February 1949.

Forwarded for necessary action.

FAIRCHILD AIRCRAFT
Division of
FAIRCHILD ENGINE & AIRPLANE CORPORATION

CHAS V. WILLIAMS
MAJOR, USAF
Contracting Officer

M. T. Walker
Contracts Administrator

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452.1 Model Designation 35

AMC Form No. 10-7
(Rev 1 Apr 48)

INSERT OFFICE SYMBOL AND FULL SIGNATURE IN APPROPRIATE BLOCK

, CO OR DEPUTY

R INSPECTOR

MCPFXA66

JBLIC INF. OFFICE

OMPTROLLER

ERSONNEL & ADM.

ESEARCH & DEV.

NTELLIGENCE

SUPPLY AND MAINT.

PROC. & IND. MOB. PLNG.

V. Silverston

OTHER

MCPFXA66/WS/bjw
9 November 1948

SUBJECT: Trainer Designations

TO: Chief of Staff
United States Air Force
Washington 25, D. C.

ATTENTION: DC/S, Materiel

1. In conformance with telephone conversation between Mr. E. G. Barber, Headquarters, USAF and Mr. Nate Silverston, Headquarters, AMC, Procurement Division, the following information is furnished:

The designation T-31A will be assigned to the procurement of the Fairchild trainer (Navy designation SNQ).

The prototype bombardier version of the T-29A airplane will be designated YT-32.

The production bombardier trainer will carry the designation T-32A.

On the assumption that the additional thirty (30) C-125 type aircraft being procured under the FY 1950 Program from Northrop Aircraft, Inc. will be identical to the configuration of the Arctic Rescue type (C-125B), the designation C-125B will remain unchanged.

FOR THE COMMANDING GENERAL:

GEORGE E. SCHARTZEL
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

9 NOV 48 AM 8:22

*AREA COMMANDS WILL LINE OUT ORGANIZATIONAL TITLE NOT APPLICABLE WHEN ADDITIONAL SPACE IS NEEDED IN COORDINATION BLOCK	ORIG. FILE COPIES TO: RECORDS SEC. AGD; HQ. BR ☐; LAB. BR. ☐	INITIALS	EXTRA COPY RETAINED	OFF. SYMBOL	INITIALS
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X452.1 — Trainer Designations
X400.12 — Procurement Policy
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AFMPD/Mr. E.O. Barber/hls/2869

AFMPD

9 November 1948

SUBJECT: Loan of Model XNQ-1 Airplane, Serial No. 75726

TO: Bureau of Aeronautics
Department of the Navy
Washington 25, D. C.

1. Reference is made to:

a. Letter from Fairchild Engine and Airplane Corporation, dated 9 September 1948, subject: "Navy Contract NOa (s)-6662, Loan of Model XNQ Airplane, Serial #75725."

b. Letter from Headquarters, USAF, dated 13 September 1948, subject: "Loan of Model XNQ-1 Airplane, Serial #75725."

2. The XNQ airplane, Serial #75725, now has a higher powered engine installed. It is the desire of the Air Force to evaluate this airplane, Serial #75725, with airplane, Serial #75726, to determine which one is more suitable for the needs of the Air Force.

3. It is requested that Model XNQ-1 airplane, serial #75726, be loaned to the U. S. Air Force for loan by the Air Force to Fairchild under an existing blanket bailment agreement between Fairchild and the Air Force. The purpose of the loan is to permit Fairchild to overhaul this aircraft so its performance characteristics will be those of a new aircraft.

4. Fairchild Aircraft has offered to do this work without any charge, reference telephone conversation. This project has been coordinated with Captain Moss, Director of Naval Air Training.

FOR THE CHIEF OF STAFF:

ALFRED A. KESSLER, JR.
Brigadier General, USAF
Director, Procurement & Ind.
Planning, DCS/Material

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Lee R.I. 11-19-48
XNQ

4k

Bailment Contract for Fairchild XNQ-1 Airplane

MCPPM6 MCPPM1 10 Nov 45 1.
Attn: Capt. Barclay

1. It is requested that your office take necessary action to initiate Bailment Instructions covering the loan of Navy Model XNQ-1 airplane, Serial No. 75725 to Fairchild Aircraft, as requested in paragraph 3 of the attached letter, dated 5 November.

2. In telephone conversation with Brig. Gen. K. McNaughton, 9 November, he advised that it was planned to fly both versions of the XNQ airplane (R-650-10 and GSO-580 engines) at Hagerstown, Md., to compare their flight characteristics. The General advised that he would contact the Navy to obtain the two articles XNQ, and also to have Navy personnel to attend the flight comparison. Members of Training Command will also be in attendance. AMC will also be advised, and it is recommended that the Project Officer from your Branch, together with a member of the Training and Transport Flight Test Division, be represented on the Flight Characteristics Comparison Board.

3 Atchs:
1. Fairchild ltr dtd 11/5/45, Req. for Bailment XNQ-1 (3)
2. Fairchild ltr dtd 9/9/45, Loan of Model XNQ-1 (3)
3. Navy Dept ltr dtd 10/4/45, Loan of Model XNQ-1 (3)

GEORGE E. SCHAETZEL
Colonel, USAF
Chief, Aircraft & Missiles Section
Procurement Division

RWK/et
2-9105
Bldg 15
Rm 234

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For File 29 Fairchild

SUBJECT: Fairchild XNQ-1 Trainer DATE: 12 November 1948

MEMO TO: Trainer Unit

1. The attached file concerning the Navy XNQ Trainer has been forwarded to us this date by Mr. Kellhofer. It is requested that you take the necessary action to bail to Fairchild Aircraft Corporation, under blanket bailment Contract ac-11023, the referenced XNQ.

2. Up to the present time, this entire subject has been handled by Mr. Kellhofer and General McNaughton.

3. As of this date the undersigned, in a discussion with Colonel Schaetzel, Chief of the Aircraft Section, pointed out the apparent discrepancies from normal procurement channels. We do not at this time have military characteristics covering an aircraft of the type under discussion; and, in addition, the Beech Aircraft Corporation have, as a result of direct contact with personnel of the Training Command, modified their Bonanza aircraft so as to make it meet the expressed desires of Training Command. It therefore appears that the normal approach would require some type of competition between the modified Beech Bonanza and the XNQ type aircraft, with a set of military characteristics as the basis for such a comparison.

4. In view of the foregoing, you will obtain data as to the status of the Lycoming GSO engine to include its price, service experience, estimated availability, and whether or not the type is approved by the Air Force. You will further obtain information as to the availability from USAF of Navy surplus stocks of the radial engine presently installed in the XNQ. We should be prepared to recommend the type engine to be included in any future production of the XNQ type trainer, taking into consideration availability, price, maintenance, and excluding performance, which decision we shall leave to the Training Command representatives.

D. Graham

1 Incl
File including:
M&R, 10 Nov 48, from MCPPXA1
Ltr, 13 Sep 48, from Hq USAF
FAD ltr CA-W-286, 5 Nov 48

D. W. GRAHAM
Lt. Colonel, USAF
Chief, Training, Transport,
and Special Aircraft Branch

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DEPARTMENT OF THE UNITED STATES AIR FORCE

ROUTING AND RECORD SHEET

SUBJECT: Evaluation and Flight Test of the New [illegible] Trainer

TO: Director of Research and Development, DCS/M DATE [illegible]

COMMENT NO. 1

FROM: Training Division, Dir. Training & Requirements Lt Col [illegible]

1. Necessary steps are being taken by this Division to arrange an evaluation and flight test of the new [illegible] trainer at the Fairchild Factory, Hagerstown, Maryland, within the next few weeks. This test will include a comparison between two models of this airplane: one equipped with a 300 h.p. radial engine, and the other with a 350 h.p. [illegible] engine.

2. It is planned to include representatives from this Headquarters, Headquarters Air Materiel Command, Air Training Command, and the Navy. A date for this meeting will be arranged between this Division and the Fairchild Aircraft Company, and your office will be notified at that time. It is desired that a representative, or representatives, of your office attend the conference, since the development and procurement of this aircraft is a matter of concern to your office.

AFOTG-2 [illegible]

AFOTG-1 [illegible]

W. E. B[illegible]
Major
Asst. [illegible] Div Dirctd
Director [illegible] & Req's

Minutes of this conference held 5 & 6 June HT can be obtained from DTR and Maj.

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NO [illegible]

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Lee Rich C.1 dated 12-3-48

Availability of the E-680-13 Lycoming Engine

MCMXXIX MCPPXA66 16 Dec 48 1

Attn: Mr. M. J. Kruger

1. Confirming conversation between Mr. F. Rankin of this office and Mr. Kruger, your office was requested to investigate the availability of the E-680-13 Lycoming Engine, for use on a trainer airplane currently designated as the XBQ-1 airplane by the Navy.

2. The availability information should cover engines stored in Air Force stock, surplus, War Assets Administration, et cetera and any other governmental agency at which this engine may be stored.

3. This information should also include the number of new engines, serviceable engines, and reparable engines.

GEORGE E. SCHARTZEL
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

WL/rd
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Loan of Model XNQ-1 Airplane to Fairchild Aircraft Corporation;
Open Bailment Contract W 33-038 ac-11023
MCPPA66 19 Nov 48 1

MCPPA66
Attn: Miss Love

1. It is requested that a Bailment Instruction be prepared to Fairchild Aircraft Division, Hagerstown, Maryland covering the loan of one (1) Navy Model XNQ-1 airplane, BU/Aer Serial Number 72750. This Navy aircraft has been loaned to the Air Force in accordance with BU/Aer letter dated 4 October 1948, attached. The loan of this aircraft shall be accomplished by bailment under the existing Blanket Bailment Agreement with Fairchild Aircraft, Contract W 33-038 ac-11023.

2. The subject aircraft shall be bailed to the contractor for purposes of performing certain test flights in order to determine the performance of the XNQ-1 airplane employing the R-670-10 operating engine.

3. The resultant flight characteristics will be used for comparison with the R-680-10 engines originally installed in the Navy XNQ-1. The results of the above tests will be furnished the Government. After the tests of this aircraft have been accomplished, it will be returned to its original configuration prior to redelivery to the Air Force.

4. The Period of bailment to be covered by the Bailment Instruction shall extend from 12 October 1948 to 12 February 1949.

GEORGE E. SCHAETZEL
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

MS Obj
30117

Incl:
BU/Aer ltr dtd 10-4-48 (2 cy)
Fairchild ltr CA-W-286 dtd 11-5-48 (Orig.)
Fairchild ltr CA-W-140 dtd 9-9-48 (2 cy)
R&M,C.1 dtd 11-10-48
Eq. Mash. ltr dtd 9-[illegible]-48 (Orig.)

Filed under these dates

AF Form No. 71-535
(Rev 20 Oct 48)

Initiating Agency:
Aircraft & Missiles Section
Procurement Division
MCPFXA66

Blanket Bailment Agreement
No. W 33-038 ac-
Bailment Instruction No.
RM

DEPARTMENT OF THE AIR FORCE
AIR MATERIEL COMMAND

MCPFXS8
Wright-Patterson Air Force Base
Dayton, Ohio
22 November 1948

BAILEE: FAIRCHILD AIRCRAFT CORPORATION
FAIRCHILD ENGINE & AIRPLANE DIVISION
Hagerstown, Maryland

It has been determined that the national defense will be furthered by the loaning of the property thereunder.

1. Bailed Property
One (1) each Navy Model XNQ-1 Aircraft, BU/Aer Serial No. 75725

2. Purpose of Bailment
The Bailee shall use the bailed aircraft for purposes of performing test flights in order to determine the performance of the XNQ-1 airplane employing the GSO-580 Lycoming engine.

3. Modifications
Modifications of the bailed aircraft are hereby authorized; however, after the tests have been accomplished, the aircraft will be returned to its original configuration for return to the Government.

4. Point for Delivery and Return of Bailed Property
Bailee's plant, Hagerstown, Maryland.

5. Period of Bailment
The period of bailment shall commence upon delivery of the property to the Bailee and shall expire on 28 February 1949.

6. Additional Provisions
a. Aircraft test and utilization weekly reports shall be transmitted to the Aircraft & Missiles Section, Procurement Division, MCPFXA-66, as called for under Article 9(a)(1)b of the Blanket Bailment Agreement.

AUTHORIZED BY Nate Silvers[?]
Contracting Officer

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THE SECRETARY OF DEFENSE
Washington

22 November 1948

Dear Mr. President:

With reference to the contract certification requirements of Public Law 547, 80th Congress, the Department of the Air Force by the enclosed memorandum of October 29,,1948 has requested approval of a change in the proposed use of $109,220,000 of funds previously released by you.

Because completed tests have now indicated the superiority of the XF-89 over the XF-87 procurement of the latter type of aircraft has been cancelled, and $80,220,000 of the $1,345,165,000 which you approved on May 28, 1948 has thus become available for alternative procurement. In addition, review by the Air Force has indicated that by use of the Fairchild NQ trainer major economies can be effected in its flight training program; and with this in mind, procurement of F-84's amounting to $29,000,000 that was included in the $103,630,000 which you approved on September 16, 1948, has been withheld. The Department of the Air Force now proposes to procure the following aircraft with this $109,220,000 ($80,220,000 and $29,000,000):

Type	Quantity	Amount
F-89	48	$66,530,154
F-94	110	34,428,346
NQ	100	8,261,500
Total	258	$109,220,000

On the basis of the recommendations of the Department of the Air Force, of reviews and comments by the staffs of the Munitions Board and the Research and Development Board, copies of which are enclosed, and of my own review of the matter, I have concluded that the change is warranted, that the contracts which would be let under the procurement programs are necessary in the interests of the national defense, that the specifications would insure the maximum utilization of improvements in aircraft and equipment consistent with the defense needs of the United States, and that placing the contracts would not result in commitments or development of a structure that would require future obligational authority in excess of the President's stated fiscal program. I, therefore, recommend that you approve release of the $109,220,000 for the purposes outlined herein.

Sincerely yours,
/s/ James Forrestal

The President

James Forrestal

The White House

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11-23-48 XNG

EQTEP EST NOVEMBER MSG NO A-838
MCPP V AFMPC
PASS TO MCPPXS
THE BUREAU OF AERONAUTICS HAS DELIVERED TO THE FAIRCHILD FACTORY AT HAGERSTOWN, MARYLAND, ONE XNQ-1 AIRPLANE, BUREAU NUMBER 75725, FOR THE PURPOSES OF CONDUCTING COMPARATIVE FLIGHT TESTS FOR THE USAF WITH THE FLAT ENGINE MODIFIED XNQ.
THIS SHIP IS ON LOAN TO THE USAF AND IT IS DIRECTED THAT AMC EXECUTE A BAILMENT CONTRACT WITH THE FAIRCHILD AIRPLANE DIVISION EFFECTIVE THIS DATE FOR THE USE OF THIS AIRPLANE. SUCH OVERHAUL OR TUNING UP AS MAY BE DONE AT FAIRCHILD AIRPLANE DIVISION WILL BE AT COMPANY EXPENSE. END.
RECD MSG NO A-838 231535 EST NOV MCP GMK

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T-31

MCM SXB9 Engrs 16 NCU
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Ltr 24 C 1
12-23-48

To: MCPPXA66 From: MCMSXB93 Date: 23 Nov 48 Comment No. 2.

1. Reference is made to Comment 1.

2. Only two (2) R-680-13 serviceable engines in USAF stock, and these engines are on loan to the Power Plant Laboratory, Area B.

3. An inquiry is being made of Identification Section this Headquarters to determine the quantity of new, serviceable and reparable R-680-13 engines which might be available from War Assets stock. Upon receipt of reply, your office will be advised accordingly.

R. W. FINN
Colonel, USAF
Chief, Aircraft Section
Supply Division

LAR/ibn
5-3162
P-101-I
B-285

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In reply please refer to: CA-E-332

26 November 1948

Subject: Blanket Bailment Contract W 33-038 ac-11023
Request for Bailment Instructions on
XNQ-1 Airplane, Serial No. 75726

To: Commanding General
Air Material Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPPXA

Through: AF Plant Representative
Hagerstown, Maryland

Reference: BuAer Letter Aer-AC-62, dated 19 November 1948
(Copy Attached)

1. From the referenced letter, it will be noted that XNQ-1 Airplane, Serial No. 75726, is to be bailed to Fairchild Aircraft for the purpose of performance comparison with XNQ-1 Airplane, Serial No. 75725.

2. It is respectfully requested that XNQ-1 Airplane, bearing Serial No. 75726, be bailed to the Contractor for a period extending from 16 November 1948, the date the aircraft arrived at this facility, until 28 February 1949. The cooperation of the Air Material Command in forwarding this bailment instruction at the earliest possible date will be greatly appreciated.

FAIRCHILD AIRCRAFT
Division of
FAIRCHILD ENGINE & AIRPLANE CORPORATION

H. T. Walker
Contracts Administrator

HTW:dbo

Approved and forwarded for action.

Charles V. Williams

CHARLES V. WILLIAMS
MAJOR, USAF
Contracting Officer

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AF Form No. 74-570
(Rev 9 Jan 48)

Initiating Agency:
Aircraft & Missiles Section
Procurement Division
MCPPXA-66

DEPARTMENT OF THE AIR FORCE
UNITED STATES AIR FORCE
AIR MATERIEL COMMAND

Blanket Bailment Agreement
No. W 33-038 ac-11021
Bailment Instruction No. 480
Amendment No. 1
RN No. 4239

MCPPXS-8/WL/DMM
Wright-Patterson Air Force Base
Dayton, Ohio

6 December 1948

BAILEE: FAIRCHILD AIRCRAFT CORPORATION
FAIRCHILD ENGINE & AIRPLANE DIVISION
HAGERSTOWN, MARYLAND

1. It has been determined that the national defense will be furthered by amending subject Bailment Instruction as follows:

a. Paragraph 1, BAILED PROPERTY, is hereby amended by adding One (1) each Navy Model XNQ-1 Aircraft, BU/Aer Serial No. 75726.

b. Paragraph 2, PURPOSE OF BAILMENT, is hereby amended as follows:

"The XNQ-1 Aircraft, BU/Aer Serial No. 75726, shall be used for comparison with the GSO-580 Lycoming Engine installed in XNQ-1 Aircraft, BU/Aer Serial No. 75725".

2. Except as hereby modified, either expressly or by necessary implication, all the terms, covenants and conditions of subject Bailment Instruction shall continue in full force and effect.

AUTHORIZED BY [signature]
Contracting Officer

HAL V. SILVERSTON

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COPY

BEECH AIRCRAFT CORPORATION

Wichita, Kansas

December 9, 1948

Captain M. S. Strok
Procurement Division
Special Aircraft Section
MCPPXA5
Wright-Patterson Air Force Base
Dayton, Ohio

Dear Captain Strok:

Attached are two photographs and a BEECHCRAFT News Release announcing the first flights of our new BEECHCRAFT "Mentor" Model 45.

The press release contains brief specifications obtained from our first flight tests. In the very near future we hope to have the pleasure of showing the airplane to you and to have you fly and evaluate it.

Yours very truly,

BEECH AIRCRAFT CORPORATION

Lynn D. Richardson
Military Sales

LDR:ch
Attachments (3)

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BEECHCRAFT NEWS

BEECH AIRCRAFT CORPORATION • Public Relations Director • WICHITA, KANSAS, U.S.A.
FOR RELEASE SUNDAY MORNING NEWSPAPERS DECEMBER 12, 1948

Wichita, Kansas, Dec. 11, 1948 -(Special)- A new especially designed and privately financed military airplane was announced officially today by Walter H. Beech, president of Beech Aircraft Corporation, when he revealed that the Beechcraft Model 45 "Mentor", a primary and basic-advanced trainer, made its initial flights from the Beech field in Wichita, Kansas, December 2 and is now being readied for a special tour around the country for demonstration and inspection by U. S. military forces.

A single-engine, all-metal, two-place trainer, this newest Beechcraft, according to Beech officials, was developed inexpensively by using the Beechcraft Bonanza as a basis, and that while it "was not developed with government money, it does meet all the latest air force specifications". Powered with a Continental E-185 engine, first official engineering estimates indicate that this new Beechcraft trainer will have a cruising speed of 160 mph at 10,000 feet, a true air high speed of 176 mph at sea level, and a permissible indicated maximum dive speed of 280 mph.

In explaining why he believes that this new airplane will be of value to today's air forces, Mr. Beech pointed out that the Model 45 "has the tremendous advantage over other airplanes of its type by having extremely high performance combined with extremely high operating economy and low fuel consumption".

As regards production possibilities for this newest Beechcraft, the company's vice-president and general manager, John P. Gaty remarked, "This 'off-the-shelf' trainer should be of major importance to military strategists who are faced with the difficult problem of matching procurement needs with budget economies -- the world-wide operational records already set by more than 1900 Beechcraft Bonanzas in use by business owners today prove the outstanding economy and performance of

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From: Beech Aircra Corporation
Wichita, Kansas

this basic-trainer version." While no production estimates have been announced, it is understood that Beech believes they can produce any required quantity as rapidly as the necessary components can be procured, due to the availability of high production tooling designed for the Bonanza and available for most of the parts of the new Model 45 "Mentor" trainer. During the early months of the Bonanza production, when the company was rushing to meet a heavy schedule of a large backlog, the Beech production reached a total of nine completed aircraft daily, and observers believe Beech could easily exceed such a production if the necessity arose.

Significance of the Design

In presenting the Model 45 "Mentor" as its conception of an initial pilot training airplane, Beech Aircraft explains that "the design philosophy behind the Model 45 was to offer the military services a high performance trainer that would incorporate all the controls and characteristics of heavier, more advanced combat craft, yet could be operated and maintained at a minimum cost".

Closely following all air force specification requirements including a conventional tail, Beech independently has built this trainer which they believe will be highly acceptable to both the CAA and the military. Because of its utility and performance they recommend the Model 45 as both a primary and a basic-advanced trainer, an airplane which they believe can be used successfully to train pilots for the more advanced work of learning to operate the faster, heavier, combat craft. Reported to have the strength factor of a primary trainer plus the performance factors of a basic trainer, this new Beechcraft is heralded by its manufacturers as having an impressive list of advantages to its credit.

First, the airplane has an ultimate load factor of 10 for maneuvers, and an ultimate landing load factor of 6.67; and in this respect offers a strength unmatched by other basic trainers in use today. And coupled with such a strength

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From: Beech Aircraft Corporation
Wichita, Kansas

factor is the high performance as indicated in the following summary:

Gross Weight	2650 lbs.
High Speed, T.A.S.	176 mph @ Sea Level
Normal Cruising Speed, T.A.S. @ 61% Power	160 mph @ 10,000 ft.
Max. Dive Speed, I.A.S.	280 mph
Landing Speed (Flaps), T.A.S.	56 mph
Climb First Minute	925 ft.
Service Ceiling	18,000 ft.
Range at Cruising	634 miles
Fuel Consumption	10 gals/hr
Take-Off Distance over 50-ft. (Zero Wind, Sea Level, Sod Runway)	1300 ft.
Landing Distance over 50-ft. (Zero Wind, Sea Level, Sod Runway)	750 ft.

Economical To Buy and Maintain

Second, on the manufacturer's "reason-why" list, is the fact that this is an "immediately available" trainer which will not require the normal three-to-five year period required for designing, tooling, and getting ready for production that every new aircraft must go through. And Beech, in going ahead with its plans, all on its own, has faith that its new Model 45 will be of value to the military air forces, and that the air force will welcome an "off-the-shelf" trainer.

Third, a considerable large percentage of the material used to build the Model 45 can be classified now as "non-strategic" material, a fact which the manufacturer believes would be of importance in the case of an emergency requiring full steam ahead in the production of combat aircraft.

Fourth, Beech estimates it can produce and deliver this new trainer in quantities for less than $20,000 complete, or in the words of the company "about

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From: Beech Aircraft Corporation
Wichita, Kansas

two for one as far as any other trainer of comparable performance available right now". This is a factor which Beech believes will definitely interest the military strategists who now are faced with the problem of meeting procurement needs in the face of possible reductions in appropriations.

Fifth, Beech states the Model 45 will be economical to operate, and lists the following comparisons as examples:

— Compared with the AT-6 advanced trainer, over a 5-year period each Model 45 would save approximately 150,000 gallons of gasoline for other uses.

— Compared with the BT-13 basic trainer, over a 5-year period each Model 45 would save approximately 97,500 gallons of gasoline for other uses.

— Compared with the AT-6 advanced trainer, over a 5-year period each Model 45 would cost approximately $9,750 less in engine maintenance.

— Compared with the BT-13 basic trainer, over a 5-year period each Model 45 would cost approximately $4,750 less in engine maintenance.

Sixth, as regards maintenance of the Model 45, Beech points out that due to the fact that many parts on the Model 45 "Mentor" and on the Model A35 "Bonanza" are interchangeable, the military will have the added advantage of an increased factory production supply, a spare parts availability through the system of Beechcraft service stations should a trainer require service away from its base, and also the advantage of better maintenance facilities through these commercial Beechcraft service shops across the country.

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[illegible] DEC. 12, 1948

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From: Beech Aircraft Corporation
Wichita, Kansas

Story Behind the Name

In covering the news of the introduction of Beech Aircraft's Model 45 trainer, it might be well to add a couple paragraphs about the company's choice of the name "Mentor" — some aviation fans may recall it was just a little over two years ago that Beech provoked a general searching of the dictionaries when they chose the word "Bonanza" as the name for the commercial predecessor for this trainer. Briefly "Mentor" might be boiled down to mean "trusted servant" inasmuch as the manufacturer's rather historical explanation tells us that:

"The name originates in Greek mythology. When Odysseus left his native Ithaca to go to the Trojan War, he left his young son, Telemachus, in care of Mentor, his trusted servant. During the 20 years of Odysseus' absence, Mentor brought up young Telemachus to be a fine and upstanding young man, equally outstanding in character, as in scholastic accomplishment and in the art of war.

"From Homer's figure Mentor, the name 'Mentor' found its way into all civilized languages as a personification of trustworthiness and dependability, and is applied to educators and to those who guide and train young men."

(It might be observed here that the word "Mentor" is spelled and pronounced identically in all major languages of western civilization -- and since Beech Aircraft products have both an outstanding reputation and a large sales record throughout foreign countries, it is quite possible that the manufacturer chose the name with one eye on the potential market for this new trainer abroad.)

Chief Test Pilot Okays on First Hop

With a nod of approval after the first flight, Vern Carstens, Beechcraft's chief test pilot, commented: "I like its roomy cockpits, its excellent visibility from either seat. It's a very stable airplane: directionally, laterally, and longitudinally. It has the performance and the characteristics to make it a good trainer."

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DEPARTMENT OF THE AIR FORCE
Hq United States Air Force
Washington, D. C.

17 Dec 1948

SUBJECT: Supplemental 1948 Aircraft Procurement Program

TO: Commanding General
Air Materiel Command
Wright-Patterson AFB
Dayton, Ohio

1. On 22 November 1948, the Secretary of Defense certified to the President and requested the release of funds for the following aircraft:

F-89	48	$ 66,530,154
F-94	110	34,428,346
T-31	100	8,261,500
	258	$109,220,000

2. It is directed that your Command proceed with immediate negotiations leading to the procurement of the aircraft listed above.

3. Your action hereunder must be confined solely to negotiation and no commitments whatsoever will be made until the funds have been released and "Findings and Determination" made in the usual manner.

BY COMMAND OF THE CHIEF OF STAFF:

/s/ E. M. Powers
E. M. POWERS
Major General, USAF
Acting Deputy Chief of Staff, Materiel

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MC 20 December 1948

4th Group Planning Program

Chief of Staff
United States Air Force
Washington 25, D. C.

Attn: Deputy Chief of Staff, Material

1. Upon verbal request from Hq USAF, the proposed 4th Group Planning Program, comprising a total of 1669 aircraft, was reviewed by this Hq. With no information other than the total number of aircraft, a proposed schedule has been prepared which is attached as Inclosure 1.

2. With particular reference to tooling, facilities, and scheduling, in the event this program is adopted by the Air Force for Fiscal Year 1950, the following recommendations are submitted:

a. B-47

If the monthly peak rate is reduced from 10 to 5, it is recommended that we retain tools and facilities to produce 10 airplanes per month as originally planned due to the possible need of additional B-47's to satisfy strategic reconnaissance requirements, since the B-47 will be one of the airplanes considered for this purpose at the meeting soon to be held on this subject in Washington.

The original starting date of 1 January 1950 for B-47A production was predicated on availability of funds by 1 September 1948. Approximately 2 months were lost awaiting receipt of authorization for this program. The attached schedule has been set back a corresponding amount from the original Planster Program.

b. B-54

Although the peak rate for this airplane will be reduced from 20 to 10 per month, it is recommended that the plan to provide tooling and facilities for a peak rate of 20 per month be continued to provide some mobilization potential for this aircraft. This would also furnish additional flexibility in considering this model for strategic reconnaissance requirements.

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Comptroller, USAF, Attn: Deputy Chief of Staff, Materiel, subject: [illegible] Group Planning Program

The acceleration rate has been slightly retarded between 1 January 1951 and 1 June 1951 as compared with the original Finletter Program. This was necessary because of unavailability of B-1 Fire Control Systems in this period.

c. F-89

Although the new program will require a peak rate of only 14 airplanes per month, it is recommended that facilities and tooling be provided for the originally contemplated rate of 35 per month to provide mobilization potential for this airplane.

d. F-86A

The new schedule requires a production rate of 25 per month as compared to the 40 per month which was originally contemplated. It is recommended that the Air Force continue with the plan to provide facilities for a peak rate of 40 per month as a mobilization planning measure.

e. F-93

It is recommended that the F-93 be continued in production in the Fiscal Year 1950 Program rather than substituting either the F-88 or the F-90. These three airplanes are in the same general class, all three having been built to penetration fighter characteristics and their performance is quite similar. (See comparative performance chart attached as Inclosure II). The lower cost of the F-93 will permit the procurement of 124 airplanes for the price of 42 F-90's in Fiscal Year 1950. It is recommended that the present plan to provide facilities and tooling for a peak rate of 100 per month be continued as a mobilization planning measure.

f. F-94 (AWF-80A)

The new schedule calls for a peak rate of 20 per month. It is recommended that facilities and tooling be provided for this rate.

g. C-119

The new schedule calls for a rate of 8 per month. The present plan is for tooling and facilities for a peak rate of 20. Due to a possible Navy requirement for this model airplane and to provide some mobilization potential, it is recommended that we continue to provide tooling and facilities for the peak rate of 20 per month.

T-31147

Ltr to HQ, USAF, Attn: Deputy Chief of Staff, Material, subject: "48 Group Planning Program"

h. C-125/123

Since it has not been definitely established which of these airplanes will be procured to fulfill the assault transport requirement, new tooling and scheduling plans will have to be considered when that decision is made.

i. H-10

To date, the Kellett Company has been unable to supply a satisfactory proposal or substantiate their ability to produce this airplane. It is therefore, impossible to propose a firm schedule at this time.

j. T-28

The new program requires a peak rate of 20 per month. The original plan was to provide tooling and facilities for a peak rate of 54 per month. Due to the possible Navy participation in this program, and the fact that the additional tooling costs are relatively small, it is recommended that we continue with the provisioning of tools and facilities for the rate of 54 per month.

The start of production for the T-28 has been set back 5 months from the Finnster Program to make the schedule more realistic. This will allow approximately 3 months between completion of the experimental articles and the start of production to determine what changes may be necessary as result of flight tests.

k. T-71 (XNQ)

This airplane has been scheduled at a 24 per month peak rate but due to possible Navy requirements and again to provide some mobilization potential at a very nominal cost, it is recommended that this airplane be tooled and facilities provided for a peak rate of 50 per month.

l. J-47 Engine

The ultimate level off rate to meet requirements of the new program is only 70 engines per month. However, there is presently an arrearage of 738 J-47 engines for F-86 and B-45 airplanes and spares, and in order to make up this arrearage in a reasonable time (March 1950), it will be necessary to accelerate engine production during the next 16 months to a rate of at least 250 per month. In order to do this, it will be necessary to keep the Lockland facility, as well as the West Lynn facility, in operation. This, of course, will have the advantage of providing ready expandability which is considered most desirable due to the possi-

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Ltr to HQ, USAF, Attn: Deputy Chief of Staff, Materiel, subject: "US Group Planning Program"

bility of this engine later being installed in additional types of aircraft, and also due to the possibility of Canada desiring to procure J-47 engines for installation in the F-86 airplanes which are contemplated for procurement.

m. J-48 Engine

This engine is being procured solely for the F-93. Action on tooling and facilities for its production must follow whatever action is taken on the F-93 airplane. The current recommendation is to tool the airplane for 100 per month and the engine tooling should be in proportion.

n. J-34 Engine

This engine is used in the F-88 and F-90 airplanes and tooling for its production will depend on the action taken on deletion of the F-90 from the program as recommended in paragraph 1,e above.

o. R-1300 Engine

Tooling and facilities provisions for this engine should be in accordance with whatever decision is reached regarding recommendation in paragraph 1,j concerning the T-28 airplane.

p. R-680

This is the engine to be used in the T-31 airplane and action taken with regard to it must be in conformance with whatever action is decided upon for the T-31 airplane.

q. Major components of the K-1 and K-2 bombing systems have been planned at a rate of 56 per month. The ultimate requirement is in doubt due to the frequent changes in programs and equipments. It is recommended, therefore, that no change be made in present plans for tools and facilities for this equipment.

3. It is noted that neither the RB-49 nor any other strategic reconnaissance airplane is now on the proposed Fiscal Year 1950 Program notwithstanding the fact that the urgent requirement for this type airplane has been repeatedly stressed by the Air Force for the past year and a half. Recommendations of this Command on this subject will be presented at the meeting mentioned in paragraph 1,a above, but once a decision is made it will be necessary to reduce Fiscal Year 1950 quantities of other airplanes in this schedule to permit purchase of a strategic reconnaissance airplane.

F-6147

[illegible] 3607

[illegible]

[illegible] urgent requirement for night [illegible] contrary to the emphasis placed on [illegible] the last year and particularly [illegible] which period the five Year 70 Group Program [illegible] the former night fighter requirement.

5. The new 48 Group Program, if put into effect, will have the following effects on the industry:

a. The Republic Company will have no business after June 1950.

b. The Consolidated-Vultee Company at Fort Worth will have no business after December 1950.

6. A preliminary estimate of cost for this program is attached as Inclosure III.

7. As was discussed by representatives of this Command with the Air Staff in Washington on 9 December 1948, the need is urgent for a stable Air Force procurement program. It is imperative, therefore, that positive action be taken now by the Air Staff to stabilize airplane models, configurations, and the program.

JOSEPH T. McNARNEY
General, USAF
Commanding

3 Incls.
1. Chart, Fimn. 3, New 70 GP and 48 GP
2. Performance Comparison
3. Memo dtd 12/8

T-3347

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Supplemental 1948 Aircraft Procurement Program

MCPPXA MCPH 22 Dec 48 1.
MCPPXE

1. There is attached for compliance copy of letter, 17 December 1948, from the Acting Deputy Chief of Staff, Material, USAF, Subject: Supplemental 1948 Aircraft Procurement Program, directing AMC to proceed with immediate negotiations leading to the procurement of the 48 F-89, 110 F-94 and 100 T-31 airplanes.

2. You are directed to proceed immediately with the provisions of this directive. As will be noted action of AMC must be confined solely to negotiations and no commitments whatsoever will be made until the funds have been released and "Findings and Determinations" made in the usual manner.

3. The directions with respect to commitments will accordingly prevent the transmittal of any purchase requests to the Budget and Fiscal Division for commitment until the funds have been certified and released to this Command. However, all action possible shall be taken with respect to the preparation of the GFF lists, interim reports, purchase requests, "Findings and Determinations", and any other action which will serve to permit placement of the contracts for the airplanes and the GFP as soon as the funds are released.

H. A. SHEPARD
Brigadier General, USAF
Chief, Procurement Division

WED:haw
2-2215

Incl:
Cy ltr, 17 Dec 48

cc:
MGP
MCPP
MCPO
MCGEH (Mr P M Davis)
MCQB (Col P S Hobbins)
MCAGXP22

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SUBJECT: T-31 Trainer

DATE: 22 Dec 48

MEMO TO: Mr. Silverston

As of this date Colonel Funk directed that action be taken to conduct preliminary negotiations for 100 T-31 Fairchild trainers. A budget of $8,261,500 has been established. No commitments will be made. Action should be taken now to coordinate the specification, prepare the GFP List, and arrange for an inspection of the two Navy aircraft presently bailed to Fairchild. Personnel from the Navy; Hq USAF; Deputy Chief of Staff, Materiel, Operations; Training Command; Engineering Division; and Maintenance Division should be invited. For any cost estimating purposes, General Wolfe has directed that the radial engine presently in stock be used.

D. W. GRAHAM
Lt. Colonel, USAF
Chief, Training, Transport,
and Special Aircraft Branch

1. Tool for 50 a month
[redacted] or 5th
Actel Reservations

NQ-13

Branch File

1. Called Flood & asked for Quotation 100 GPO-13a10
Rec'd 25 per Mo + quote for Tooling 50 per Mo.
2. Patent Space -
3. Performance + aerodynamic Specs (specific Actel Standards
+ Info on GPO-13 engine as well data and performance Comparison
Letter of 3 engine -10-13-GS-GPO
4. Notified Hdqtrs. +Calo. of Insp. Inspection of GPO-13 aircraft
5.

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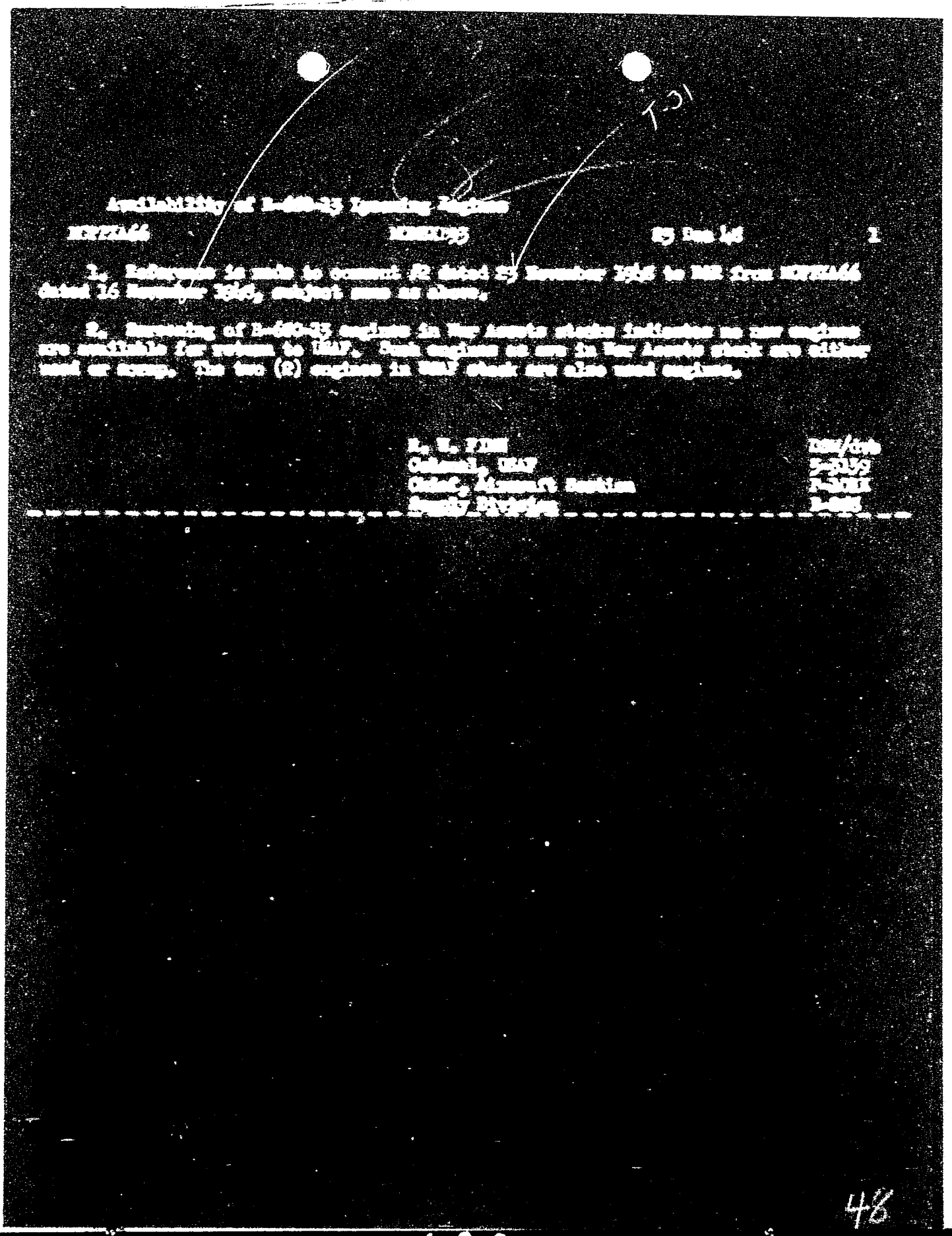

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Classification Canceled
(or Changed to)
AUTH:
By C H Bowley Capt USAF
Date 27 Dec 1948

Supplemental 1948 Procurement — Fairchild T-31A File

MCPPXA6 — MCPPXA — 23 Dec 48 — 1

1. Authorization has been received from Hq USAF to proceed with immediate negotiations leading to the procurement of 100 T-31A airplanes from Fairchild Aircraft, Hagerstown, Maryland. It is requested, therefore, that you take the necessary action to prepare CPP lists, interim reports, Purchase Requests, findings and determinations, and any other action which will serve to expedite placement of the aircraft contracts as soon as funds are finally released. It is requested that the R680-10 engine only be considered for the subject airplane and that tooling be procured for a maximum rate of 50 per month. It is suggested that an immediate mock-up and/or 689 Inspection be held on the subject airplane in order to determine the changes considered necessary by Training Command, Hq USAF personnel, Navy, and AMC so that a definite configuration can be reached and costs obtained therefor.

BEN L. FUNK
Colonel, USAF
Chief, Aircraft and Missiles Section

BLF/as
2-7105

To: MCPPXA — From: MCPPXA6 — Date: 23 Dec 48 — Comment 2

1. The present Fairchild XNQ aircraft has the R680-13 engine installed. Indications are that there are approximately 1000 R680-13 engines in surplus stocks. At present it has not been determined whether these engines are in the possession of the Navy or a civilian surplus dealer. Comment 1 requests that only the R680-10 engine be considered. It is suggested that no change from the presently installed engine should be made until we determine finally the availability of the -13 engine.

2. All other suggested action has been initiated.

D. W. GRAHAM
Lt. Colonel, USAF
Chief, Training, Transport, and Special Aircraft Branch

DWG/mfb
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AEC-251-GP (15-10-45)

A.G.P.	
PRIORITY	
ROUTINE	
MULTIPLE ADDRESS	

TELETYPE MESSAGE

AIR SERVICE COMMAND TELETYPE NETWORK

Mr. William Lanklin
MCPPXA66/bjw

FROM: AMC DATE: 23 Dec 48

TO: CHIEF OF STAFF
USAF
WASHINGTON 25, D. C.
ATTENTION: DC/S, MATERIEL

CLASS.

KEN I. FUNK
Colonel, USAF
Chief, Aircraft & Missiles Sect.
Procurement Division
NAME RANK AND TITLE OF AUTHENTICATING OFFICER

MCPPXA66-12-41 ... THIS HQ. IS HAVING AN INSPECTION OF FAIRCHILD XNQ TO DETERMINE CONFIGURATION OF T-31 TRAINER AT FAIRCHILD AIRCRAFT, HAGERSTOWN, MARYLAND 5 JANUARY 1949 AT 0900. IT IS REQUESTED THAT APPROPRIATE AGENCIES, INCLUDING NAVY, BE ADVISED. REQUEST THIS HQ. BE ADVISED BY 29 DECEMBER 1948, NAMES AND/OR NUMBER OF PERSONNEL WHO WILL ATTEND IN ORDER THAT HOTEL RESERVATIONS CAN BE MADE. SIGNED PROCUREMENT DIVISION.

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COORDINATION

C G OR C O	CONTROL OFFICE	MAINTENANCE	P & T	SUPPLY	BUDGET & FISCAL	OTHERS

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Texas Engineering and Manufacturing Company, Inc.

Postoffice Box 6191
DALLAS 2, TEXAS

December 23, 1948

ROBERT McCULLOCH.
PRESIDENT

ORIG FILE COPIES TO: | INITIALS
RECORDS BR. AGO APR 19 1949
EXTRA COPY RETAINED
VALUE OF PAPER-CHECK ONE
PERMANENT ☐ TRANSITORY ☐

U.S. Army Air Forces

SUBJECT: Military Type Primary Trainer Airplane

TO: Mr. Nate Silverston
Procurement Division
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

ATTENTION: MCPPXA-66

1. The Military Type Primary Trainer airplane manufactured by Texas Engineering and Manufacturing Company, Inc., will be ready for demonstration and flight test at Wright Field, or any other point of your choosing, on January 15, 1949. The initial prototype of this airplane has been thoroughly tested, both structurally and performance-wise, to assure performance that meets all the requirements of Air Force Primary training.

2. The airplane is of all-metal construction, low wing monoplane type, with hydraulically operated landing gear and flaps. The tandem seating arrangement, cockpit controls, instruments, and canopy are similar to those of the T-6. Both performance and structure have been thoroughly tested in civilian use in over 1600 airplanes of identical basic design and structure to that of the Military Type Primary Trainer that we are building.

3. Proven performance and structure contribute materially to the low price of $12,000.00 for which this airplane can be produced in quantities for the Air Force.

4. Plant and production capacity is immediately available at our facility that was designed and constructed for the production of T-6 aircraft during World War II. Production can start immediately without any interference with important Air Force operations on aircraft of other design. Initial delays and excessive costs for completion of engineering, tooling, plant layout and planning, will be eliminated and these savings in time and money have been reflected in the cost of the airplane to the Air Force.

5. Engineering and quantity production tooling are available and in operation, which will assure the rapid delivery of large quantities of these airplanes. Material sources are established and dies and patterns for forgings and castings are ready for immediate use. Adequate stock of such important items as landing gear struts, tail wheel struts, forgings, castings, extrusions, etc., are available for immediate use.

6. The airplane is designed for maximum savings in maintenance and replacement parts costs. The wing tips are detachable and the wings

Trainer, Basic - Single-Engine (R)

Basic Trainer, Single-Engine
Ea PPXA-66

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are detachable at the center section. The cowling is of the automotive type, quickly removable for access to the engine. The power plant design is adaptable to quick engine change to meet Air Force specifications.

7. Spare parts are in production and immediately available at a cost comparable to the low cost of the complete airplane.

8. Specifications are attached which detail the structure, power plant and performance of the airplane.

9. We have been informed that the Air Force is considering the procurement of an airplane for primary training. We submit the attached specifications, photographs, and inboard profile view of our Military Type Primary Trainer airplane. The performance of this airplane has already been proven, and will be available for further demonstration on January 15, 1949. We believe that with the savings in costs to the Air Force realizable from the low price of our airplane, it will be beneficial to delay any procurement action until after the demonstration and flight tests of our airplane have been conducted to your satisfaction.

Yours very truly,

TEXAS ENGINEERING & MANUFACTURING CO., INC.

Robert McCulloch

Robert McCulloch
President

RMcC/am
Encl.

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FEATURES OF THE TEMCO TRAINER

1. A comparison of the unusual width of the landing gear spread against the total wing span will illustrate the excellent advantages of this design with respect to elimination of ground looping problems.

2. The outer panels by reason of their attachment to the center section, involving two bolts in the front spar and one bolt in the rear spar, permit removal of the outer panels with a minimum amount of effort.

3. The wing tips, attached to the outer panels by brazier-head screws and riveted elastic stop nuts, are easily removed and included as interchangeable spare parts.

4. The landing gear strut assemblies are interchangeable - right-hand with left-hand.

5. The horizontal stabilizers are interchangeable - right-hand with left-hand - simplifying spares problem.

6. The sliding canopy has incorporated in the design a method for quick removal or jettisoning of side panels for emergency exit.

7. Location of such controls as trim tab wheels, wobble pump levers, flap operating levers, landing gear levers, fuel selector switches and gauges, is similar to T-6 installation. The aforementioned controls are grouped together on a removable type control shelf extending between front and rear cockpit. Control shelf can readily be removed for maintenance purposes.

8. The engine section is designed for quick replacement, the engine mount being attached by four bolts to firewall. All electrical connections of the Cannon plug type.

9. Automotive type cowling with removable upper and lower sections provide quick access to engine compartment.

10. The instrument panels are designed for quick removal for inspection and maintenance.

11. The aircraft is equipped with full compliment of instruments in front and rear instrument panels in accordance with requirements of the aircraft.

12. Steel tubing turn over truss is incorporated into design of windshield for pilot protection.

13. External inspection doors are located under fuselage front cockpit and the rear of fuselage adjacent to tail surfaces, permitting ready access for maintenance and inspection of controls, hydraulic lines, fuel lines, electrical wiring, etc.

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14. The structure of the aircraft is exceptionally rugged and designed for an ultimate load factor of 7.

15. External skin gauges of the fuselage, center section and forward section of the aircraft are of .032 minimum thickness, providing external surfaces of sufficient rigidity to withstand stone bruises, dents, buckling, etc. from severe use.

16. The basic structure of the aircraft has been subjected to extended serviceability tests on at least 1600 Temco Swift 125 commercial models in operation for a period of approximately two years.

17. Adequate quantities of such items as forgings, castings, extrusions, etc., are available and in stock. Production of the aircraft could be established immediately and deliveries of completed aircraft started within approximately 90 days from receipt of production contract. The present tooling capacity is rated at 8 aircraft per day.

18. The price of approximately $12,000.00 per airplane is made possible by the fact that approximately 85% of the tooling and engineering costs have already been absorbed prior to construction of this model.

19. The major components of the aircraft, such as outer panels, wing tips, tail surfaces, landing gear, engine cowling, etc., are already in production and available at prices representing considerable savings to the purchaser.

20. The Temco Trainer in flight has all of the characteristics of heavier aircraft and should not be confused with other commercial two-place aircraft.

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MILITARY TYPE TRAINER AIRPLANE
MANUFACTURED BY TEXAS ENGINEERING & MANUFACTURING CO., INC.
DALLAS, TEXAS

.....

AVAILABILITY FOR INSPECTION AND FLIGHT TESTING:

One (1) aircraft of the above type, fully equipped and embodying all of the specifications normally required in an aircraft of this category, will be available for inspection and flight testing by no later than January 15, 1949.

PRODUCTION SCHEDULING:

Engineering	-	85% complete
Production Tooling	-	85% complete
Materials	-	Forging dies, patterns, extrusion dies, special tooling, complete and in active use.

Source of supply established and deliveries of materials now being made.

FACILITIES:

Former North American "A" Plant at Dallas, Texas, now being occupied by Texas Engineering and Manufacturing Company, Inc. on a five-year lease basis. Extensive manufacturing facilities such as machine shop equipment, sheet metal manufacturing equipment, heat-treating equipment, etc., available and suitable for the manufacture of the aforementioned aircraft. Since Contractor is not engaged in a prime contract involving manufacture of military aircraft, production of the aforementioned aircraft would in no way conflict with present aircraft planning.

MANAGEMENT:

Former Supervisory force and executive personnel responsible for the operation of North American Aviation's Dallas plant during the war period is now in complete charge of operations of the Texas Engineering and Manufacturing Company, Inc.

AIRCRAFT MAINTENANCE FEATURES:

Eighty-five percent of the major components of the aircraft, such as landing gear, power plant, center section, outer panels, control surfaces, hydraulic actuating units, etc., have been subjected to vigorous and extensive tests by useage in commercial passenger version of the aforementioned aircraft.

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TEMCO TE-1A MILITARY TYPE TRAINER

SPARE PARTS

(Representative List)

Group 1

	Price Each
Outer Wing Panels Complete L/R (Less Wing Tip, Aileron & Flap)	$ 288.10
Wing Tip Assembly L/R	41.33
Wing Slat Assembly L/R	20.76
Aileron Assembly L/R	49.35
Outer Wing Flap Assembly L/R	46.75

Group 2

Elevator Assembly Less Trim Tab L/R	$ 83.90
Horizontal Stabilizer Assembly L/R	104.77
Vertical Stabilizer Assembly	43.74
Rudder Assembly Less Trim Tab	95.50

Group 3

Center Wing Section Structure (Less Gear, including Fuel Tank Installation)	$1164.00
Center Wing Section Complete including Landing Gear Installation & Fuel Tank Installation	1805.00
Landing Gear Strut Assy. Complete with Brakes	235.38
Landing Gear Strut L/R	97.45
Landing Gear Actuator L/R	47.75
Landing Gear Trunnion L/R	39.24
Landing Gear Axle L/R	4.08
Landing Gear Fork	28.58
Landing Gear Strut Wheel Fairing L/R	1.80
Flap Actuating Cylinder	19.50
Hydraulic Power Unit	193.50
Fuel Tanks L/R	40.55
Tail Wheel Assy. including Strut	52.07
Tail Wheel Strut	33.64

Group 4

Motor Mount Assembly	$ 68.62
Upper Cowl Assembly	38.04
Lower Cowl Assy. including Scoop, Grill Assy., Cowl Flap Assy.	105.66
Exhaust Stack, Forward, Intermediate or Aft	4.12

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Fairchild Aircraft
DIVISION OF FAIRCHILD ENGINE AND AIRPLANE CORPORATION
HAGERSTOWN • Cable Address "Faircraft" • MARYLAND

23 December 1948

Subject: Availability of Model NQ Airplane for Air Force Procurement Inspection

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: Nate Silverston
MCPPXA

Through: AF Plant Representative
Hagerstown, Maryland

1. Confirming the telephone conversation of this date between the undersigned and Mr. Nate Silverston of the Air Materiel Command, you are advised that the Model NQ airplane with the Lycoming 680-13 engine installed will be available at this facility for procurement inspection by the Air Force, 9 a.m., 5 January 1949.

Very truly yours,

FAIRCHILD AIRCRAFT
Division of
FAIRCHILD ENGINE & AIRPLANE CORPORATION

A. F. Flood
Division Comptroller

HTW:dhc

Approved and forwarded for information.

Charles V. Williams

CHARLES V. WILLIAMS
MAJOR, USAF
Contracting Officer

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MAR 8 1949
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ENGINEERING
ADMIN

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28 December 1948

MEMORANDUM FOR GENERAL CRAIG, DCS/M
Room 3E-194

Procurement of Training Aircraft

I understand the Beech people in Wichita, Kansas (who made a lot of two engine trainers during the war) have a new trainer about the size of the Fairchild NQ but which would cost between 1/3 and 1/2 as much. Do you think procurement of the Fairchild T-31 (Navy designed NQ) should be held up at least until there has been opportunity to answer the following questions:

1. What would be the airframe comparative cost, and over-all cost including spares?

2. What would be the extent of future gas consumption saving from the lower h.p. engine in the Beech trainer?

3. Would there be an important industrial mobilization planning advantage in bringing Beech back into the military airframe business as compared with new trainer business for Fairchild at this time in addition to their C-82's, C-119's and 120's?

4. I understand the commercial Beech Bonanza is a successful post-war design of which many hundreds have been sold and the "bugs" pretty well cleared. If the new trainer design is a close parallel, wouldn't this help considerably in maintenance costs and servicing?

5. If the new trainer were produced largely from Bonanza jigs, and tooling, what would be the delivery date situation compared with the NQ's; also potential rapid expansion of deliveries in case of emergency?

6. Is there much advantage in training future Air Force pilots on tricycle landing gears vs. the older two wheeled type, and how do the two planes compare in performance, ruggedness, etc.?

7. What are the arguments in favor of the considerably more expensive NQ vs. off-the-shelf procurement of the Beech?

A. S. BARROWS
Under Secretary of the Air Force

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Lycoming R-680-13 Availability from Navy Stock

BAGR-CD MCPPXA66 29 Dec 48 1
Atten: Commander Hawkins

1. It is requested that your office initiate correspondence with the Navy Dept. to ascertain the availability of new Lycoming R-680-13 Engines in Navy stock. The engine in question is being considered for installation in the T-31A airplane (AF version of Navy XNQ-1), a production quantity of which this Command has been directed to procure.

2. For your information, on 15 November 1948 W. Lankin, of this office, contacted the Navy Dept. by phone and conversed with a Mr. Yates in the Maintenance Division. We were informed that forty (40) new engines of the type in question are available in Navy stock. Hence the request in paragraph 1 would be to confirm the forty (40) engine availability.

3. This office was informed that the address to be contacted is:

Chief, BU/Aer, Navy Dept., Atten: Maintenance Division.

4. It is requested that copies of the reply to your correspondence be forwarded this office for our information and files.

BEN I. FUNK
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

WL:bjw
28138
Rm. 113
Bldg. 15

BJW

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R-680-13 Engines, Availability and WAA Reclamation of

MCPPIE MCPPIA66 29 Dec 45 1

Attn: Mr. Bakanauskas

1. This confirms a phone conversation between W. Lankin of this office and Mr. Bakanauskas in which the former requested an investigation to ascertain availability and prices to the Government of the R-680-13 (Lycoming) engine at the various commercial supply companies who had occasion to buy the war surplus engines from WAA.

2. It is requested further that you investigate the possibilities of WAA reclaiming those new engines which were sold to the commercial companies.

3. Reply to the foregoing is urgently solicited.

BEN I. FUNK
Colonel, USAF
Chief, Aircraft & Missiles Section
Procurement Division

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Maj. McLaughlin/mfs/6235
30 Dec. 1960

MEMORANDUM FOR THE Assistant Secretary of Defense, M&P/ISA

SUBJECT: Procurement of Training Aircraft

1. The following comparison of the Fairchild T-31 and the Beechcraft is submitted for your information. The paragraphs below are numbered to correspond to the paragraphs of Mr. Barwell's memorandum to General Cleary.

All performance figures and costs are estimates based upon preliminary information available at this time. The total figures quoted for the Fairchild include landing gear, undercarriage, elevator, and rudder necessary for its operation. Since the Beech trainer is an off-the-shelf, only commercial modifications and equipment are utilized. In the event a military version is procured, the total cost would be increased by include electronics, and military requirements and equipment in accordance with military specifications and the requirements dictated by a combat mission. Performance figures for both aircraft are based on manufacturer's brochures.

		Fairchild	Beech
2.	Unit flyaway cost per aircraft (100 a/c).	$97,500	$83,700
	Overall aircraft cost including spares for 300 aircraft.	$36,000	$28,900
3.	Fuel consumption gal/hr.	17.5	10
	Oil consumption qts/hr	1.8	1

4. The attached list Fairchild back log on current military orders of 6,119 aircraft validates practically all of their present production capacity. It is anticipated that Fairchild mobilization capacity will be utilized for production combat transport aircraft which will be required in large numbers. Beechcraft is not at present producing a combat military aircraft and could, in the event of an emergency, devote their facilities without be hindered.

5. Over 400,000 hours flying hours on 2,000 Beech Bonanzas [illegible] utilized most of the difficulties inherent in [illegible]

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5. The Beech Trainer can be delivered at the rate of 16 aircraft per day within 6 months. In the event of an emergency they could produce 30-40 per day by sub-contracting. Fairchild will require one year to begin deliveries with an estimated peak capacity shortly thereafter of 50 aircraft per month. By sub-contracting this quantity could be increased considerably. Fairchild rate unknown.

6. (a) It is the opinion of this office that training in a tricycle gear type aircraft would eliminate a large number of landing accidents inherent in any training program where a conventional type gear is used. It is realized that some aircraft with conventional type landing gears are still in the active Air Force inventory([illegible] all development trend is to tricycle type gear.

(b) Performance comparison

	Beechcraft	Fairchild
Gross Weight	16500	17100
Vmax at sea level	270 mph	275 mph
Vstall	56 mph	57 mph
Rate of Climb	735 ft/min	1000 ft/min
Service Ceiling	21,000'	20,000'
Max. Range	634 miles	1000 miles
T.O. Distance over 50' Obs.	2160 feet	1800 feet
	3000'	2500'

(c) Ruggedness

Load Factors

	Beechcraft	Fairchild
Limit (+)	[illegible]	[illegible]
Ultimate	[illegible]	[illegible]
Ratio	[illegible]	[illegible]

Ruggedness of Beech has been demonstrated by the fact that [illegible] factures has replaced one part in every third [illegible] 100 hours. This is their warranty period. No [illegible] available on Fairchild.

7. This office cannot support any [illegible] procurement of the T-50 aircraft. [illegible] designed by the Navy, we feel [illegible] produce this aircraft. If the [illegible] problems should arise with [illegible]

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program calls for a trainer of 3,500# to 4,000# with a conventional type gear. The Beech aircraft does not meet the specifications of the above program in the weight and landing gear categories.

2. It is recommended that a committee be appointed to evaluate existing and available aircraft of this type. The most suitable article to be procured as a result of this comparative evaluation. It is estimated that such an evaluation can be completed in 45 days.

D. L. PUTT
Brigadier General, U. S. Air Force
Director of Research & Development
Office, Deputy Chief of Staff, Material

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OFFICE SYMBOL	1. AFMDR-1	2. AFMDR-10	3. AFMRD	4.	5.
GRADE AND SURNAME OF COORDINATING OFFICERS					

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HAGERSTOWN MD 30 DECEMBER 1948

HAGERSTOWN MD. DECEMBER 30 1948 3/00PM

COMMANDING GENERAL

AIR MATERIEL COMMAND

WRIGHT PATTERSON AIR FORCE BASE

DAYTON, OHIO

ATTENTION MR NATE SILVERSON

MCPPXA.

CA-W-411.....RE TELEPHONE CONVERSATION OF 28 DECEMBER 1948

BETWEEN MR. NATE SILVERSTON OF AIR MATERIEL COMMAND AND A.F. FLOOD

OF FAIRCHILD' THE ROUND FIGURE OF $4'800'000.11 IS SUBMITTED FOR

PROCUREMENT OF ONE HUNDRED /100/ NQ TRAINER AIRPLANES AT A

MAXIMUM PRODUCTION RATE OF TWENTY-FIVE /25/ A MONTH' SPARE PARTS

AT 20 PERCENT OF AIRFRAME VALUE' AND HANDBOOKS. THE NQ AIRPLANES TO BE

MANUFACTURED IN ACCORDANCE WITH NAVY SPECIFICATION SP-4000 DATED

1 APRIL 1948 AND INCORPORATING LYCOMING R-680-13 ENGINE, DETAILED

TERMS AND CONDITIONS OF DEFINITE CONTRACT ARE TO BE NEGOTIATED

AT A LATER DATE.

FAIRCHILD AIRCRAFT

A.F. FLOOD

DIVISION COMPTROLLER

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Beech "Mentor" and Fairchild XNQ Trainer

MCPPXA MCPPXA6 30 Dec 48 1

1. In order to answer certain questions raised by the Assistant Secretary of the Air Force, a telephone request was received by this office from Mr. Barber, Hq USAF, to supply the following information.

a. Comparative prices and delivery schedules for the Fairchild Air Force version of the Navy XNQ trainer and the Beech "Mentor" proposal.

b. The ultimate mobilization plant peak rate for both the afore-mentioned.

2. Certain other items of engineering information were requested to be supplied by Major Angerson of MCREQA5. A consolidated phone call was placed to Mr. Gaty, of Beech Aircraft, at which time he quoted a price complete, based on 100 articles, of $15,000. He further stated that first delivery would be six months following date of authority to proceed and that his estimate of ultimate plant peak rate would be 30 to 40 a day with 20% subcontracting.

3. Mr. LeBoeuf, the Dayton Representative of Fairchild Aircraft Corporation, as the result of a telephone conversation with Mr. Flood of his parent company, quoted an airframe price, based on 100 articles, of $40,000 with first delivery 12 months from authority to proceed, and ultimate peak plant capacity of 50 per month. The amount of subcontracting was not stated. GFP prices were not available.

4. The above information was transmitted by telephone to Lt. Colonel J. Hogg, Hq USAF, who stated that he would coordinate his reply to Mr. Barrows with Mr. Barber.

D. W. GRAHAM
Lt. Colonel, USAF
Chief, Training, Transport,
and Special Aircraft Branch

DWG/mfb
Ext 22216

Copy to:
MCREQA5 - Major R. C. Anderson
MCPPXA1 - Mr. R. W. Kellhofer
MCPPXA66 - Mr. Nate Silverston

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Availability of R-985-1 Engines

MCMXXIII MCPPXA66 31 Dec 45 1

Attn: Mr. D. C. McQuarrie

Further to telephone conversation between Mr. McQuarrie and W. L. Lemkin, it is requested that the following information be expedited to this office:

(a) How many new R-985-1 engines are available in AF stock for use on the T-11A airplane?

(b) How many serviceable R-985-1 engines are available in AF stock for use on the T-11A airplane?

MAX I. FOUR WLL:bjw
Colonel, USAF 28138
Chief, Aircraft and Missiles Section
Procurement Division

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AMC Form No. 10-3
(Rev 29 Jul 47)

ROUTING AND R ORD SHEET

MATERIEL COMMAND

Use this form for inter-office correspondence within headquarters.

Use authorized office symbols to designate addressor and addressee.

Place initials of dictator and typist, telephone number and location to right of signature.

Number all comments consecutively.

Note warning signal at lower left of form. Remaining space is sufficient only for proper spacing of typewritten signature.

Use entire width of sheet, both sides.

Separate comments by horizontal lines across page

SUBJECT: Maintenance Record - R-680-13 Engine - T-31A Airplane

TO: MCREXT21 FROM: MCPPXA66 DATE: 24 Dec 48 COMMENT NO. 1

Atten: Mr. D. P. Ransomer

1. This confirms conversations between Mr. Ransomer and W. Lankin of this office during which the former was requested to supply MCPPXA66 with a Maintenance Division opinion regarding the quality of the R-680-13 engine from the maintenance viewpoint. Final selection of this engine for use in the T-31A airplane will, in part, be dependent on whether the engine in question required a high or low amount of maintenance.

2. An expedited reply to the foregoing is requested.

[illegible]
EBK I. KUNK
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

WLK/jw
2513S
Rm. 113
Bldg. 15

MCPPAA66:

1. This office has received the [illegible] on the subject that maintenance-wise it is a [illegible] tenance in comparison with [illegible]

2. The [illegible] not been [illegible] at time of [illegible]

3. [illegible] maintenance point of view, [illegible]

[illegible]
[illegible]
[illegible]

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PP JEPAB

FM JEP 102A/HQ USAF WASH D C 312121Z

TO COMGENAMC WRIGHT PATTERSON AFB DAYTON OHIO

AF GRNC

FROM AFHEN 24827

THE FOLLOWING PERSONNEL WILL ATTEND T-31 INSPECTION AT FAIRCHILD PLANT 5 FEBRUARY 1949

REQUIRE HOTEL ACCOMODATIONS.

COL. G.. DIGOSWAY- TRAINING DIV , HQS , USAF

COL. T.J.CUNNINGHAM-TRAINING DIVISION,HQS,USAF

LT.COL.O.B.JOHNSON-REQUIREMENTS DIVISION,HQS,USAF

BRIG.GEN.E.H. ALEXANDER-HQS,TRAINGING COMMAND

COL.JAMES ROBERTS-HQS,TRAINING COMMAND

LT.COL. A.W.POLKING-HQS,TRAINING COMMAND

TWO REPRESENTATIVES FLYING SAFETY-NAMES UNKNOWN

NO HOTEL ACCOMODATIONS REQUIRED.

MAJ.T.W.FURLOW-BUAER

LT.CDR.R.H. DASTELL-BUAER

MR.C.F.BLANDING-BUAER

MR.R.J.COUGHLAN-BUAER

MR.CHAFF-BUAER-BALTIMORE

MAJ.GEN.K.P. MCNAUGHTON-D/T&R,HQS, USAF

MAJG.W. MCLAUGHLIN-R&D,HQS, USAF

CAPT. L.R. STANDIFER-R&D, HQS, USAF

CFN. 24827 T-31 5 1949

31/2248Z DEC

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In reply ... ase refer to: CA-W-421

Fairchild Aircraft DIVISION OF FAIRCHILD ENGINE AND AIRPLANE CORPORATION
HAGERSTOWN • Cable Address "Faircraft" • MARYLAND

4 January 1949

Subject: Proposal for NQ-1 Trainer Airplane

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPPXA-15

1. Pursuant to the request of the Air Materiel Command, the Contractor is pleased to submit the following proposal for the procurement of one hundred (100) Model NQ-1 airplanes, spare parts and data:

A. One Hundred (100) Model NQ-1 airplanes designed and manufactured in accordance with Navy Specification SD-400C, dated 1 April 1948, with tooling required for a maximum production of twenty-five (25) airplanes per month and incorporating the Lycoming R680-13 engine, all at a unit price of $39,187.00.

TOTAL $3,918,700.00

B. Spare Parts for the above airplanes at 20% of airframe value. $ 783,740.00

C. Handbooks for the above airplanes in accordance with current applicable Air Force Specifications. $ 53,114.00

TOTAL OF PROPOSAL $4,755,554.00

2. The Contractor submits the following separate quotation for incorporating in the basic tool design and manufacture such features as will permit a maximum production rate of fifty (50) airplanes a month but not including the manufacture of duplicate tools or fixtures over and above those required for a maximum production of twenty-five (25) airplanes a month.

$ 824,530.00

3. The delivery schedules for the NQ-1 airplanes, predicated on receipt of contractual coverage by 15 January 1949, is as follows:

...CORDS TO: | INITIALS
APR 15 1949
...PAPER-CHECK ONE ... TRANSITORY

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QUANTITY	MONTH
1	November, 1949
3 additional	December, 1949
5 "	January, 1950
7 "	February, 1950
10 "	March, 1950
15 "	April, 1950
20 "	May, 1950
25 "	June, 1950
14 remaining	July, 1950

4. Both the prices and delivery schedule noted above are contingent upon the following:

A. There shall be included in any contract issued pursuant to this quotation, a provision for redetermination of prices, substantially in accordance with Paragraph 4-305.5 of Section 4 of the Joint Procurement Regulations.

B. Engines, propellers, instruments and other items normally furnished as Government Furnished Property shall be furnished to the Contractor, without charge, by the Government.

C. No liquidated damages are to be included in the contract for failure to deliver on specified dates.

D. The prices quoted do not include any provision for flight or ground risk insurance.

E. The prices quoted do not include the costs of any bonds or premiums on insurance risks assumed by the Government.

F. There shall be included a provision for partial payments in the amount of 75% of incurred costs.

G. The Contractor will be required to accomplish only Phase I flight testing which is herein defined to mean the following: Phase I flight testing will consist of initial and acceptance flight tests by the Contractor to show the airplane to be air-worthy and suitable from the standpoint of safety for delivery to the Air Force.

H. The prices quoted do not include the furnishing of any mock-ups or the furnishing or testing of any wind-tunnel or other models.

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Subject: Proposal for NQ-1 Trainer Airplane 4 January 1949

I. The Contractor shall be entitled to occupy and use the facilities supplied to it under the provisions of Special Facilities Contract W 33-038 ac-557 and Emergency Plant Facilities Contract W 535 ac-17015 under the currently existing terms and conditions.

J. There shall be excluded from any contract issued pursuant to this quotation, any provision indemnifying the Government for patent infringement by the Contractor.

K. All drawings heretofore prepared for the Model XNQ-1 airplanes and which are applicable for use on the Model NQ-1 airplane will not be redrawn or modified.

5. The detail cost information in support of the prices quoted in Paragraphs 1 and 2, above, is attached hereto as Exhibit A. The pricing formula used in preparing this proposal is substantially the same as that used in preparing the quotation for NQ airplanes submitted 5 October 1948 with the exception that the labor rates have been adjusted to reflect wage increases granted under our Union Contracts subsequent to 5 October 1948.

Very truly yours,

FAIRCHILD AIRCRAFT
Division of
FAIRCHILD ENGINE & AIRPLANE CORPORATION

A. F. Flood
Division Comptroller

HTW:dhc
Attach.

Basic XNQ-1 — approx 371,000

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SUMMARY MINUTES OF A BOARD OF OFFICERS
APPOINTED BY THE SECRETARY OF THE AIR FORCE
CONVENED BY THE PENTAGON
WASHINGTON, D. C.
29, 30, 31 DECEMBER 1948
3, 5, and 6 JANUARY 1949

1. Pursuant to an oral directive of the Secretary of the Air Force, the Board of Officers met in session on 29 December 1948 at 0900 in Room 3D-1022, the Pentagon, to review and make recommendations for changes, if necessary, in the composition of the 48 Group Program, the Aircraft Production Program, and the Research and Development Program of the U.S.A.F. The Board met in continuous session, recessing from time to time as required, until adjournment at 1700 hours, 6 January 1949.

2. Attendance:

a. The Board was composed of General Muir S. Fairchild, General Joseph T. McNarney, Lt. General H. A. Craig, Lt. General Lauris Norstad, and Major General E. M. Powers, Recorder (without vote).

b. General Joseph T. McNarney presided as the Acting Chairman of the Board in the absence during all sessions of the Board of General Muir S. Fairchild.

c. Major General F. F. Everest and Major General F. H. Smith, Jr., represented Lt. General Lauris Norstad during the periods of the latter's absence on 31 December 1948 and on 5 and 6 January 1949.

d. In attendance as witnesses during the meeting of the Board were those individuals listed on Inclosure No. 1.

3. The agenda containing items for consideration of the Board is attached as Inclosure No. 2.

4. The Board submitted on 7 January 1949 in an interim report to the Secretary of the Air Force its recommendations on certain items concerning the Composition of the Air Force and Aircraft Procurement Program. This submission was required in order to obtain an approval of recommendations affecting the reprogramming of the FY 1949 program which had been directed by the Secretary of Defense. A copy of this interim report which was approved on 7 January 1949 by the Chief of Staff, USAF, and the Secretary of the Air Force is attached as Inclosure No. 3. These recommendations are also included in the pertinent part of this final report.

5. The Composition of the 48 Group Program:

a. The Board heard testimony by Major General F. H. Smith, Jr., who presented the composition of the 48 Group Program planned for FY 1950 and as an ultimate requirement. (Inclosure No. 4). It subsequently heard statements

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from Lt. General Curtis LeMay, Commanding General, SAC, Major General R. M. Lee, Commanding General, TAC, and Major General G. P. Saville, Commanding General, ADC. Inclosure No. 5, indicates the recommendations of the Commanding General, SAC, for the composition of the Heavy and Medium Bomb Groups and the Strategic Reconnaissance Groups.

b. The Board determined that the launching of an atomic offensive and the defense of the Western Hemisphere and the essential base areas from which to launch the atomic offensive must be considered as the primary mission of the Air Force and must be given the greatest consideration and priority in arriving at the proper composition of the 48 Group Program under the $14.4 billion concept of the Joint Chiefs of Staff. The Board likewise recognized the necessity of maintaining the tactics and techniques and the state of the art of tactical reconnaissance in connection with Ground Troops in both exercise and theory. It recognized the inability of an all-purpose fighter to do adequately both interceptor and penetration missions. Reconnaissance aircraft was considered to be in the highest priority in the aircraft program in order to make the bombers effective and the requirement for a long range airplane to properly accomplish the long range reconnaissance mission of the Air Force was considered a necessity. The Board recognized that the present program is not a desirable one but that it has been designed to meet the requirement where the requirement actually has to be met; that from the basis of meeting first things first, the proposed program is a sound one.

c. The Board recommends that the following changes be made in the composition of the 48 Group Program:

(1) That 2 heavy bomb groups be increased to 4 heavy bomb groups.

(2) That 12 medium bomb groups be decreased to 10 medium bomb groups.

(3) That 15 2/3 day fighter groups be decreased to 15 day fighter groups.

(4) That 1/3 tactical reconnaissance group be increased to 1 tactical reconnaissance group.

(5) That 16 Air National Guard day fighter groups be increased to 18 Air National Guard day fighter groups.

(6) That 8 Air National Guard all-weather fighter groups be decreased to 6 Air National Guard all-weather fighter groups.

(7) That the 20 USAF fighter groups in the 48 Group program be composed of 8 Penetration Fighter Groups, 7 Interceptor Fighter Groups, and 5 All-Weather Fighter Groups.

(8) That the composition of the 24 Fighter Groups in the Air National Guard portion of the 48 Group program be composed of 9 Penetration Fighter Groups, 9 Interceptor Fighter Groups, and 6 All-Weather Fighter Groups.

(6) That the MX-49 program, consisting of 30 aircraft procured from FY 1948 Supplemental funds, be cancelled.

(7) That the procurement of 51 B-45C aircraft from FY 1948 Supplemental Funds be cancelled and the last 33 B-45C aircraft in the schedule be factory modified, if possible, to RB-45C prior to delivery; that of the 26 B-45C aircraft excess to unit requirements, 10 be utilized for transitional training and 16 be modified for high altitude high speed tow target purposes.

(8) That procurement of 118 F-93A aircraft from FY 1948 Supplemental Funds be cancelled.

(9) That the procurement of 1 T-29(Bombardier version) from FY 1948 Supplemental Funds be cancelled.

(10) That the procurement of 30 C-125B aircraft from FY 1948 Supplemental funds be cancelled and that a re-evaluation be made of the C-122 and C-125B aircraft and the Air Force requirements for this type of aircraft; that pending this re-evaluation, no further contracts for this type of aircraft be issued.

(11) That the procurement of 10 H-10 aircraft from FY 1948 Supplemental funds be cancelled and a re-evaluation of the H-10(Kellett) and the HRP-2(Piasecki) be held. When this re-evaluation is completed and an aircraft is selected, coordination be had with the Navy to agree on the use of the same type of engine in Air Force and Navy models of this helicopter.

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(12) [redacted] be accelerated by AMC and the training command of the maximum practicable number of the interceptor and bomber pilots to units and of the trainer of any other category in that category that can be in production within the allocated funds, and that procurement of 110 trainer aircraft from FY 1948 Supplemental funds and 209 trainer aircraft from FY 1950 funds be withheld pending this evaluation.

(13) That the requirements and characteristics forwarded by Headquarters USAF to AMC for a T-X pilot trainer be withdrawn and that new requirements and characteristics be submitted based on further study to be conducted by the DC/S, Operations, United States Air Force.

(14) That planned procurement of 302 F-86A aircraft from FY 1950 funds be continued but with final procurement decision on these aircraft subject to a fighter evaluation to be held in the near future.

(15) That no commitments on the procurement of 12 F-88/90 aircraft from FY 1950 funds be made until a thorough evaluation indicates which of the 3 aircraft, F-88, F-90, or F-93 should be procured.

(16) If after evaluation of the 3 fighter aircraft indicated above, it appears more urgent to retrofit a selected aircraft with a one man radar presentation, to provide rapidly an interim fighter, then those funds planned for procurement of F-88/90 aircraft in FY 1950 be used for this retrofitting purpose.

(17) That the procurement of 64 C-124A aircraft out of FY 1950 funds be accomplished with the type engine presently installed in the C-119B to be installed in these C-124A aircraft; that, with the exception of the first 4, these aircraft be fitted with a pedestal; that these first 4 be allowed to be held aside and retrofitted with these pedestals as possible without interfering with the production line of the remainder; that tow apparatus be not included in these C-124A aircraft.

(18) That an evaluation of the Cessna 195 being procured with FY 1948 Supplemental funds be made and, the proposed procurement of 28 L-X's from FY 1950 funds be retained in the program and held in abeyance pending the evaluation of the Cessna 195.

(19) That there be procured from FY 1950 funds 58 B-47 aircraft at a level off rate of 5 per month and that no procurement be made of the RB-47 until it is determined that FY 1951 funds are available for that purpose and that the aircraft will satisfy the reconnaissance requirement.

S-5404

[redacted]

procurement program for [redacted] and 1950 [redacted]
tions above [redacted]

[redacted] the Board reviewed the U. S. Air Force [redacted]
duction objectives for [redacted] primary [redacted] contained in [redacted]
closure No. 13), and recommended approval [redacted]
striking therefrom the reference to [redacted]

9. A memorandum, prepared within AMC, indicating [redacted]
ere being taken within that headquarters to establish [redacted]
on maintenance work load capacity and a priority of [redacted]
aircraft types and models was read to the Board. Upon receipt of [redacted]
tion, the Board determined that no further action on Item 5 of [redacted]
was required on its part.

10. Items 6 and 7 in the Agenda were considered to be beyond the province of this Board and consequently were not reviewed by it.

11. A complete transcript of the record of the meetings of the Board with all exhibits included will be kept on file in the Office of the DC/S-Materiel for those interested in the detailed discussion on any point.

13 Incls

JOSEPH T. McNARNEY
General, U. S. Air Force
Acting Chairman

Approved: HOYT S. VANDENBERG
Chief of Staff
United States Air Force

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[redacted]

THE WHITE HOUSE
Washington

January 6, 1949

My dear Mr. Secretary:

I have approved the requested change in the proposed use of $109,220,000 of aircraft procurement funds for the Department of the Air Force previously released in accordance with the requirements of Public Law 547, 80th Congress, as requested in your letter of November 22, 1948.

Sincerely yours,

/s/ Harry Truman

The Honorable

The Secretary of Defense

[redacted]

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UQQTT EST JAN MSG NO A-987 7 January 1949
MCP V AFMPI
THE PRESIDENT HAS APPROVED THE RELEASE OF $109,220,000 FOR 48 F-89 AIRCRAFT, 110 F-94 AIRCRAFT AND 100 T-31 TRAINERS. PROCUREMENT DIRECTIVS ARE FORTHCOMING IMMEDIATELY.
SIGNED GENERAL KESSLER
END
PLS ACK

MSG NO A-987 RECEIVED 071200 EST MFW

7 Jan 49 - Dist by MCP4:

Orig to Records Section	MCAGXF22
CC: Gen K B Wolfe	MCP
Gen H A Shepard	MCPP
Directorate File	MCP4

Note: This msg has been quoted to all activities of Proc Div concerned in R&R Con #1 dtd 7 Jan 49 and which authorizes immediate release for 48 F-89 airc and 100 F-94 airc. No proc will be made at this time of the T-31 airpl. This is in accordance w/ instructions contained in msg A-988 dtd 7 Jan 49 from AFMPI to MCP. W.E.Donnelly.

W. E. DONNELLY
Assistant to Director
Procurement & Industrial Planning

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JAN 7 12 [illegible] ED

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7 Jan 49 - Dist by MCP4:

Orig to Records Section	MCAGXF22
CC: Gen K B Wolfe	MCP
Gen H A Shepard	MCPP
Directorate File	MCP4

Note: Instructions to this effect are contained in R&R Com #1 dtd 7 Jan 49, from MCPP to all Procurement Division activities concerned. W.E.D.

W. E. DONNELLY
Assistant to Director
[illegible] & Industrial Planning
7 January 1949

071205 EST JANUARY MST NO A-988

MCP V AFMPI
REFERENCE MSG NO A-987, PROCUREMENT DIRECTIVE FOR 100 T-31 TRAINERS IS TEMPORARILY BEING WITHHELD
SIGNED GENERAL KESSLER
PLS ACK
7&
M
MSG NO A-988 RECEIVED 071208 EST MFW

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Supplemental FY-1948 Appropriation - FY-1949 Aircraft Procurement Program

MCPPXA MCP4 7 Jan 49 1.
MCPPXE
MCPPXG

1. The following two messages from Headquarters, USAF, with respect to the release of $109,220,000 for the forty-eight (48) F-89s, one hundred ten (110) F-94 and one hundred (100) T-31 airplanes, are quoted for your information:

Msg No A-987 dtd 7 Jan 49 - "THE PRESIDENT HAS APPROVED THE RELEASE OF $109,220,000 FOR 48 F-89 AIRCRAFT, 110 F-94 AIRCRAFT AND 100 T-31 TRAINERS. PROCUREMENT DIRECTIVES ARE FORTHCOMING IMMEDIATELY. SIGNED GENERAL KESSLER."

Msg No A-988 dtd 7 Jan 49 "REFERENCE MSG NO A-987, PROCUREMENT DIRECTIVE FOR 100 T-31 TRAINERS IS TEMPORARILY BEING WITHHELD. SIGNED, GENERAL KESSLER."

Based on the instructions contained in the messages above quoted, you are hereby instructed to proceed immediately with the procurement of the forty-eight (48) F-89 Northrop night fighter aircraft, and the one hundred ten (110) F-94 Lockheed night fighter aircraft.

2. TI-2249, Addendum No. 9, has been assigned to this procurement.

3. A formal release of the funds has been made to the Comptroller's Department, Hq AMC, and Budget and Fiscal Division of that activity will accordingly make commitments and obligations of the funds in the usual manner.

4. No action will be taken at this time with respect to the procurement of the one hundred (100) T-31 training airplanes. Formal instructions with respect to the procurement of these airplanes will be furnished at a later date.

E. A. SHEPARD
Brigadier General USAF
Chief, Procurement Division

WED:haw
2-2215

CC:
MCGO (1) Gen Cook
(2) Col Johnson
(3) Mr Burkholder
MCCB
MCP
MCPP
MCPI
MCPO
MCPIXP2
MCGEH - Mr P. M. Davis

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Aer-MA-21
F21(R680-13)

AIR MAIL

10 Jan 1949

Bureau of Aeronautics General Representative
Central District
Wright Field, Dayton, Ohio

Subject: R-680-13 Engines - Availability of.

Reference: (a) BAGR CD Ltr Serial 13333 dtd 31 Dec.

1. In reply to reference (a), it is advised that the Bureau of Aeronautics can make available forty (40) subject engines for transfer to the United States Air Force without reimbursement.

2. If the above forty (40) engines are desired by the Air Force, it is requested that the Bureau of Aeronautics receive shipment instructions as soon as possible. These instructions should include the Air Force Appropriation to which the cost of transportation shall be charged.

Paul Foley, Jr.
By Direction

Lt. Linder - 5094
7 Jan 1949
MReavill

AMC (MCPPXA-66)
Wright-Pat., A.F. Base
Dayton, Ohio.

Bureau of Aeronautics
(Aer-MA-21)
Navy Department
Washington 25, D.C.

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Fairchild Aircraft

DIVISION OF FAIRCHILD ENGINE AND AIRPLANE CORPORATION
HAGERSTOWN 2, Cable Address "Faircraft" MARYLAND

In reply please refer
129EPC1

10 January 1949

Subject: T-31 Trainer
Procurement Inspection Comments

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPPIA66

Thru: AF Plant Representative
Hagerstown, Maryland

Enclosure: Triplicate "Alteration or Study Items Requested by T-31 Trainer Procurement Inspection Committee"

1. The enclosure lists the alteration or study items requested by the Procurement Inspection Committee on the Fairchild T-31 Trainer with the R680-13 engine during the Procurement Inspection held at the Contractor's plant on 5 and 6 January 1949. As resolved by the Inspection Board, the Contractor intends to take certain action on each of these items as indicated on the enclosure.

2. The Modal Specification for the T-31 Trainer will be revised accordingly and resubmitted to the AMC for approval. It is respectfully requested that enclosure be approved from an engineering standpoint.

FAIRCHILD AIRCRAFT
Division of
Fairchild Engine & Airplane Corporation

A. J. Thieblot
Chief Engineer

HCB:vsv
MCPPX06/JEC/pw
Contractor's letter and exhibit of study of items on T-31 airplane have been reviewed by this office and are considered to be in line with Procurement Inspection Board conference held on 5 and 6 January 1949 at this facility.

Classification Canceled
Changed to
By Authority of
By

C. E. CLEVELAND, Lt. Col., USAF
AF Plant Representative

T-31

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ALTERATION OR STUDY ITEMS SUGGESTED BY T-31 TRAINER PROCUREMENT INSPECTION COMMITTEE

ITEM NO.	SUBJECT	EXPLANATION	ACTION INTENDED BY CONTRACTOR
	Microphone and headset.	Install wiring, etc., for M-16/AR boom type microphone-headset. Also install jack adjacent to radio console for T-17 microphone, microphone and headset storage clips in both cockpits per BuAF drawing 1751.1752.	Will comply.
2	Radio installation.	Submit complete radio installation proposal showing "installed" equipment and other equipment for which space and structural provisions are made.	Will comply.
3	Radio installation.	Install AN/ARC-3 UHF Command, VHF combat interphone and SC-1/GP range receiver. Furnish space and structural provisions for AN/ARC-27 UHF Command (as alternate for ARC-3) and ARN-14. ANC will furnish drawings covering the ANC-19 broken down into smaller units.	Contractor will submit proposal for ANC approval as covered by Item 2 above.
4	Radio console.	Raise radio control console on right side of both cockpits to height of approximately 16" from floor. Tilt console so that controls are normal to operator's vision.	No action required.
5	Microphone switches.	Install two (2) each microphone switches on each throttle; one (1) switch to be connected for normal "push-to-talk", the other so that when energized regardless of interphone switch setting both occupants of the airplane are on interphone.	Will comply.
6	Radio junction box.	Install radio junction box in radio compartment to include relays, terminal strips, etc.	Will comply.
7	Radio circuit breakers.	Install radio circuit breakers in front cockpit only, properly identified.	Will comply.

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ITEM NO.	SUBJECT	EXPLANATION	ACTION INTENDED BY CONTRACTOR
8	Baggage compartment.	Move baggage compartment one station aft. Extend radio compartment to provide space for ARC-19 (UHF) and ARC-14 (ODR) components. Provide installing these items with their long axes fore and aft or otherwise to provide maximum access to radio and battery installation. Install equipment so as to be able to remove one piece of radio without removing a second item. Install battery on elevator type mount if necessary.	Will comply as required by conjunction with Items 2 and 3 above.
9	Static dischargers.	Install AN/ASA-3 static dischargers.	Will comply.
10	Range receiver antenna.	Install on inside of canopy.	Will comply.
11	Radio controls.	Install duplicate controls in both cockpits arranged in a row fore and aft in the following order starting at forward end: (a) Interphone, (b) Range receiver, (c) VHF Command, (d) Space for UHF Command, (e) Space for ARN-14, (f) VHF Command and Range Receiver transfer panel. Mounting provisions required for installing standard Navy-USAF radio control panels later.	Comply as part of Items 2 and 3 above.
12	Pick-axe antenna.	Install CFP "pick-axe" antenna on tip of vertical stabilizer within plastic housing. Installation to be tested in accordance with USAF Spec. 7122.	Will study, including flight test, for later proposal.
13	Ammeter and voltmeter.	Install GFP type J-1 (Spec. 32529) ammeter with proper shunt and GFP AN3203-V30 voltmeter in lieu of present volt-ammeter.	Will comply.
14	Landing gear indicator.	Install Type C-1 (Spec. 21250) landing gear indicators, one for each retractable gear, and one red indicator light (AN3157-6) for landing gear position indication in lieu of present instrument. Install system substantially in accordance with Spec. 32300D, except green indicator lights are to be replaced with the type C-1 indicators.	Will comply.

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ITEM NO.	SUBJECT	[illegible]	ACTION ENTERED BY INSPECTOR
15	Cockpit light.	Install one (1) type C-1A (or equivalent), in the [illegible] cockpit.	[illegible] assembly.
16	Instrument lighting.	Install [illegible] ultra-violet [illegible] A-11 [illegible] [illegible] [illegible]	[illegible] instrument [illegible] [illegible] [illegible] [illegible] [illegible]
17	Formation lights.	[illegible]	[illegible]
18	Taxi light.	[illegible]	[illegible]
19	Flasher.	[illegible]	[illegible]
20	Passing light.	[illegible]	[illegible]
21	Landing light.	Install one AN[illegible] [illegible] the leading edge of the left wing. Use one AN[illegible] outlet on the left side of cockpit and it in the vicinity of the landing gear control lever. Install per Spec. 7-32765E.	[illegible]

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ITEM NO.	SUBJECT	EXPLANATION	ACTION INTENDED BY CONTRACTOR
29	Landing gear indicator lights - external.	Install two (2) white indicator lights, one on each landing gear, so that they are visible to ground personnel with gear down. Connect this circuit to the wing tip light circuit so that power is connected only when the wing tip lights are "on". The lights should be "on" only when the respective gear is down and locked.	Will comply.
30	Generator control relay.	Relocate for improved accessibility for removing.	Will comply.
31	Inverters.	Install two (2) inverters (one main and one standby) with automatic changeover relay in lieu of one inverter now installed.	No action to be taken.
		The type of inverter to be used will be recommended upon receipt of the electrical load analysis mentioned in Item 25 above.	Suitable inverter will be recommended by AMC upon receipt of electrical load analysis.
32	Generator cutout relay.	Install an AN-3005-1 generator cutout relay in lieu of the relay now installed.	Will comply.
33	Generator voltage regulator.	Relocate the generator voltage regulator to a position where it is readily accessible in the cockpit.	Will comply.
34	Battery relay.	Install an AN-3071-1 relay in the battery circuit in lieu of the relay now installed.	Will comply.
35	Battery accessible.	Install the battery on an "elevator" type tray so that it is dropped out of the bottom of the fuselage for servicing, or remove the battery aft to improve accessibility.	The best location for the battery will be studied in connection with Items 3, 8 and 25 above. An "elevator" type tray will be provided if necessary.
36	Rear cockpit switches.	Delete the generator, battery, landing light, taxi light and all position light switches from the rear cockpit.	Will comply.
37	Fluid drains.	Fair the outlets for negative instead of ramned pressure.	Contractor will comply except for oil breather pipe where study will be made to recommend most desirable type of outlet before installation in production.

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ITEM NO.	SUBJECT	EXPLANATION	ACTION INTENDED BY CONTRACTOR
38	Engine cowling.	Provide a two zone cowling to isolate the accessory from the power section of the engine.	Not required.
39	Fuel strainer access door.	Relocate the fuel strainer access door so that it is under the strainer.	Will comply. Cowling shown with the -13 engine at the inspection was designed for the -10 engine and had the access door improperly placed.
40	Fuel tank cap.	Provide a chain on the fuel cap.	Will comply.
41	Oil tank cap.	Delete the special lock.	Will comply.
42	Oil tank inspection.	Provided an inspection opening in the oil tank.	Oil tank will be redesigned to allow for oil dilution system. Inspection provisions will be made in this redesign.
43	Oil drain valve.	Replace the present "T" oil drain with an approved straight-through poppet drain valve.	Will comply.
44	Fuel shut off valve.	Provide an AF-approved fuel shutoff valve.	Will submit present valve to AMC for engineering approval before releasing for production.
45	Oil dilution.	Provide an approved oil dilution system.	Will comply. Requires redesigned oil tank as mentioned above under Item 42.
46	Oil tank hopper.	Provide a hopper in the oil tank which will be in accordance with the Handbook of Instructions for Aircraft Designers.	Will comply. See Items 42 and 45 above.
47	Oil immersion heaters.	Provide for use of standard oil immersion heaters in the oil tank filler necks.	Not required.
48	Exhaust system.	Remove the exhaust port gaskets.	Contractor not to remove. Deviation.
49	Exhaust system.	Separate the exhaust system from the accessory section and the combustible fluid lines contained therein.	No change required at this time. See Item 61 below.

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ITEM NO.	SUBJECT	EXPLANATION	ACTION INTENDED BY CONTRACTOR
50	Fuel system controls.	Paint all fuel system controls red.	Will comply.
51	Carburetor air temperature thermometer.	Provide an approved carburetor air temperature thermometer.	Will comply.
52	Carburetor heat.	Provide a carburetor heat system in accordance with the requirements of the Handbook of Instructions for Aircraft Designers.	Present system to be retained until service use dictates change.
53	Vacuum pump suction relief valve.	Relocate the vacuum pump suction relief valve so that it isn't mounted directly to the vacuum pump and does not receive full engine vibration.	Will comply if vacuum instruments are used.
54	Carburetor air filters.	Provide carburetor air filter in accordance with Spec. AN-I-8.	Will comply.
55	Color coding.	Provide color coding for all power plant removal break connections in accordance with AF Spec. 98-24105.	Will comply.
56	Power plant controls.	Eliminate the present "slop" in the engine controls and meet HIAD requirements. Recommend using solid push-pull controls.	Contractor will eliminate present "slop" in airplane. Tite-flex controls are probably better.
57	Fuel booster pumps.	Delete the line-mounted and install tank-mounted fuel booster pumps.	Will use present system.
58	Fuel tank caps.	Provide a standard Air Force filler cap for the fuel tanks.	Will use present filler cap.
59	Dust plugs.	Provide dust excluders for the air inlet to the engine induction system, the oil cooler and the exhaust outlet.	Will comply except there is no oil cooler with -13 engine.
60	Fire extinguishing and heater door.	Provide a spring-loaded door opening into the engine accessory compartment which can be used for ground fire fighting and ground heating during cold operations.	Will comply, using the same door as for the fuel drain access.
61	Exhaust shrouding.	Provide at least 3/4" clearance between the exhaust pipe and the exhaust shrouding at all points.	Present system acceptable. If later heating requirements demand, compliance will be obtained by modification to airplane to be negotiated at that time.

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Item No.	[illegible]	[illegible]	[illegible]
52 and 53	[illegible]	[illegible]	[illegible]
54	[illegible]	[illegible]	[illegible]
55	Cable guard.	[illegible]	[illegible]
56	Stabilizer [illegible]	[illegible]	[illegible]
57	Special tools and ground handling equipment	[illegible]	[illegible]
58	[illegible]	[illegible]	[illegible]
59	Access panels.	[illegible]	[illegible]
60	Parking brake markings.	[illegible]	[illegible]
61	Cable guard.	[illegible]	[illegible]
62	Wing flying hoist.	[illegible]	[illegible]
63	Seat.	Seat must be built in accordance with Spec. AN-S-49(1).	Same as item by above.
64	Fairing, fillets, and tips.	Fairings, fillets and tips should be fabricated of harder material. The horizontal stabilizer tips should be "quick changed".	Will comply.

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ITEM NO.	SUBJECT	EXPLANATION	ACTION INTENDED BY CONTRACTOR
75	Fire extinguisher and pre-heat door.	Request spring-loaded fire extinguisher and preheat door be incorporated.	Contractor will comply using same door as previously recommended for fuel strainer, heater and fire extinguisher access discussed above.
76	Tail wheel.	Install steerable, lockable, tail wheel.	Contractor will comply. AAF to furnish P-51 steerable tail wheel drawings for information.
77	Landing gear locks.	[illegible] of locks on [illegible]	Contractor will comply. Proposal will be submitted for AAF approval.
78	Stabilizer.	[illegible]	[illegible] Contractor experience to determine future requirements.
79	Ground handling access.	[illegible]	Contractor will provide [illegible] in engine covers to facilitate [illegible] previously discussed here.
80	Airplane covers.	[illegible]	To be considered when spare parts and special tools are considered for this airplane.
81	Landing gear tow bars.	[illegible]	Will comply.
82	Special tools and ground handling equipment.	Provide necessary special tools and ground handling equipment required to service the airplane in accordance with Spec. AN-01-17.	To be considered when spares and special tools are evaluated for procurement.
83	Interference of propeller with top cowling.	Change top cowling at both sides to allow at least 1/2" clearance between the cowling and the propeller when the cowling is raised.	Contractor to study means to allow sufficient clearance without major redesign of cowling, if possible. Deviation may [illegible]
[illegible]	[illegible] generator air blast tube.	Change design of generator air blast tube to allow better accessibility to magneto.	Will comply.

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ITEM NO.	SUBJECT	EXPLANATION	ACTION INTENDED BY CONTRACTOR
85	Wing tips.	Request 12-inch removable wing tips in lieu of present type. Delete handhold.	Will comply. Wing tip to be removable close to outboard aileron hinge instead of present location.
86	Access door to fuel strainer drain.	Access door to fuel strainer drain is on the opposite side of the lower cowling of the strainer.	Will relocate access door as described above.
87	Landing gear switch safety mechanism.	Add a safety mechanism to the landing gear switch to prevent movement of wheels up position unintentionally. Should be same type device now installed for emergency lowering, i.e., lever must be pulled out before it can be raised.	Contractor will provide suitable safety latch by incorporating a detent in handle-operating slot and spring loading lever.
88	Landing gear emergency operation.	Device for emergency lowering of landing gear normally installed should be removed from the switch used for normal operation of wheels and located in a separate position.	No action required.
89	Cockpit ventilation.	Provide more fresh air to both cockpits.	Contractor will provide two air ventilators. Will submit proposal to AMC. If service experience dictates additional cockpit cooling, will consider use of [illegible] in canopy.
90	Landing or taxi lights.	Install two [illegible] lights.	Contractor will supply [illegible] as discussed above.
91	Passing light.	Install.	Will comply as discussed above.
92	Manifold pressure gage line purge valve.	Install [illegible] manifold pressure gage. Install [illegible] portion of lower rear panel to right of manifold pressure gage.	Will comply.
93	Flush static provisions.	Install flush static system for airspeed indicator in accordance with USAF Spec. 27380C.	Will comply.
94	Free air thermometer.	Install Type C-13B thermometer on windshield of front cockpit.	No action required.

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ITEM NO.	SUBJECT	EXPLANATION	ACTION INTENDED BY CONTRACTOR
95	Fuel quantity gage.	Install in accordance with USAF Spec. 21100B, calibrated in pounds.	Will comply.
96	Tachometer generator.	Provide standard pad drive Type AN5547-2 in accordance with drawing AND20005.	Will comply.
97	Instrument panel arrangement.	Install instruments as shown on attached sketch, front-mounted with types and specification numbers as indicated. Cowl flap position indicator not required. Compass to be on vertical center line. Front and rear panel to be identical.	Contractor will comply with instrument panel layout as it was approved by the Procurement Inspection Committee.
98	Cockpit lighting.	Request a cockpit mock-up of the instrument lighting system.	Contractor intends to comply as discussed above. Further correspondence with AMC will discuss details.
99	Hoist sling.	Eliminate sling from miscellaneous equipment list. To be included in special tools exhibit.	Will be considered at time of spare parts procurement.
100	Cockpit handhold.	Provide two (2) handholds in front cockpit for assisting in entering and leaving.	Will comply.

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HEADQUARTERS UNITED STATES AIR FORCE

ROUTING AND RECORD SHEET

TALLY NO.	
FILE NO.	

SUBJECT: Evaluation of Available Commercial Basic Trainers Against T-31A

TO: Deputy Chief of Staff, Materiel

DATE 11 JAN 1949

FROM: Director of Training and Requirements

COMMENT No. 1
Lt Col Johnson/cpw/71715

1. It was the decision of the recent Board of General Officers that the Fairchild T-31A aircraft, also known as the Navy XNQ, not be procured until all existing aircraft of this type in industry are evaluated.

2. It is requested that Air Materiel Command be directed to circularize industry for all existing models of this type of aircraft and assemble them at Wright-Patterson Air Force Base for full evaluation, including flight, by a board consisting of members representing Air Materiel Command, this headquarters, and the Air Training Command at the earliest date possible.

3. The composition of this board should be determined by joint action of DCS/Operations, DCS/Materiel and Air Materiel Command, in keeping with the recent recommendation by General Craig for the constitution of "Aircraft Mock-up and 689 Boards." It is requested that the DCS/Materiel take the necessary action to constitute and appoint this board.

4. The board should be instructed to evaluate competing aircraft against the minimum requirements of the military characteristics for this type of trainer and thoroughly weigh the performance of this aircraft against the mission, cost of operation, producibility, ease of maintenance, and unit cost.

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[illegible] McNAUGHTON
[illegible], USAF
Director of Training & Requirements

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AF Mobile
4 Dec 1947

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Dept. of Air

Chief

1 + 1

13 JAN 1948

MEMORANDUM FOR THE UNDER SECRETARY OF THE AIR FORCE

SUBJECT: Procurement of Training Aircraft

1. Reference is made to your Memorandum, dated 28 December 1948, subject as above. The following paragraphs are addressed to correspond to the paragraphs of your referenced Memorandum.

All production figures and costs are estimates based upon informal information available at this time. The unit figures quoted for the Fairchild trainer include spares, engineering changes, other systems and other GFE included in the specifications. Since the Navy trainer is an off-the-shelf aircraft, only commercial accessories and equipment are utilized. In the event a military version is produced the total cost would be increased to include electronics, and other instruments and equipment in accordance with existing specifications and any additional requirements as recommended by a training board. Performance figures for both aircraft were taken directly from manufacturers brochures.

		Fairchild	Navy
1.	Airframe cost per aircraft (200 a/c).	$39,500	$11,500
	Overall aircraft cost including spares for 200 aircraft	$82,000	$18,900
2.	Gas consumption gal/hr.	17.5	30
	Oil consumption qts/hr.	1.6	2

3. Air Material Command advises that Fairchild's book log on current military orders of C-119 aircraft utilizes practically all of their present production capacity. It is anticipated that Fairchild's mobilization capacity will be utilized to produce combat transport aircraft which will be required in large numbers. Navy aircraft is not at present producing a combat military aircraft and would, in the event of an emergency, devote their mobilization effort to trainers.

Return comeback copy to AFDEN-

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OFFICE SYMBOL	1.	2.	3.	4.	5.
GRADE AND SURNAME OF COORDINATING OFFICERS					

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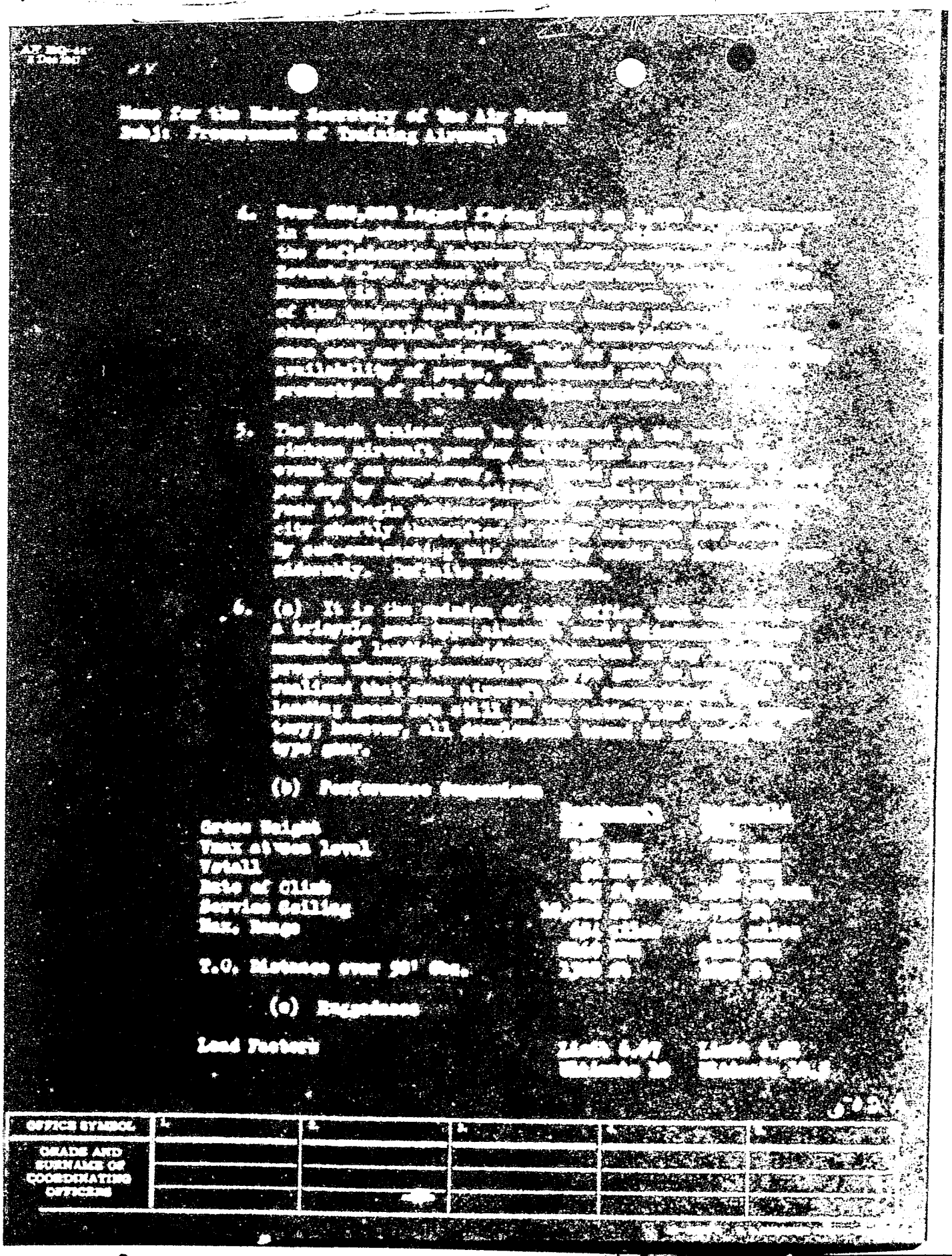

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GRADE AND SURNAME OF COORDINATING OFFICERS					

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AF Form 1 Dec 48

Lt Col Hoag/pk [illegible], Extn 12 Jan 49
for Gen Craig, Signature

[illegible]

[illegible]

7. [illegible]

2. Action has already been taken to [illegible] existing models of this type of aircraft [illegible] consisting of members representing the [illegible] Command and the Air Training Command. This board will evaluate all pertinent aircraft against the following list of specifications, characteristics for this type of trainer and thoroughly study those of the aircraft against the following: ease of operation, serviceability, ease of maintenance, and cost.

S/

W. H. [illegible]
Major General, USAF
Acting Deputy Chief of Staff, Materiel

1 Incl
Memo to Gen. Craig
dtd 28 Dec. 48

OFFICE SYMBOL	1. AFMEN-1B	2. AFMEN-1	3. AFMED	4. AFMCC	5.
GRADE AND SURNAME OF COORDINATING OFFICERS	[illegible]	[illegible]	[illegible]		
	[illegible]				

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Hq AmiC Form No. 80-34A-2
(24 Jun 47)

TITLE SHEET

HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, DAYTON, OHIO

NEN:vcn

Engineering Division
MEMORANDUM REPORT ON

No. of Pages 7

Date 13 January 1949

SUBJECT: Design Proposal
Model M-92D Trainer Aircraft
Fairchild Aircraft Division

OFFICE Aircraft Laboratory / Contract or Order No.

SERIAL No. MCPPXA-24-1154-2-1 Expenditure Order No. 720-87

A. PURPOSE:

1. To comment on data submitted with D&DTR No. MCPPXA-66-T-6, dated 18 November 1948.

B. FACTUAL DATA:

2. The data consisted of four (4) copies of Fairchild Model Specification No. R-92D-000.

3. The data describe a two-place/low wing monoplane powered by one (1) Lycoming GSO-580 engine. This airplane is derived from the Navy's XNQ-1.

4. The designer states in the Model Specification that a list of deviations from applicable USAF Specifications will be submitted at a later date. The subject model Specification cannot be approved until these deviations are received by the Aircraft Laboratory for review.

5. Comments on the design of the subject airplane are contained in Appendix I of this Memorandum Report.

6. Comments on the form and content of the subject Model Specification are contained in Appendix II of this Memorandum Report.

7. Three (3) copies of the subject Model Specification are being returned herewith, the remaining copy is being retained in the Aircraft Laboratory.

WF-O-24 MAY 48 2000

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HqAMC Form No. 80-34
(20 Dec 46)

SIGNATURE SHEET

MCREXA-24-4154-22-1
Engineering Division
13 January 1949

C. CONCLUSION:

8. The contractor should be advised of the comments and recommendations of Appendices I and II of this Memorandum Report and should be requested to comply with action indicated therein.

D. RECOMMENDATION:

9. It is recommended that compliance with Par. C-8 above, be accomplished.

Distribution:

MCF XA-6

Prepared by N. E. NELSON
(Name)

Approved by H. S. LIPPMAN
Chief, Evaluation & Requirements

Approved by O. J. RITLAND
Colonel, USAF
Chief, Aircraft Laboratory
Engineering Division

Concurrence:

WF-L-9 JUN 47 ICM

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MCREXA-24-4154-22
Engineering Division
13 January 1949

APPENDIX I

Aircraft Laboratory Design Comments on the Fairchild Model M-92D.

1. Aerodynamics.

(a) Performance.

The performance characteristics have been checked by the Aircraft Laboratory and are acceptable. In all cases the designer's figures were more conservative than those calculated by the Aircraft Laboratory. In view of this, the Project Office was requested to obtain a copy of the Fairchild Performance Report and submit it to the Aircraft Laboratory, to aid in determining the reasons for these discrepancies. This report has not been received as yet but when it is received an additional report will be forwarded to the Project Office discussing this matter.

(b) Stability & Control.

The designer does not give the most aft c.g. position in the Model Specification, however, based on calculations previously made on a similar Fairchild design it appears that the margin of static longitudinal stability, stick fixed and stick free, will be satisfactory providing the most aft c.g. is within 2% to 4% of the normal c.g.

The static directional and lateral stabilities will be satisfactory. The airplane will probably not possess any adverse lateral oscillation. (Dutch Roll)

Lateral control will be satisfactory.

(c) General Aerodynamics.

It will probably be difficult to comply with the engine cooling Specification with the proposed engine installation.

The stall characteristics are expected to be satisfactory.

2. Weight.

The weights, as presented, are satisfactory.

3. Structure.

There are no comments other than those contained in Appendix II of this Memorandum Report.

4. Dynamics.

Flutter.

The subject Model Specification is satisfactory in regard to flutter.

Vibration.

The designer states that the engine mounting is in accordance with applicable

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Bureau of Aeronautics requirements and any differences between their requirements and those of the USAF will be included in an addendum report on deviations. Since the Navy Specification is not available it is not known whether or not the engine mounting is satisfactory and the Model Specification cannot be approved in this regard.

5. Wheels & Brakes.

(a) Main Wheels.

The proposed 6.50-10 main wheels and 7.50-10 tires are satisfactory. It should be noted that the 7.50-10 tires may be used with either the 6.50-10 or 7.50-10 wheel. However, at present the Air Materiel Command has no specification drawing covering a wheel and brake assembly with the small brake capacity required by the subject airplane. If it is decided to procure this airplane, MCREXA-6 should be authorized by R&R to develop a suitable wheel and brake assembly.

(b) It was not possible to determine the suitability of the proposed tail wheel because the Model Specification did not give sufficient information about the location of the center of gravity. It should be noted also that the size of the proposed tail wheel was not clearly defined.

6. Hydraulics.

There are no comments other than those contained in Appendix II of this Memorandum Report.

7. Alighting Gear.

(a) The contractor should substantiate by test the statement that the main gear will extend by gravity.

(b) The tail wheel is non-steerable but swivels 360°. No mention is made of a tail wheel lock. If one is not incorporated the design should be changed to provide a lock which is controllable by pilot and co-pilot.

(c) There is no mention of Specifications 40228J, 40638B, or AN-J-5. The contractor states that this airplane is designed to Bureau of Aeronautics requirements and that a list of differences between Bureau of Aeronautics and USAF requirements will be submitted at a later date. This data must be submitted before any approval can be given on the landing gear.

(d) More information is required as to what type of protection from mud, snow, etc. is provided for the alighting gear operation mechanism.

(e) The three-view drawing submitted did not show c.g. position, strut angles and other data required by H.I.A.D. to determine the suitability of landing gear installation. This information is required before complete comments can be made.

8. Mechanisms.

The flap control levers should be mechanically interconnected between cock-pits

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to preclude inadvertent cycling of flaps.

9. General Comments.

(a) A training type airplane should have emergency egress panels in the canopy. In addition some means of jettisoning the canopy should be provided for egress in emergencies in the air. This should positively control the canopy until it is clear of the crew.

(b) It is recommended that the seats meet the strength requirements of Specification AN-S-49, Amendment 2, but that they accommodate the new B-12 back type parachute and the new contoured survival kit. (The Equipment Laboratory has been contacted and concurs in the use of the B-12 parachute. The providing of space requirements for the survival kit is necessary so that the interchangeable standard cushion will fit.)

(c) It is recommended that a cushion be provided to replace the survival kit in the seat pan. This cushion should be contoured for increased comfort and should compress to a thickness of 5 inches when used by a 200 pound man. It shall not compress to less than 4 1/4 inches when used by a 250 pound man.

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MCREXA-24-4154-22-1
Engineering Division
13 January 1949

APPENDIX II

Aircraft Laboratory Comments on th e Form and Content of the Subject Model Specification.

1. Reference Page 2, Par. A-1.

Specification ANC-2 should be changed to "Specification ANC-2a, dated 1 March 1948."

2. Reference Page 2, Par. D-2.

A new Par. D-2 should be inserted designating the Finish Specification.

3. Reference Page 14, Par E-4b(1).

The limit maneuver load factor of +6.40 is lower than that required for primary trainer type aircraft. This should be listed as a deviation and is subject to approval based on the contemplated uses of the aircraft.

4. Reference Page 14, Par. E-4C.

The limit landing factor of 4.0 must be substantiated by drop test since it is lower than the maximum value specified in C-1803E.

5. Reference Page 15, Par. E-5b.

The maximum rib spacing and spar locations must be inserted.

6. Reference Page 16, Par. E-5d.

The distance from the plane of symmetry to the centroid of aileron area must be inserted.

7. Reference Page 17, Par. E-6a.

~~Reference Page~~ The distance from design gross weight c.g. to 1/3 maximum chord point must be inserted.

8. Reference Page 28, Par. E-15.

Delete the last sentence of this Par. and substitute: "The design and installation of the brake hydraulic system shall be in accordance with Specification AN-H-2b, Amendment 1."

9. Reference Page 36, Par. E-19b (11) c.

Delete this Par. and substitute "Special Tools if applicable shall conform to Specification AND-17."

10. Reference Page 37, Par. E-19b (13).

The correct designation of the seats must be included in this Par.

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MCREIA-24-4154-22-1
Engineering Division
13 January 1949

11. Reference Page 39, Par. F-1.

Electro-mechanical actuators shall be tested and inspected in accordance with Engineering Division Technical Note No. TN-TSESE-1, dated 1 November 1944 and revised 1 July 1947. The designer must be advised of this since it is not called out in Specification R-1800E.

12. Reference Page 20, Par. E-8(b)2.

The designation of the tail wheel size is incorrect as a 10 x 4 is a solid tire. If a solid tire is intended then the notation "6 ply smooth contour" is in error. The designer should correct this discrepancy and settle definitely the type of wheel. He should be advised that the low pressure series is currently the most popular.

13. Reference Page 47, App. I-B-I.

The proper tail wheel size must be inserted. If the airplane is procured the Aircraft Laboratory will specify the correct drawing numbers and weights.

14. Reference Page 57, App. III, Deviation III-C.

The lower factor on the overturn structure cannot be approved until information as to the actual load factor at 4000 lbs. is submitted.

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AAF Form No. 45
(Rev'd 22 Aug 44)

REQUEST FOR MODEL OR TYPE DESIGNATION CHANGE OF STATUS EQUIPMENT

ITEM NO. [illegible]

DATE 14 January 1949

1. NAME OF ARTICLE AFFECTED:
Fairchild Trainer

2. PROCUREMENT SPECIFICATION AND/OR DRAWING NUMBER:

3. PERTINENT INFORMATION

A. ITEM [illegible] (IS NOT) A NEW ITEM.

B. ITEM (IS) [illegible] AN IMPROVEMENT OVER AN EXISTING ITEM NOW KNOWN AS:
XNQ-1

C. ITEM WILL REPLACE OR SUPPLEMENT THE PRESENTLY ADOPTED ITEM:

D. ESTIMATED UNIT COST IN QUANTITY PROCUREMENT IS: Unknown

4. RECOMMENDATIONS

A. ITEM TO BE CLASSIFIED AS:
Standard

B. ITEM TO REPLACE OR SUPPLEMENT:

C. RECLASSIFICATION OF THE REPLACED OR SUPPLEMENTED ITEM TO BE:

D. SPECIAL PROVISIONS (TO BE) (NOT TO BE) PROVIDED FOR THE TRAINING OF AAF PERSONNEL IN ITS OPERATIONS AND MAINTENANCE

E. USING ARMS, SERVICE TEST BOARDS AND TECHNICAL COMMITTEES CONCUR IN THE PROPOSED ACTION AS FOLLOWS:
Authority - U.S. Navy

F. ITEM HAS BEEN DEVELOPED TO MEET:
(AAF REG. 65-74) Title
☒ MILITARY CHARACTERISTICS — [illegible]
☐ DEVELOPMENT DIRECTIVE — (Number and Date)
☒ OTHER REQUIREMENTS — (Reference) T.S. No. [illegible] Date

G. ITEM DOES NOT MEET THESE REQUIREMENTS IN THE FOLLOWING RESPECT:

H. RELATED EQUIPMENT INCLUDES EXISTING ITEMS WHICH MUST BE MODIFIED AND NEW ITEMS MUST BE STANDARDIZED AND ARE:

I. ITEM IS INTENDED FOR:
☒ IMMEDIATE PROCUREMENT AND ISSUE.
☐ PROCUREMENT AND ISSUE WHEN EXISTING STOCKS OF ITEMS HAVE BEEN SUPERSEDED OR DEPLETED.
☐ FUTURE PROCUREMENT AND ISSUE IN CASE OF EXPANSION.

J. PHOTOGRAPHS ILLUSTRATING THIS ITEM ARE:

K. GIVE A RESUME OF REASONS FOR ENTRY, REMOVAL, OR CHANGE OF CLASSIFICATION AND A PERTINENT DESCRIPTION OF THE CHARACTERISTICS OR CHANGE IN CHARACTERISTICS OF THE ITEM: Two place Monoplane equipped with R-680-13 Engine, retractable gear, one piece canopy enclosure, adjst flying instruments, and range of 650 miles at 65% BHP. To train pilots from primary stage up to 130 hours, with 20 hours of instrument flying, and cross country. Will use [illegible] set, low frequency radio and Standard USAF Interphone.

25138

APPROVED:
INITIATED BY ....WILLIAM LANKIN..... PHONE [illegible]

.....D. W. CRAIG, Lt. Colonel, USAF..... [illegible], USAF.....
BRANCH CHIEF SECTION CHIEF

Type Designation..... has been assigned and an Authority for Change of Status of Equipment in accordance with AR 850-25 is being initiated.

.....
SPECIFICATIONS & STANDARDS BRANCH
ENGINEERING STANDARDS SECTION

AAF-13) [illegible] 1500

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON

18 JAN 1949

AFMEN-1C

SUBJECT: Evaluation of Basic Trainers.

TO: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

1. A decision to procure the Fairchild T-31A is being held in abeyance pending complete evaluation of all existing aircraft capable of performing the basic training mission of the Air Force.

2. It is requested that your Command canvass industry for all existing models of this type of aircraft and assemble them at Wright-Patterson Air Force Base for full evaluation by a Board consisting of members representing Air Materiel Command, Air Training Command, and this Headquarters. Composition of this Board will comply with the USAF directive regarding Mock-Up Boards, dated 29 November 1948.

3. The Board will evaluate competing aircraft against the minimum requirements of Military Characteristics for a Basic Pilotage Trainer, to be forwarded at a later date. Performance of aircraft will be thoroughly weighed against the mission, cost of operation, producibility, ease of maintenance and unit cost.

4. Air Materiel Command will be responsible for:

a. Evaluating all technical data submitted on competing aircraft prior to its submission to the Board.

b. Establishing the convening date of the Board and notifying the interested agencies.

c. Recording the minutes of the Board meetings.

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Ltr to AMC

Subject: Evaluation of Basic Trainers

d. Submitting the findings and recommendations of the Board to this Headquarters for approval.

BY COMMAND OF THE CHIEF OF STAFF:

E. M. POWERS
Major Co.. ., USAF
Acting Deputy Chief of Staff, Material

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MCPP
19 January 1949

MCPP

SUBJECT: Evaluation and Procurement of T-34 Type Trainer

TO: Chief of Staff
United States Air Force
Washington 25, D. C.

ATTENTION: DC/S, Material

1. In contemplation of conducting an evaluation of various existing aircraft suitable for primary training, the following plan for the evaluation of these airplanes is submitted for your information:

In view of the fact that the airplanes to be evaluated will be of the "off-the-shelf" type and the evaluation will involve the inspection of an existing article, use of a point system is not recommended. Instead, it is recommended that a Board consisting of representatives from Engineering and Procurement Divisions, Air Material Command; Requirements, Training Command, and possibly representatives from the Navy will make the final selection of the trainer to be procured. The selection of the airplane will be based upon Board action on comments from Engineering and Maintenance Divisions, Air Material Command, flight tests, delivery, and cost of the competing airplanes.

2. In order to conduct an evaluation in accordance with the plan cited above, the following information is required:

(a) Will the trainer be required to meet AF strength criteria in accordance with H.I.A.D. or will CAA strength criteria be acceptable?

(b) Military characteristics, including among other things:

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Ltr fr AMC to C/S, Wash., 25, D.C. dtd 1-19-49, Subj: Evaluation & Procurement of T-31 Type Trainer

(1) Performance.

(2) Minimum requirements for USAF standard equipments (communication, navigation, instruments, etc.).

(c) Will only the TEMCO and Beech trainer airplanes be evaluated or may a simplified version of the Fairchild UNQ-1 airplane and a modernized version of the North American T-6 trainer be considered for competition?

3. It cannot be overemphasized that in order to conduct this evaluation successfully, the military characteristics must be very clearly defined.

4. Upon receipt of the military characteristics of the trainer desired and additional information as requested above, immediate action will be taken to have the competing trainer aircraft inspected and evaluated at this Command.

FOR THE COMMANDING GENERAL:

H. A. SHEPARD
Brigadier General, USAF
Chief, Procurement Division

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, UNITED STATES AIR FORCE

1 February 1949

SUBJECT: Military Characteristics for Aircraft (BASIC TRAINER)

1. A requirement exists for a basic pilot trainer which can be produced in quantity without overtaxing the economy and natural resources of the United States. This aircraft will be used for the first 130 hours of flying in the pilot training program from pre-solo to graduation to the advanced trainer. This program includes soloing of the student, precision air work, acrobatics, instrument training and night flying. This aircraft must possess stability and steadiness in flight, such that precision air work and instrument flying may be accomplished, without undue buffeting in rough air. It must be emphasized that this aircraft replaces the old PT-13 and PT-14 type aircraft and must combine the capabilities of both, i.e., it must be of rugged construction and possess easy handling qualities as well as the necessary weight and speed characteristics to permit transition to the advanced single-engine, 6000 lb, 800 horsepower trainer without difficulty.

a. Class: A single-engine, moderate performance, conventionally powered land plane.

b. Mission: To serve as a basic trainer aircraft for Air Force student pilots prior to commencing training in advanced types.

c. Requirements:

(1) Performance:

(a)	High speed at tactical operating altitude	150 knots (minimum)
(b)	Average cruising speed for required endurance at tactical operating altitude	125 knots (minimum)
(c)	Endurance at cruising speed and tactical operating altitude exclusive of 30 minutes reserve	4 hours (minimum)
(d)	Tactical operating altitude	7500 ft. (minimum)
(e)	Rate of climb at sea level	900 ft per min (minimum)
(f)	Service ceiling	12,000 ft (minimum)

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Subject: Military Characteristics for Aircraft (BASIC TRAINER)

(g)	Take-off over 50 ft obstacle	1500 ft (maximum)
(h)	Landing distance over 50 ft obstacle	1250 ft (maximum)
(i)	Stalling speed at sea level in landing configuration	55 knots (maximum)

(j) Performance characteristics to be emphasized in order of priority:

1. Speed
2. Endurance
3. Rate of climb
4. Altitude

(2) Flying characteristics:
This aircraft will be capable of performing basic acrobatic maneuvers and will be inherently stable under all normal conditions of flight. It will possess adequate stall warning characteristics and normal safe recovery from stalls in all attitudes.

(3) Crew composition:
A crew of two to include instructor and student pilot.

(4) Cockpit arrangement:
Tandem cockpit is required. Cockpits, instruments, and controls will be identical except the controls for landing, navigation, and taxi lights will be in the front cockpit only.

(5) Equipment:

(a) Radio:

1. Minimum required:

a. Command set

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Subject: Military Characteristics for Aircraft (BASIC TRAINER)

b. Interphone

c. LF Range Receiver

2. It is desired that space for the radio compass be provided if practicable.

(b) Instruments - Instruments for basic instrument training and necessary engine instruments are required. Arrangements of these instruments and the lighting will comply with standard Air Force requirements. A hood or colored glass will be provided for simulated instrument flying from the rear cockpit.

(c) Emergency:

1. Emergency lowering of the landing gear will be provided. A mechanical system is preferred.

2. Emergency egress is required for both ground and air operations.

3. Crash harness and turn over structure of suitable strength will be provided.

(d) Crew comfort - An adequate relief system will be installed.

(e) Heating System -

1. Adequate ventilation for a hot day operation.

2. Adequate heating for 20°F is required.

(f) Exterior Lights -

1. One landing light (minimum)

2. Passing light

3. Taxi light

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Subject: Military Characteristics for Aircraft (BASIC TRAINER)

4. Indicator light for landing gear down and locked (one white light for each wheel visible from the ground).

5. Standard flashing navigation lights.

(g) Seats - Seats will be adjustable to accommodate all personnel who qualify for flight training.

(h) Fuel - The 30 minutes of reserve fuel will require a change in selector switch to be used.

(6) Structure and Design:

(a) Visibility - Adequate vision to allow for satisfactory flight of the trainer from either cockpit.

(b) This aircraft must be designed for maximum producibility using a minimum number of man hours in production and maximum of non-strategic materials. Simplicity of design must be emphasized.

(c) The aircraft should be designed to withstand the hard usage of inexperienced student pilots operating off hard surface, sod and unimproved auxiliary fields. Ruggedness in this type of aircraft cannot be overemphasized.

(d) The ease of maintenance, repair and replacement of parts will receive major consideration. Design and construction of the aircraft should be such that all accessories will be removable without removal of other equipment.

(e) Baggage compartment - Space for tie-down kits, minimum 1st echelon maintenance, and such other space as can be provided.

(f) Retractable tricycle or conventional landing gear will be acceptable; however, tricycle is desired. A steerable tail wheel is required if conventional gear is used.

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Subject: Military Characteristics for Aircraft (BASIC TRAINER)

(g) The weight will be consistent with efficient producibility, but will not be at the sacrifice of ruggedness, accessibility, ease of maintenance, or ability to carry necessary equipment. This aircraft must be of sufficient size to permit the accommodation of the full range of student sizes without cramping or interference of movement. Experience during the last war on great numbers of students has conclusively proved that an aircraft to fulfil the dual requirement of the PT and BT type should be in a class of approximately 3,000 to 4,000 lbs.

/s/ Carl A. Brandt

CARL A. BRANDT
Major General, USAF
Chief, Requirements Division
Directorate of Training & Requirements

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON

AF [illegible]-25 2 February 1947

SUBJECT: Military Characteristics for Basic Pilot Trainer.

TO: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

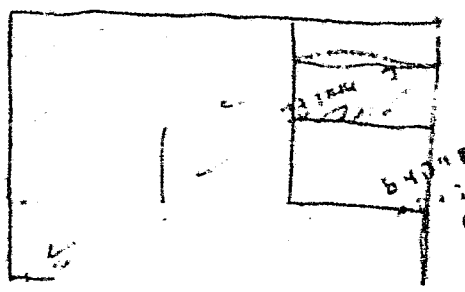
Reference: Ltr from this Hqs dtd 16 Jan 47, subj: "Evaluation of Basic Trainers".

Forwarded herewith are the military characteristics to be used in the evaluation of the Basic Pilot Trainer mentioned in referenced letter.

BY COMMAND OF THE CHIEF OF STAFF:

1 Incl
Military Characteristics for Basic Trainer

S. L. [illegible]
Brigadier General, U. S. Air Force
Director of Research & Development
Office, Deputy Chief of Staff, Materiel



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Air Material Command

MCRMT-15

MCRM/Tech(D)/mb

2 February 1949

MEMORANDUM FOR: MCPP

SUBJECT: Maintenance Division Technical Evaluation
Single Engine Basic Trainer

1. In compliance with T.I. 2331, Addendum No. 1, dated 7 February 1949, "Evaluation of Basic Trainers," the following evaluation of Beech, Fairchild and TEMCO airplanes inspected at Headquarters Air Material Command is submitted pertinent to maintenance and repair of these aircraft when operated under Air Force activities operating conditions. Emphasis is placed on quick change features, ease of servicing, daily maintenance and interchangeability. The evaluation is based on past experience with similar types of aircraft.

2. The following rating system is devised whereby a total of 100 points is allocated to the aircraft and components thereof. Each aircraft was evaluated on the basis of attainment of 100 points for compliance with the "best" maintenance practices and handbook requirements. For the purpose of deriving a rating the aircraft were divided into various components as tabulated below and points were allocated in proportion to their relative importance:

a. Ratings:

	NOMENCLATURE	TOTAL POINTS	FAIRCHILD	BEECH	TEMCO
(1)	Fuselage	10	9	7	6
(2)	Wings, flaps ailerons, slots etc.	11	9	6	10
(3)	Empennage	11	8	10	8
(4)	Alighting gear	12	10	9	11
(5)	Fuel system	4	3	3	1
(6)	Oil system	4	4	3	3

[redacted]

Hq AMC Form No. 9
(Rev 17 Nov 48)
WP-O-33 DEC 48 499.M

This form replaces Hq AMC 9 and 10-48 (28 Jun 48), Hq AMC 10-813 and 10-814, existing stocks of which will be used until exhausted.

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Memo for MCPPA66, Subj: Maint Div Tech Evaluation Single Engine Basic Trainer

e. Electrical:

(1) Battery requires AN standard venting.

f. Miscellaneous equipment:

(1) Provide canopy defrosting.

(2) Install fire extinguisher in front cockpit.

4. In the event that the Beech aircraft is procured it is requested that the following recommendations be incorporated:

a. Power plant:

(1) The present power plant accessory section plate should be removed and a plate be installed that will allow removal of individual accessory items in a minimum amount of time.

(2) Incorporate spillage cup and drain on oil tank.

(3) Install standard filler cap.

(4) Redesign oil drain system to comply with AN standards.

(5) Request study be made to redesign lower cowl to provide adequate drainage for removing waste from engine compartment during cleaning of engine.

(6) Metal to metal surface is desired between exhaust stacks and ports.

(7) Change location of fuel drain to eliminate fire hazard should fuel flow back on exhaust stacks.

(8) Install fire extinguisher door in accessory section of cowling.

b. Airplane proper:

(1) Increase clearance between elevator ball crank and inspection plate.

[redacted]

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Memo for MCPPA66, subj: Maint Div Tech Evaluation Single Engine Basic Trainer

(2) Install stronger baggage door handle.

(3) Install Dzus fasteners for inspection doors.

(4) Change location of cowl flap handle.

(5) Provide a reserve fuel selector switch.

(6) Relocate free air temperature bulb so it does not protrude through the windshield to prevent its use as a hand hold.

(7) Use standard fasteners throughout the aircraft.

(8) Include lights on gear to show "down and locked" from ground.

(9) Change the present windshield installation to provide ease of removal and replacement.

(10) Provide relief tube.

(11) Provide hood for instrument flying training.

(12) Provide sun visor.

(13) Provide external power source.

(14) Increase brake reservoir capacity 50 per cent.

(15) Revise present brake system to eliminate two separate brake reservoirs.

c. Radio:

(1) Install AN/ARC-3, interphone and BC-452. AN/ARN-7 is desirable.

d. Electrical:

(1) Redesign complete electrical system to provide 24 volt system, including battery in accessible location.

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e. Propeller and controls:

(1) Redesign propeller installation to eliminate excess time required to remove and reinstall.

(2) Recommend design change in rear engine case to provide accessibility for adjusting and replacing governor.

(3) Redesign nose cowl to provide access to pitch change motor.

(4) Provide increased support or reroute hydraulic lines to pitch change motor.

(5) Recommend metal prop.

f. Instruments:

(1) Recommend remote compass.

(2) Provide standby compass in front cockpit.

(3) Provide AN standard instruments.

g. Miscellaneous equipment:

(1) Provide heat for rear cockpit.

(2) Provide canopy defroster.

5. In the event that the TEMCO airplane is procured it is requested the following recommendations be incorporated in the airplane prior to delivery:

a. Airplane proper:

(1) Relocate battery to rear of firewall.

(2) Incorporate overflow drain at gas tank filler neck.

(3) Incorporate filler neck that will utilize standard AN cap.

[redacted]

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(4) Relocate free air temperature bulb to prevent use as hand hold.

(5) Provide steerable lockable tail wheel.

(6) Provide seat installation in accordance with Specification AN-S-49, Amendment 2.

(7) Provide protection between fairings and skin.

(8) Provide external power source.

(9) Incorporate fire extinguisher door in cowling. Fire extinguisher and first aid kit to be accessible to pilot and co-pilot.

(10) Install hydraulic system pressure gage and AN type fittings.

b. Power plant:

(1) Install AN6264 hose.

(2) Provide 30 minutes reserve fuel selector switch.

(3) Provide AN fittings, clamps, etc. in engine installation.

(4) Provide vane type fuel pump.

(5) Incorporate standard fuel selector valve.

(6) Provide increased anchorage of fuel lines.

(7) Reroute fuel line to carburetor to eliminate water trap.

(8) Relocate wobble pump to prevent interference with other controls.

(9) Incorporate new elevator and rudder tab control to provide satisfactory operation with gloves.

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(10) Utilize standard fasteners throughout airplane.

(11) Relocate oil cooler to provide better cooling conditions.

(12) Incorporate spillage cap and drain on filler of oil tank.

(13) Accessory section will require redesign to permit removal and replacement of accessories in minimum time.

(14) Provide engine control rods in place of present control system.

c. Propeller and controls:

(1) Provide better propeller controls.

(2) Recommend metal prop.

d. Instruments:

(1) Provide standard pitot tube installation.

(2) Provide standard instrument arrangement.

(3) Provide remote compass installation.

e. Radio:

(1) Install AN/ARC-3, combat interphone and BC-452. AN/ARN-7 desired.

f. Electrical:

(1) Modify complete electrical system to provide 24 volt system.

(2) Change battery location to rear of firewall.

g. Miscellaneous equipment:

(1) Provide canopy defrosting.

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Memo for MCPPA66, Subj: Maint Div Tech Evaluation Single Engine Basic Trainer

(2) Install fire extinguisher to be accessible to both pilots.

(3) Provide heat in rear cockpit.

6. In the "as is" condition the Maintenance Division considers the Fairchild aircraft the most desirable (reference overall superiority rating, paragraph 2) of the three aircraft evaluated. However, should the recommendations outlined in foregoing report be incorporated the efficiency of the Beech and TEMCO aircraft would be considered comparable to the Fairchild from a maintenance viewpoint.

8. In the event an "off-the-shelf" airplane is procured it is requested that changes found desirable during 689 Inspection be accomplished prior to delivery of the first airplane to the Air Force.

1 Incl
T. I. 2231, Add No. 1

THOMAS B. McDONALD
Brigadier General, USAF
Chief, Maintenance Division

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[redacted]

Declassify to file Standard

SUBJECT: Evaluation of Basic Trainer DATE: 3 Feb 1949 F-314

MEMO TO: Mr. Silverston

Attached is a proposed method of conducting the subject evaluation that has been, in general, concurred in by Colonel Funk. You will immediately prepare the letter inviting industry to participate in the evaluatinn. This letter should be in final form by not later than 4 February. A date of 14 February for the assembling of the aircraft at Wright Field is hereby established. In the event any contractor informs us that circumstances prevent his aircraft being available on this date at Wright Field, our plans will be modified to allow him a reasonable extension of time. It is felt that there are only 2 or 3 aircraft fallingwithin the category as outlined in Military Characteristics for the basic trainer, and we know at this time that they are ready for almost immediate fly-in.

It is to be noted that although our letter to industry will specify a desired weight of 3,000 lbs., it is not to be construed that the specification of this weight excludes any aircraft from consideration. It is also to be noted that either tricycle or conventional gear with steerable tail wheel are satisfactory.

Immediate coordination must be effected with Flight Test Division so as to insure adequate hangar space for the technical evaluation and ramp and servicing facilities.

It is suggested, further, that direct coordination be effected with Training Command, through the Training Command Liaison Office, Hq AMC.

You will immediately prepare a letter to DCS/M, through MCGO, specifying, in general details, our plans for conducting this evaluation. This letter will be specific as to the dates. You will, in this letter, leave the question as to whether the Navy should be invited to participate in this evaluation to Hq decision.

D. W. Graham

Incls
File on subj evaluation

D. W. GRAHAM
Lt. Colonel, USAF
Chief, Training, Transport,
and Special Aircraft Branch

Conf. R&R Com 1, 2 Feb
Com 2, 3 Feb in Conf R&R file
Unclass. ltr from Wg USA 7, 18 Jan 49
filed 11/16/49

Classification Canceled
(or Changed to C)
Authority: CBarclay
By
Date 16 Feb 49

[redacted]

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HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE
DAYTON, OHIO

MCPPXA66/NS/bjw
4 February 1949

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL, AIR MATERIEL COMMAND, ATTENTION FOLLOWING OFFICE SYMBOL:

MCPPXA66

SUBJECT: Technical Evaluation of a Single-Engine Basic Trainer

TO: [redacted]

1. The USAF intends to procure one hundred (100) single-engine, tandem, two-place basic trainers. Accordingly, a technical evaluation will be conducted at Headquarters, Air Materiel Command, Wright Field, Dayton, Ohio, to begin 14 February 1949.

2. This evaluation will be limited to existing aircraft requiring a minimum of modification. The contractor is requested to make available for subject evaluation an airplane which substantially meets the requirements listed below:

(a) Single-engine, tandem, two-place basic trainer.

(b) High speed - 150 Knots at 7500 ft. altitude.

(c) Service ceiling - 12,000 feet.

(d) Endurance at cruise air speed at 7500 ft., 4 hours plus 30 minutes reserve.

(e) Desired gross weight approximately 3,000 lbs.

(f) Ample space provision for ARC-3 VHF and Low Frequency Receiver.

(g) Landing Gear - tricycle gear preferred. Conventional gear with steerable tail wheel acceptable.

3. Limited flight tests and technical inspections requiring partial disassembly will be conducted at this Headquarters. If the contractor intends to ~~participate in subject~~ [illegible] Submit Engine Report Chapter IV Vol I Tech Data Handbook by 1st March

79-A

Hq AMC Form No. 9 (30 Jun 48)

This form replaces Hq AMC 19-4A (30 Jun 48), Hq AMC 19-4B and 19-4C, existing stocks of which will be used until exhausted.

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Ltr fr Hq., AMC dtd 2-4-49, Subj: Technical Evaluation of a Single-engine Basic Trainer

evaluation, it is requested that this Headquarters be notified immediately, Attention: [illegible], Telephone Fairmore 7111, Extension 30117.

4. The contractor shall furnish this Headquarters with Fixed Price cost proposals based on the procurement of one hundred (100) trainers to be delivered in accordance with the following schedule:

1 in March 1950
3 in April 1950
5 in May 1950
7 in June 1950
10 in July 1950
15 in August 1950
20 in September 1950
22 in October 1950
17 in November 1950

5. Further information shall be provided by the contractor insofar as:

(a) Suitability of design for production.

(b) Facilities and tooling required.

(c) Production breakdown contemplated.

(d) Strategic and non-strategic materials to be used.

(e) Ease of maintenance and service.

(f) Extent of interchangeability.

(g) Amount of subcontracting contemplated.

(h) Mobilization peak rate utilizing existing facilities.

(i) Financial data.

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Ltr fr Hq., AMC dtd 2-4-49, Subj: Technical Evaluation of a Single-Engine Basic Trainer

6. Contractor will furnish ample copies of the model specification for use during the evaluation as well as capable technical personnel to aid AMC personnel during the evaluation.

FOR THE COMMANDING GENERAL:

BEN I. FUNK
Colonel, USAF
Chief, Aircraft & Missiles Section
Procurement Division

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C O P Y

R 18 2-1-49

This document contains information affecting the national defense of the United States within the meaning of the Espionage Act, 50 U.S.C. 31 and 32, as amended. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

T-31

to be released

ATTACHED LETTER WRITTEN TO THE FOLLOWING COMPANIES:

Aeronca Aircraft Corporation, Middletown, Ohio
Beech Aircraft Corporation, Wichita 1, Kansas
Bell Aircraft Corporation, Niagara Frontier Division, Buffalo, N. Y.
Bellanca Aircraft Corporation, Bellanca Airport, New Castle, Delaware
Boeing Airplane Company, Wichita Division, Wichita 1, Kansas
Cessna Aircraft Company, Wichita, Kansas
Chance-Vought Division of United Aircraft Corporation, Stratford, Conn.
Chase Aircraft Company, P.O. Box 1476, Trenton, New Jersey
Consolidated Vultee Aircraft Corporation, San Diego 12, California
Curtiss-Wright Corporation, Airplane Plant, Columbus 16, Ohio
Douglas Aircraft Corporation, Santa Monica, California
Fairchild Engine & Airplane Corporation, Fairchild Aircraft Division, Hagerstown, Maryland
Flastwings, Division of Kaiser Cargo, Inc., Bristol, Pennsylvania
Mr. Harlan D. Fowler, 1067 N. Beverly Blvd., Whittier, California
Fletcher Aviation Corporation, 190 W. Colorado St., Pasadena, California
Grumman Aircraft Engineering Corporation, Bethpage, L. I., N.Y.
Hughes Aircraft Company, Culver City, California
Lockheed Aircraft Corporation, Burbank, California
Luscombe Airplane Corporation, Trenton 7, New Jersey
Glenn L. Martin Company, Baltimore 3, Maryland
McDonnell Aircraft Corporation, St. Louis 1, Missouri
North American Aviation, Inc., Inglewood, California
Northrop Aircraft, Inc., Northrop Field, Hawthorne, California
Piper Aircraft Company, Lock Haven, Pennsylvania
Republic Aviation Corporation, Farmingdale, L. I., N. Y.
Ryan Aeronautical Company, San Diego 12, California
Spartan Aircraft Company, Tulsa 15, Oklahoma
Taylorcraft Aviation Corporation, Litchfield, Ohio
Frontier Aircraft Corporation, 775 Ellicott Bldg., Buffalo 3, N. Y.
Goodyear Aircraft Corporation, Akron 15, Ohio
Interstate Engineering Corporation, 2450 E. Imperial Hwy., El Segundo, California
Fairchild Personnel Division of Fairchild Engine & Airplane Corporation, Winfield, Kansas
Aero Flight Aviation, Inc., Long Beach, California
Texas Engineering & Manufacturing Co., Inc., Dallas, Texas
Aircraft Industries Association, 15th & "M" Streets, N.W., Washington 5, D. C.
Boeing Airplane Company, Seattle 14, Washington

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TSCAD Form No. 6 (4 APR 47)

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MCGOXT/5-4102
Wright-Patterson
Air Force Base
Dayton, Ohio
7 February 1949

HEADQUARTERS
AIR MATERIEL COMMAND

TECHNICAL INSTRUCTIONS

SERIAL NO: TI 2231, Addendum No. 1

SUBJECT: Evaluation of Basic Trainers

TO: Directorate, Research and Development
Directorate, Procurement and Industrial Planning
Directorate, Supply and Maintenance

1. Problem Presented:

a. A decision has been made by Hq USAF to hold in abeyance all action to procure Fairchild T-31A pending a complete evaluation of all existing aircraft capable of performing basic training mission.

b. This command has been directed to accomplish the following:

(1) Canvass the aircraft industry for all existing model aircraft which will meet the minimum requirements of a basic pilotage trainer and assemble these aircraft at Wright-Patterson Air Force Base for evaluation.

(2) Evaluate all technical data and information which is submitted on these aircraft comparing performance characteristics, ease of maintenance, producibility, etc. The evaluation of the data submitted will be accomplished prior to the meeting of the Evaluation Board.

2. Factual Data:

a. The Evaluation Board is established in accordance with USAF Directive which was forwarded to this command regarding mock-up boards dated 28 Nov 47. This board will be responsible for reviewing all existing models of this type aircraft which will be assembled at the Wright-Patterson AFB and will be responsible that aircraft will be weighed against the mission, cost of operation, producibility, ease of maintenance, and unit cost.

b. The Board will consist of the following voting members:

1 member - [redacted], Hq USAF
1 member - [redacted], Hq USAF
1 member - [redacted], Tactical Using Agency
1 member - Hq AMC

The member from [redacted] will act as Chairman of the Board.

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TI 2231-1. Subj: Evaluation of Basic Trainers.

d. General Dynamics has been designated as the Navy representative for A-3 on all mock-up boards for trainer, [illegible] and miscellaneous type aircraft. For the purpose [illegible] will be the voting member for A-3.

e. Military characteristics which will [illegible] for the basic pilot training trainer will be [illegible].

f. The A-3 will be responsible for:

(1) Evaluation, all technical data and [illegible] aircraft prior to the [illegible].

(2) Establishing the priority for [illegible] and [illegible].

(3) Participating [illegible].

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TI-2231-1, subj: "Evaluation of Basic Trainers"

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ASC-251-D (12-19-47)

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PRIORITY	
ROUTINE	
MULTIPLE ADDRESS	

TELETYPE MESSAGE

AIR SERVICE COMMAND TELETYPE NETWORK

MCPPIA66/MB/bjw

FROM: AMC DATE: 7 Feb 49

TO: CHIEF OF STAFF
UNITED STATES AIR FORCE
WASHINGTON 25, D. C.
ATTENTION: DC/S, MATERIEL

MEN I. FUNK
Colonel, USAF
Chief, Aircraft & Missiles Section
Procurement Division
NAME, RANK AND TITLE OF AUTHENTICATING OFFICER

MCPPIA66-2-13 ... IN COMPLIANCE WITH AFMSN-1C, SUBJECT: EVALUATION OF BASIC TRAINERS DATED 15 JANUARY 1949, ACTION HAS BEEN TAKEN TO INVITE AIRCRAFT INDUSTRY TO SUBMIT EXISTING AIRCRAFT OF A SINGLE-ENGINE, TANDEM, TWO-PLACE BASIC TRAINER TYPE REQUIRING A MINIMUM OF MODIFICATION. A TECHNICAL EVALUATION OF TRAINERS SUBMITTED WILL BE HELD AT HQ., AMC, WRIGHT FIELD 14 FEBRUARY 1949. EVALUATION WILL BE ACCOMPLISHED BY A COMMITTEE CONSISTING OF AMC PERSONNEL AND SUCH OBSERVER PERSONNEL FROM HQ., USAF AND TRAINING COMMAND THAT MAY WISH TO ATTEND. THIS COMMITTEE WILL EVALUATE ALL TECHNICAL DATA AND PREPARE A REPORT OF THE EVALUATION BASED ON COMMENTS OF THE VARIOUS LABORATORIES AND PERFORMANCE FLIGHT TESTS. THE EVALUATION BOARD AS SET FORTH IN REFERENCED LETTER WILL BE INFORMED OF EXACT CONVENING DATE FOR THIS COMMITTEE AT HQ., AMC AS SOON AS POSSIBLE AFTER THE TECHNICAL EVALUATION IS COMPLETED. MORE COMPLETE DETAILS OF SUBJECT EVALUATION WILL FOLLOW. NAVY REPRESENTATION AT SUBJECT EVALUATION WILL BE LEFT TO THE DISCRETION OF HQ., USAF. AIRCRAFT PROCUREMENT DIVISION.

see letter dated 2-4-49

452.1 — Training

FEB 12 12:12

COORDINATION	C. G. OR C. O.	CONTROL OFFICE	MAINTENANCE	P & T	SUPPLY	BUDGET & FISCAL	OTHERS
							N. Stewart
							Wainwright

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Beech

Branch File

T-31 Trainer Airplane Evaluation

MCMF MCPPXA66 7 Feb 49 1

1. Confirming telephone conversations, 4 Feb 49 and 7 Feb 49, between Lt. Col. E. Burhmann, MCPPXA66; and Lt. Col. Horner, MCMFT; Mr. Sibilsky, MCMFT; and Mr. Meech, MCMFIC, the following information is submitted.

2. Commencing 14 Feb 49, and for a period of approximately two weeks, a technical evaluation of several basic trainer type commercial airplanes will be held at Wright Field, in compliance with Letter Hq USAF, DCS/M, AFMSM-1C, 15 Jan 49. Three to five airplanes are expected to be present for this evaluation, and will be required to meet the following characteristics, among others.

a. Single engine, two-place tandem basic trainer suitable for instrument training and night flying.

b. Gross weight approximately 3,000 lbs.

c. Landing gear - tricycle or conventional with steerable tail wheel.

d. High speed - 150 knots at 7,500 feet altitude.

e. Initial rate of climb - 900 ft/min.

f. Stall speed in landing configuration - 55 knots.

3. As a part of the technical evaluation, it is desired that Flight Test Division conduct a very limited flight test program. Several Flight Test Division pilots will fly each of the airplanes, and judge the airplanes not as basic trainers, but solely on their general flying characteristics. Prior to the date of the evaluation, it is requested that there be drawn up a pilot's check list which will satisfy the above flight test considerations and be adaptable to a flight of approximately twenty (20) minutes. It is desired that a copy of this proposed check list be forwarded to this office for coordination.

4. Upon completion of the flight test portion of the evaluation program, it is desired that a consolidated report, based upon all Flight Test Division pilots' comments be forwarded to this office, to become a part of the technical evaluation which will be submitted to a Board of Officers consisting of members from Hq USAF, Hq Training Command, and Hq AMC.

5. Another phase of the evaluation will be a technical inspection of the participating aircraft by representatives of the Engineering Division, Maintenance Division, and Supply Division, Hq AMC. For this purpose it is requested that hangar space be made available for as many as five of the subject airplanes for the two weeks period, beginning 14 Feb 49.

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Subject: T-31 Trainer Airplane Evaluation

6. Supply of fuel and oil, on a cash basis, is being arranged with TSWLU, Mr. M. F. Crutcher.

7. Further inquiries and coordination on all the above should be directed to Lt. Col. E. Burhanna, MCPPKA66, Ext. 28138.

ERN I. FUNK
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

EF/mfb
28138

CC:
MCEPT - Lt. Col. R. E. Horner
MCEPXC - Mr. W. W. Meech

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HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE
DAYTON, OHIO

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE TO COMMANDING GENERAL, AIR MATERIEL COMMAND, ATTENTION FOLLOWING OFFICE SYMBOL:

MCPPXA66

MCPPXA66/HS/bjw
8 February 1949

SUBJECT: Liabilities - Technical Evaluation of a Single-Engine Basic Trainer

TO: Fairchild Aircraft Division of
Fairchild Engine and Airplane Corporation
Hagerstown, Maryland

THROUGH: AF Plant Representative

1. Contractor is informed that the invitation to submit an aircraft per AMC letter MCPPXA66/HS/bjw dated 4 February 1949, Subject: Technical Evaluation of a Single-Engine Basic Trainer is conditioned upon the following AMC policy:

(a) The article must be submitted at no cost to the Government, either from the standpoint of manufacture or transportation to and from the point of examination and/or test;

(b) The Command will assume no responsibility for loss or destruction of or any damage to the article while in its possession;

(c) The examination and/or testing of the article shall in no way obligate the Government to procure either experimental or production quantities of the article;

(d) A report giving the results of the evaluation of the respective airplane submitted shall be furnished upon request to the party submitting the article. This report shall not be construed as an indorsement of the article by the Government nor shall it be used in whole or in part for advertising purposes;

(e) The Government is exempt from liability arising from confidential disclosures and inclusive of intervening rights where the submitted devices do not bear notice of patent or patent pending;

(f) The Government retains the right to secure patent protection for inventions, discoveries, or improvements in the submitted devices made by Government employed personnel in examining, evaluating, or testing the devices and appearing as a part of the report thereupon.

No. AMC Form No. 9 (30 Jun 48)

This form replaces Hq AMC 19-4A (30 Jun 48), Hq AMC 19-513 and 19-514, existing stocks of which will be used until exhausted.

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Ltr fr HQ., AMC dtd 2-8-49, subj: Liabilities - Technical Evaluation of a Single-Engine Basic Trainer

2. Concurrence in the above terms and conditions is requested prior to the submission of the airplane for evaluation and/or test.

FOR THE COMMANDING GENERAL:

Jate Silverston

BEN I. FUNK
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

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Texas Engineering and Manufacturing Company, Inc.
Post Office Box 6191
DALLAS 2, TEXAS

February 11, 1949

SUBJECT: Technical Evaluation of a Single-Engine Basic Trainer

TO: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

ATTENTION: MCPPIA66

REFERENCE: MCPPIA66/NS/bjw, 4 February 1949

1. Contractor acknowledges receipt of reference letter and will submit for technical evaluation at Headquarters, Air Materiel Command, by 14 February, 1949, Contractor's Single Engine Basic Trainer, Model TE-1A.

2. Fixed Price: Contractor proposes to furnish 100 Single Engine Basic Trainers designated as Model TE-1A of Texas Engineering and Manufacturing Company, Inc., at the fixed price of $9,285.00 each, fully equipped per Specification M-202.

3. Delivery: Delivery can be made in accordance with schedule listed in Paragraph 4 of reference letter, as follows:

1 in March 1950
3 in April 1950
5 in May 1950
7 in June 1950
10 in July 1950
15 in August 1950
20 in September 1950
22 in October 1950
17 in November 1950

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ATTACHMENT ☐ TRANSMITTAL ☐

Design, development, engineering and tooling of the aircraft covered by this proposal are complete to the extent that the following schedule can be met:

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1 in June 1949
5 in July 1949
15 in August 1949
25 in September 1949
25 in October 1949
29 in November 1949

4. Suitability of Design for Production: Design of the aircraft has been fully coordinated with up-to-date aircraft production methods. All parts and assemblies have been production tested to assure complete suitability of design for quantity production, including machine forming and finishing of detail parts, automatic riveting and conveyor line assembly.

5. Facilities and Tooling Required: Existing plant area, machinery and equipment are entirely adequate for efficient and economical production of the aircraft in quantities to meet schedule requirements. Detail tooling and assembly tooling are complete, proven and ready for use to an extent in excess of 80% of the tools required for full production operations.

6. Production Breakdown Contemplated: The attached exploded view of the aircraft shows the breakdown of assemblies to which production tooling has been designed and built. Tool planning and production planning of the aircraft are substantially complete covering all manufacturing operations of detail parts manufacturing, processing, sub-assembly, major assembly and final assembly. The breakdown shown in the exploded view has been developed with full consideration of efficient quantity production and economical replacement of those parts and assemblies recognized as subject to damage and replacement during the life of the aircraft.

7. Strategic and Non-Strategic Materials to be Used: The aircraft is of all metal construction and is presently designed for the use of aluminum sheet, aluminum castings, extrusions and forgings, with limited use of magnesium, steel and plastics. Many parts are readily convertible to magnesium and plastic materials. Contractor is interested and desirous of undertaking a program for the design and production of the aircraft using maximum amounts of magnesium and plastic parts in anticipation of presently used materials becoming short in supply.

8. Ease of Maintenance and Service: Accessibility, replacement of parts and assemblies and those factors generally accepted as necessary for

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efficient and economical maintenance and service have been fully incorporated in the design of the aircraft. Field tests have been conducted to prove the soundness of design and assembly in this important phase of aircraft operations. Ready accessibility for inspection checks covering engine, landing gear, control surfaces, rigging, flight instruments, radio and flight control mechanisms have been proved in field tests. Speedy replacement of parts, subassemblies and assemblies that are normally subject to wear and damage has been assured by a carefully planned production breakdown and has been proved in extensive field tests.

9. Extent of Interchangeability: Tooling of the aircraft has been designed to effect interchangeability of all parts and assemblies normally considered replaceable. Master tooling is complete for these assemblies, including cowling, outer wing panels, wing slats, wing tips, tail surfaces, control surfaces, canopy, control stick assembly, control shelf, landing gear, and tail wheel, to assure interchangeability for Field installation.

10. Amount of Subcontracting Contemplated: The outside purchase of equipment items, including engines, propellers, instruments, landing gear, and electrical and hydraulic accessories for which sources of supply have been established, is contemplated for this procurement. Castings, forgings and extrusions will be purchased and dies for these items are complete. No subcontracting is contemplated of detail parts, sub-assemblies and assemblies for the quantity covered by this procurement, since adequate capacity is available at Contractor's facility to accomplish the manufacture of these items without any interference with operations currently in process.

11. Mobilization Peak Rate Utilizing Existing Facilities: Existing facilities of machinery, equipment and operating area are sufficient to support a production rate of 15 aircraft per day. Production area exists that will permit an increase to a peak rate in excess of 30 aircraft per day with some increase in machinery and equipment and full utilization of subcontract facilities available in this vicinity. Tooling presently complete and Contractor's tooling production facilities assure rapid availability of the additional detail, sub-assembly and assembly tooling that would be required to support an increasing production schedule to 30 or more aircraft per day.

12. Financial Data: Contractor's audited report for December 31, 1947, is attached with letter setting forth information with respect to operations for the year 1948. Final audited statement for 1948 is not yet available.

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February 11, 1949

13. Model Specification M-202 covering aircraft TE-1A, Single Engine Basic Trainer is attached and sufficient additional copies will be furnished for use during the evaluation.

TEXAS ENGINEERING &
MANUFACTURING COMPANY, INC.

Robert McCulloch
President

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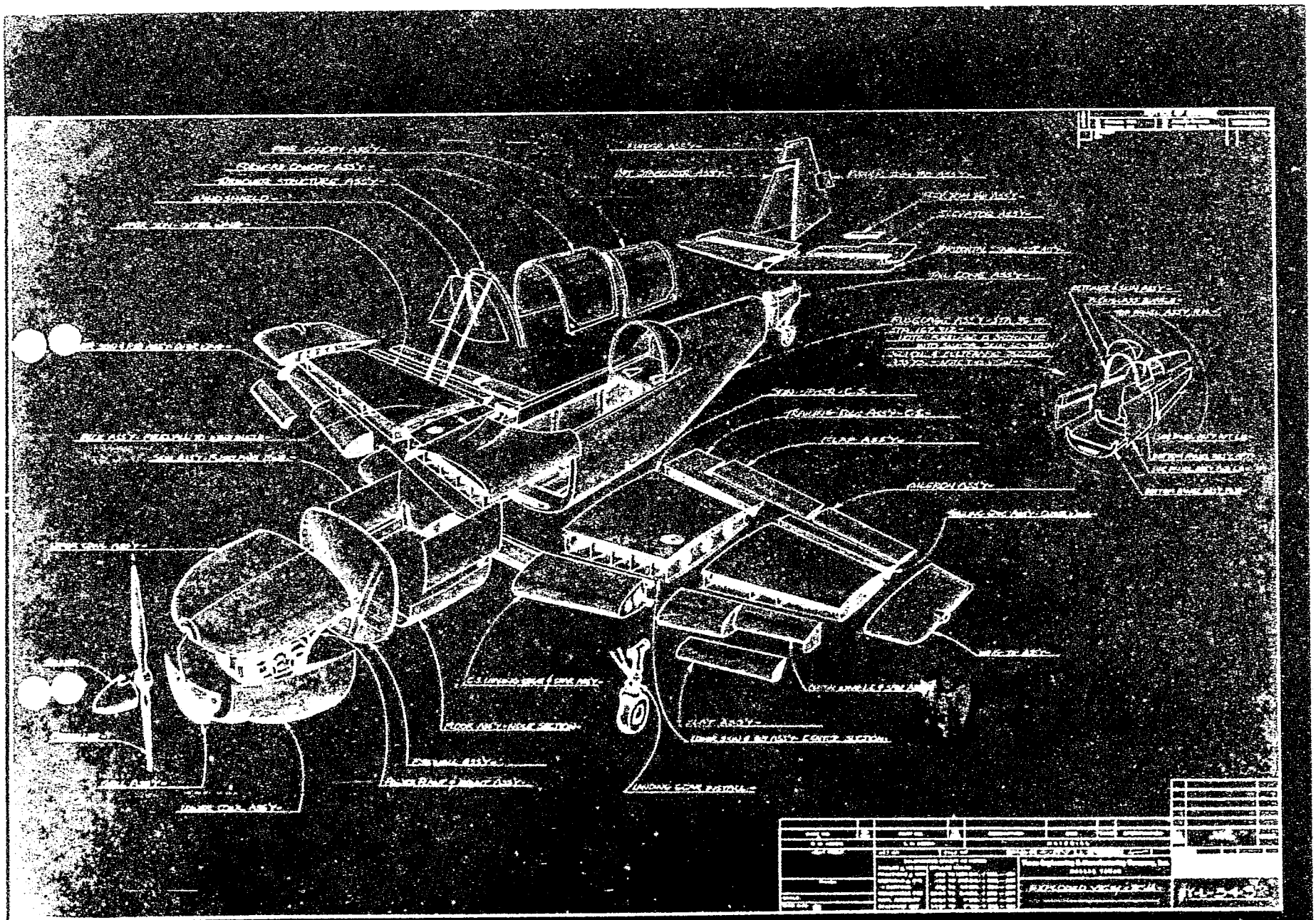

BAILEE: [illegible]

[illegible]

1. It has been determined that the national defense will be furthered by the extend Bailment Instruction as follows:

Paragraph 2, PURPOSE OF BAILMENT, is changed to read as follows:

"The Bailee is hereby authorized to [illegible] craft, Bu/Aer Serial No. 7572 [illegible] for technical evaluation of [illegible] 1949 to 15 March 1949, inclusive. [illegible] USAF and AMC flying one day's operation per month [illegible] craft shall be submitted at no cost [illegible] the standpoint of manufacture or [illegible] point of examination and/or test [illegible] ing of the aircraft shall in no way [illegible] procure either experimental or production [illegible] Upon completion of the authorized [illegible] returned by the Bailee to Avengo [illegible]

2. Except as hereby modified, either expressly or by necessary implication, all covenants and conditions of subject Bailment Instruction shall continue in full force and

AUTHORIZED BY:

Classification: Unclassified

Fairchild Aircraft DIVISION OF FAIRCHILD ENGINE AND AIRPLANE CORPORATION
HAGERSTOWN, MARYLAND

12 February 1949

SUBJECT: Proposal for T-31 Basic Trainer Airplane

TO: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

ATTENTION: MCPPXA-66

REFERENCE: AMC Letter MCPPXA66/NS/bjw, dated 4 February 1949

1. Pursuant to the request contained in the referenced letter, the Contractor is pleased to submit the following proposal for the procurement of one hundred (100) Model T-31 airplanes:

a. One Hundred (100) Model T-31 airplanes designed and manufactured in accordance with Fairchild Specification R129-000, dated 8 February 1949, (plus changes recommended by Procurement Inspection Committee) all at a unit price of $39,522.00

TOTAL ...$3,952,200.00

2. The delivery schedule for the T-31 airplanes, in accordance with the request set forth in Paragraph 4 of the referenced letter, and predicated on receipt of contractual coverage by 15 March 1949, is as follows:

QUANTITY	MONTH
1	March, 1950
3 Additional	April, 1950
5 "	May, 1950
7 "	June, 1950
10 "	July, 1950
15 "	August, 1950
20 "	September, 1950
22 "	October, 1950
17 Remaining	November, 1950

3. Both the price and delivery schedule noted above are contingent upon the following:

a. All items listed in Contractor's Model Specification R129-000, dated 8 February 1949, as Government Furnished Property, shall be furnished to the Contractor, without charge, by the Government.

b. No liquidated damages are to be included in the contract for failure to deliver on specified dates.

FAIRCHILD AIRCRAFT

SUBJECT: Proposal for T-31 - 2 - 12 February 1949

c. The price quoted does not include the costs of any bonds or premiums on insurance risks assumed by the Government.

d. The price quoted does not include any provision for flight or ground risk insurance.

e. There shall be included a provision for partial payments in the amount of seventy-five per cent (75%) of incurred costs.

f. There shall be included in any contract issued pursuant to this quotation a provision for redetermination of price, substantially in accordance with Paragraph 4-305.5 of Section 4 of the Joint Procurement Regulations.

g. The Contractor will be required to accomplish only Phase I flight testing, which is herein defined to mean the following: Phase I flight testing will consist of initial and acceptance flight tests by the Contractor to show the airplane to be air-worthy and suitable from the standpoint of safety for delivery to the Air Force.

h. The price quoted does not include the furnishing of any mock-ups or the furnishing or testing of any wind-tunnel or other models.

i. All drawings, engineering data and reports heretofore prepared for the Model XNQ-1 airplanes and which are applicable for use on the Model T-31 airplane will not be redrawn or modified to comply with current Air Force specifications.

j. The Contractor shall be entitled to occupy and use the facilities supplied to it under the provisions of Special Facilities Contract W33-038 ac-557 and Emergency Plant Facilities Contract W 535 ac-17015 under the currently existing terms and conditions.

4. Attached to this letter are the Financial Statements of this Corporation as of November 30, 1948. All other data and information requested by the Air Materiel Command are submitted separately as "Proposal Data For T-31 Trainers".

Very truly yours,
FAIRCHILD AIRCRAFT
Division of
FAIRCHILD ENGINE AND AIRPLANE CORPORATION

AFF:mw

A. F. Flood, Division Comptroller

FAIRCHILD ENGINE AND AIRPLANE CORPORATION

(a Maryland corporation)

AND ITS SUBSIDIARY COMPANIES

CONSOLIDATED BALANCE SHEET

at November 30, 1948

ASSETS

Current Assets:		
Cash		$ 3,646,691.06
United States Government obligations at cost		7,494,850.93
Accounts receivable:		
United States Government	$1,407,620.19	
Other	316,550.57	1,724,170.76
Unreimbursed costs and fees on cost reimbursed and cost-plus-fixed-fee contracts with the United States Government		691,302.52
Inventories of raw materials, work in process, finished products, and supplies at the lower of cost or market, including $7,953,364.79, title to which is vested in the United States Government to secure partial payments received	8,607,229.18	
Less, Partial payments	4,770,224.48	3,837,004.70
Prepaid expenses, etc.		205,828.91
Total Current Assets		17,599,848.88
Fixed Assets, at cost (Note 1):		
Land	41,542.68	
Building and improvements	812,097.26	
Machinery, tools and equipment	1,204,751.38	
Improvements to leased property	276,050.50	
	2,334,441.82	
Less, Reserves for depreciation and amortization	1,688,748.46	645,693.36
		$18,245,542.24

Current Liabilities
Accounts Payable
Dividend Payable
December 27, 19
Accrued wages, se
Provision for tax
taxes .....
Provision for fed

Deferred income ...

Reserve for Contin
Reserve for Self-I

Preferred Stock:
Authorized 60,00
none issued an

Common Stock:
Authorized 3,500,
$1.00 per shar
cluding 125,00
cers and emplo
Issued and outst
Paid-in Surplus
Earned Surplus ..

See accompanying notes to financial statements.

FAIRCHILD ENGINE AND AIRPLANE CORPORATION

(a Maryland corporation)

AND ITS SUBSIDIARY COMPANIES

CONSOLIDATED BALANCE SHEET

at November 30, 1948

$ 3,646,691.06			
7,494,850.93			
37,620.19			
16,550.57	1,724,170.76		
	691,302.52		
37,229.18			
70,224.48	3,837,004.70		
	205,828.91		
	17,599,848.88		
1,542.68			
2,097.26			
4,751.38			
6,050.50			
4,441.82			
38,748.46	645,693.36		
	$18,245,542.24		

LIABILITIES

Current Liabilities:			
Accounts Payable			$ 966,509.80
Dividend Payable on Common Stock - December 27, 1948			461,763.40
Accrued wages, salaries, and other liabilities			1,102,624.96
Provision for taxes, other than federal income taxes			331,588.44
Provision for federal income taxes (Note 2)			521,276.39
Total Current Liabilities			3,383,760.99
Deferred Income			63,738.49
Reserve for Contingencies (Note 3)			684,379.03
Reserve for Self-Insurance			31,625.68

CAPITAL

Preferred Stock:			
Authorized 60,002 shares without par value, none issued and outstanding			
Common Stock:			
Authorized 3,500,000 shares of a par value of $1.00 per share (126,390 shares reserved, including 125,000 shares for issuance to officers and employees)			
Issued and outstanding 2,308,817 shares		$6,226,334.38	
Paid-in Surplus		332,243.10	
Earned Surplus		7,523,460.57	14,082,038.05
			$18,245,542.24

See accompanying notes to financial statements.

FAIRCHILD ENGINE AND AIRPLANE CORPORATION

AND ITS SUBSIDIARY COMPANIES

CONSOLIDATED STATEMENT OF INCOME
for the eleven months ended November 30, 1948

Sales of Airplanes, Engines, and Parts, and Other Products		$28,133,773.30
License Fees and Royalties		17,473.16
Other Income (including discount on purchases of $30,067.02 and interest earned of $52,016.01 net)		209,745.97
		28,360,992.43
Deduct:		
Cost of Sales	$25,064,238.87	
Depreciation, including amortization of leasehold improvements	146,531.23	
Engineering and development costs and expenses not directly recoverable..	200,721.64	
General, administrative, sales and service expenses	2,169,887.80	
Other costs and expenses	102,003.20	
Provision for federal income taxes ..	191,139.87	
Provision for Contingencies	184,379.03	28,058,901.64
Net income for the eleven months ended November 30, 1948		$ 302,090.79

See accompanying notes to financial statements.

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FAIRCHILD ENGINE AND AIRPLANE CORPORATION

AND ITS SUBSIDIARY COMPANIES

CONSOLIDATED STATEMENTS OF EARNED AND PAID-IN SURPLUS

for the eleven months ended November 30, 1948

EARNED SURPLUS

Balance, December 31, 1947	$7,683,133.18
Add,	
Net income - Eleven months ended November 30, 1948	302,090.79
	$7,985,223.97
Deduct,	
Dividend declared payable on December 27, 1948 at twenty cents per share on 2,308,817 shares of Common Stock	461,763.40
Balance, November 30, 1948	$7,523,460.57

PAID-IN SURPLUS

Balance, December 31, 1947	$ 323,078.10
Add,	
Amount received from sale of 6,110 shares of Common Stock in excess of $1.00 par value per share	9,165.00
Balance, November 30, 1948	$ 332,243.10

See accompanying notes to financial statements.

FAIRCHILD ENGINE AND AIRPLANE CORPORATION

AND ITS SUBSIDIARY COMPANIES

NOTES TO FINANCIAL STATEMENTS

for the eleven months ended November 30, 1948

1. The Corporation conducts most of its operations in and with government owned facilities which are, in certain cases, integrated with facilities owned by the Corporation. Such government owned facilities, wholly or partly in use by the Corporation at November 30, 1948, had an aggregate original cost of approximately $16,350,000. The Corporation has entered into negotiations for the purchase of certain of these facilities.

2. Federal income and excess profits tax returns for years prior to 1944 have been examined by the Bureau of Internal Revenue and adjustments of taxes resulting therefrom, except for relatively minor amounts, have been settled.

3. During 1947 a Reserve for Contingencies amounting to $500,000 was provided by a charge to earned surplus, as protection against possible liability which may result from certain claims to which the Corporation is subject, possible cost disallowances and other contingencies. In addition $184,379.03 was provided during 1948 by a charge to profit and loss subject to action by the Board of Directors at the year end.

4. In certain transactions, costs and expenses must be estimated and are therefore subject to later correction.

5. The accompanying statements are subject to year end audit and adjustments.

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TO COMGENAMC WRIGHT-PATTERSON AFB DAYTON OHIO

AF GRNC

FROM AFMEN 6998

EVALUATION OF TECHNICAL DATA AND PERFORMANCE FIGURES SUBMITTED ON BASIC TRAINERS CAN BEST BE ACCOMPLISHED BY AGENCIES WITHIN AIR MATERIEL COMMAND PD NO OBSERVERS WILL BE INVITED TO PARTICIPATE IN THE QUOTED INITIAL PHASE WHERE DATA IS BEING ASSEMBLED FOR USE BY THE BOARD PD AIRCRAFT COMPETING WILL BE MADE AVAILABLE FOR FLIGHT BY THE BOARD OR THEIR CHOSEN REPRESENTATIVES CMA DURING THE FORMAL EVALUATION PD A FIRM DATE FOR CONVENING THE EVALUATION BOARD IS REQUESTED AS SOON AS POSSIBLE PD

CGN 6998

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RECEIVED AIR MATERIEL LABORATORY EQUIPMENT FEB 16 1949 PM

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ASC-251-D
(12-1-48)

A.G.P.	
PRIORITY	
ROUTINE	
MULTIPLE ADDRESS	

TELETYPE MESSAGE

AIR SERVICE COMMAND TELETYPE NETWORK

FROM: [redacted] DATE: 15 [redacted] 1949

NAME, RANK AND TITLE OF AUTHENTICATING OFFICER

TO: CHIEF OF STAFF
USAF
WASHINGTON 25, D. C.
ATTENTION: DC/S, MATERIEL

INFO: CHIEF OF STAFF
USAF
WASHINGTON 25, D. C.
ATTENTION: DC/S, OPERATIONS

AIR MATERIEL COMMAND
WRIGHT-PATTERSON
MIDDLETOWN AIR DEPOT
[redacted]

[redacted]

[redacted] ... IN COMPLIANCE WITH AFMSR-80, SUBJECT: EVALUATION OF RADIO STATIONS DATED 14 JANUARY 1949 .... TECHNICAL EVALUATION ON ARC TRANSMITTER [redacted] DATED 7 FEBRUARY 1949 [illegible] SHALL BE COMPLETED THIS WEEK. IN ACCORDANCE WITH T.I. 3830, AMENDMENT NO. 1, A COMPREHENSIVE REPORT OF TECHNICAL EVALUATION WILL BE AVAILABLE FOR MEETING OF EVALUATION BOARD TO BE HELD AT THIS HEADQUARTERS, [illegible], 23 FEBRUARY 1949. SIGNED ENCIPHERMENT DIVISION.

COORDINATION

C. G. OR C. O.	CONTROL OFFICE	MAINTENANCE	P & T	SUPPLY	BUDGET & FISCAL	OTHERS

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Technical Evaluation T-31 Basic Trainers - Producibility

MCFTIP MCPPIA66 15 Feb 49 1

Attention: Mr. Harbison

1. It is requested that necessary action be taken for the evaluation and preparation of data comparing:

(a) Suitability of design and production

(b) Facilities and tooling required

(c) Production breakdown contemplated

(d) Strategic and non-strategic materials to be used

(e) Extent of interchangeability

of the following trainers located in Hangar 4, G.E. & M., Wright Field:

TEMCO Trainer - Texas Engineering & Mfg. Co., Dallas, Texas
TE-1A

Beechcraft Trainer - Beech Aircraft Corporation, Wichita, Kansas
Bonanza (Mod.)

XNQ - Fairchild Aircraft Div., Fairchild Engine & Airplane Corp.,
M-92D Hagerstown, Maryland

Streak - 165 - Aero-Flight Aircraft Corporation, Long Beach, California

2. It is contemplated that the airplanes will be procured in the quantities in accordance with Finmster Plan No. 5.

3. The above information is requested by the afternoon of 16 February 1949 at which time all comments from the various Labs and Divisions involved will be received. Expedite action on the information requested is necessary in order to have available a consolidated report by 21 February 1949 for use by the Evaluation Board.

KEN I. FUNK
Colonel, USAF
Chief, Aircraft & Missiles Section
Procurement Division

RS:bjw
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HqAMC Form No. 80-507
(Rev 20 Aug 46)

TITLE SHEET

HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT FIELD, DAYTON, OHIO
ENGINEERING DIVISION -
MEMORANDUM REPORT ON

No. of Pages - 4

EKG:mfs

Date 15 February 1949

SUBJECT: Technical Evaluation of Single Engine Basic Trainer Airplane Propeller Installations

OFFICE Propeller Laboratory

Contract or Order No.

SERIAL No. MCREXB-720-2-1

Expenditure Order No. 720-45

A. PURPOSE:

1. To evaluate propeller installations of aircraft submitted for consideration as basic trainer airplanes.

B. FACTUAL DATA:

2. This evaluation was conducted at the request of the Procurement Division Aircraft and Missiles Section, on 14 and 15 February 1949, of airplanes submitted by industry for consideration in satisfaction of the requirements for single engine basic trainer. Technical Instruction No. 2231, Addendum No. 1, applies to this evaluation.

3. The following personnel of Propeller Laboratory examined the airplanes located at Hangar No. 4, Wright-Patterson Air Force Base, Area B:

E. A. Vonderheid
E. J. Thomas
J. F. Schmidt
L. H. Corsaw
E. K. Grimes

4. The three following airplanes were examined and evaluated:

a. Fairchild XNQ-1.
b. Beech Model 45.
c. Temco Model TE-1A.

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No attempt was made in this evaluation to analyze performance or propell efficiency. The evaluation is based on accessibility, maintenance and service factors, and installation features as outlined in the Handbook of Instructions for Airplane Designers.

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5. The Fairchild XNQ-1 airplane is fitted with a Lycoming R-680-13 engine rated at 295 hp. at 2300 r.p.m. and a two-blade 8 ft. 3 in. diameter Hamilton Standard model 2820/6135A-9 counterweight type constant speed propeller. This airplane had been previously inspected by a representative of Propeller Laboratory at a formal 689 Inspection held on 5 and 6 January 1949. At that time it was determined that the airplane is satisfactory for Air Force's procurement from the propeller installation standpoint. The following changes were considered desirable:

a. Replace existing Simmonds governor control linkage with push rod and bell crank system. This alteration was requested as the existing installation had excessive lost motion and was poorly designed. Fairchild agreed to remove the existing system but requested permission to substitute a cable and pulley system instead of push rods and bell cranks. This substitution was approved.

b. Relocate the cowl to provide a one-inch clearance with a 20-degree blade angle range propeller; redesign cowl hinge to provide propeller cowl clearance with cowl in raised position. Fairchild agreed to the redesign of the cowl hinge but objected to the relocation of the cowl on the grounds that any relocation might affect engine cooling. It was finally agreed that they would install the 20-degree propeller, check the clearance, and advise Propeller Laboratory of the results in order that a decision could be made relative to permitting some deviation from the Handbook specification. A subsequent check indicated that a cowl clearance of 7/8-inch would be obtained with the 20-degree propeller, and Propeller Laboratory agreed to a deviation from the Handbook to authorize this clearance.

c. Since it appears that a dustproof spinner will be required with the propeller installed on this airplane, Propeller Laboratory has made arrangements with Hamilton Standard Propeller Division to submit a design of a spinner suitable for this installation.

6. Beech model 45 airplane is fitted with a Continental E185-8 engine rated at 185 hp. at 2300 r.p.m. and a Beech B200-106 propeller of 7 ft. 4 in. diameter. Propeller clearances of 9-1/4 inches for the level landing condition and 4-3/4 inches with tire and shock strut deflated are considered satisfactory. The propeller is of the constant speed type, controlled by a Woodward X703-02 governor located on the lower rear left hand side of the engine. Pitch change of the propeller is accomplished by means of a hydraulic motor receiving engine oil from the governor through two external oil lines routed forward from the governor and up through the cylinders to the hydraulic motor located immediately aft of the propeller. The governor is rather inaccessible for installation and adjustment, and the control lever

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forces in the cockpit appear to be excessive. The spinner is not of the quickly detachable type and is retained by ten Phillips head screws. Propeller installation is similar to that employed on the L-13 type airplane where an electric motor is used in lieu of the hydraulic motor.

7. The Temco TE-1A airplane is fitted with a Continental C145-2H engine rated at 145 hp. at 2700 r.p.m., and a two-position, engine oil operated 73-inch diameter Sensenich propeller model C3FR4. The propeller is attached directly to the flange drive engine. Due to the design of the spinner, two of the six flange bolt nuts are rather inaccessible for tightening and lock wiring

C. CONCLUSIONS:

8. It is concluded that, from propeller installation aspects, the airplanes are preferable in the following order:

a. Fairchild XNQ-1.
b. Temco TE-1A.
c. Beech Model 45.

D. RECOMMENDATIONS:

9. The following recommendations are offered for consideration as desirable changes in the airplanes evaluated:

a. Fairchild XNQ-1: Those detailed in paragraph 5.

b. Temco TE-1A: Redesign of the propeller spinner for greater accessibility to the flange drive bolts and pitch adjustment, and to obtain quickly detachable features. Provision be made on the engine for a governor pad and internal oil lines in order to obtain constant speed operation.

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MCREXE-720-2-1
15 February 1945

c. Beech Model 45: Greater accessibility be provided for installation and adjustment of the constant speed governor; that the linkage from the present bell crank located on the fire wall to the constant speed governor be redesigned to eliminate buckling in the boden wire; that consideration be given to redesign of the propeller control and hydraulic motor into one unit to be installed on an accessible drive pad on the engine. It is the understanding that Continental has developed an engine incorporating a governor pad on the engine nose.

Distribution:

MCRECA (Maj. Anderson)
MCPPXA-cc (8) (Mr. Larkin)
MCPPXE (Capt. Cowan)
MCMMXT-2
MCID (1) "Hold"

Prepared by: E. K. Grimes
(Name)

Approved by: D. A. DICKEY
Chief, Propeller Laboratory
Engineering Division

Copy furnished:

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AIR FORCE
AIR MATERIEL COMMAND
ENGINEERING DIVISION
MEMORANDUM REPORT ON

No. of Pages 3

RLE/mhk
Date: 16 February 1949

SUBJECT: Trainer Airplane Evaluation Inspection

OFFICE: Aero Medical Labbratory

SERIAL NO.: MCREXD-720-131 Expenditure Order No. 720-65

A. PURPOSE:

1. To report on the combined Trainer Airplane Evaluation at Wright-Patterson Air Force Base, 14 February 1949, conducted in Hangar No. 4 by Procurement Division in accordance with Routing and Record Sheet request from Procurement Division in compliance with Technical Instructions No. 2231, Addendum No. 1, dated 7 February 1949.

B. FACTUAL DATA:

2. Trainer airplanes were presented for competitive evaluation by the following manufacturers:

a. Fairchild Aircraft Division.

b. Texas Engineering and Manufacturing Company.

c. Beech Aircraft Company.

3. Representing the Aero Medical Laboratory at subject inspection were Major G. E. Long, Dr. W. F. Grether, Mr. H. T. Hertzberg, and Mr. R. L. King.

4. In accordance with instructions of Colonel Graham, Procurement Division, this report has been prepared in the form of the relative value of the airplanes.

C. CONCLUSIONS:

5. Aero Medical Laboratory personnel agreed in rating the aircraft on exhibit in the order indicated below. The aircraft judged to be most desirable has been listed first.

6. Some general reasons for the rating of each aircraft are as follows:

a. First rating is given to the model exhibited by the Beech Aircraft Company. This is the only one of the three which has tricycle landing gear. The two cockpit arrangements correspond quite closely to the cockpit standard requirements of the Air Force. Visibility over the nose of this aircraft is exceptionally good.

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b. The Fairchild Aircraft Company plane is given second rating. The conventional landing gear of this aircraft is considered to be obsolete, and visibility over the nose is quite inferior to that of the Beech model, particularly in the taxiing attitude. The two cockpits of this plane are quite good and could quite readily be made to conform to Air Force Standard.

c. The aircraft made by the Texas Engineering and Manufacturing Company is given third rating. The conventional landing gear is considered to be undesirable in this type of trainer. The cockpit would require considerable modification to conform with Air Force Standards. The canopy design is such that only one of the two pilots can have the canopy open at a time.

7. In addition to the above evaluation of the specific aircraft the following principles are proposed by the Psychology Branch as conditions that should be met by this type of trainer:

a. The training airplane should have a tricycle landing gear since the Air Force is no longer buying any operational aircraft with the older type of landing gear. Future Air Force pilots will have virtually no opportunity to fly anything but tricycle landing gear. Those rare pilots who will fly tail wheel aircraft can easily be trained in the necessary skills at the time they are checked out in such craft. Not only is it wasted effort to train men on an inferior landing gear which they will never use, but the use of a tricycle landing gear on a trainer will considerably reduce the number of landing and taxiing accidents in training. This reduced accident rate in training, with the resulting saving in life and equipment, will undoubtedly far outweigh those rare accidents caused by the fact that occasionally a pilot trained on nose wheel planes later flies one with a tail wheel before he has been adequately checked out.

b. The arrangement and operation of all cockpit controls should meet the latest recommendations of the Cockpit Layout Sub-Committee of the Munitions Board. It is very important that the pilot be very familiar with a cockpit arrangement conforming to that which he will later use in operational craft. Application of this policy will be a tremendous contribution to safety in military aviation.

c. The latest types of flight instruments should be available in the student's position in the trainer and should be located according to the arrangement specified by the Cockpit Layout Sub-Committee of the Munitions Board.

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d. The lighting system in this trainer should be the latest type of combined ultra-violet and red flood lighting system being developed by the Equipment Laboratory. The installation of the light sources is of utmost importance and should be so installed that light is not reflected from the instruments into the pilot's eyes or on to the canopy. None of the airplanes examined meet these requirements at present.

e. The training airplane should have good visibility over the nose. This is very important, both for safety in flight and for taxiing on the ground. One of the most desirable features of the tricycle landing gear (mentioned above) is the great improvement in visibility over the nose in taxiing and during the climb immediately after take-off.

f. It is believed that a training airplane should provide controls for the major functions which the pilot must later use in operational aircraft. On this basis it is believed that the trainer should have elevator, rudder and aileron trim controls even though all of these may not be essential for adequate handling of the trainer. This is particularly true since the plane is to be used for instrument training. Precise instrument flying is not possible unless the pilot has the necessary controls to so trim the plane that no sliding or slipping is present.

D. RECOMMENDATIONS:

8. In the event of procurement of any of these airplane models, the contractor should comply with existing Air Force requirements for cockpit sizing, standardized control levers, switches, actuation, clearance and identification, cockpit lighting, installation of equipment, etc.

Prepared by Robert L. King
ROBERT L. KING

Approved by FRED W. BERNER
Chief, Engineering & Development Br.

Approved by A. P. GAGGE, Lt. Col., MSC (USAF)
Chief, Aero Medical Operations

Approved by EDWARD J. KENDRICKS, Col., MC (USAF)
Chief, Aero Medical Laboratory

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Engineering Division
Memorandum Report No. MCREL-7[illegible]-1711
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DISTRIBUTION:

Procurement Division (MCP.AA.2)

Training & Transport Br., Aircraft Projects Sec., Engineering Div. (MCREOA)

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HqATSC Form No. 50-507
(Rev. 5 Sep 45)

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HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT FIELD, DAYTON, OHIO
ENGINEERING DIVISION MCREEL/OAW/djm

MEMORANDUM REPORT ON Page 1 of 13 pages

Date 17 February 1949

SUBJECT: Evaluation of Single Engine Basic Trainer Airplanes

OFFICE Equipment Laboratory Contract or Order No

SERIAL No. MCREEL-720-36 Expenditure Order No 720-17

A. PURPOSE:

1. To report on the Evaluation of Single Engine Basic Trainer Airplanes insofar as items of equipment were concerned.

B. FACTUAL DATA:

2. The subject evaluation was conducted at Wright-Patterson Air Force Base, Hangar No. 4, Dayton, Ohio, 14 February 1949, on the physical models as listed in Appendix A.

3. The above evaluation was conducted by the following Equipment Laboratory personnel:

Major L. W. Beckstrom - - - - - - - - - Instruments

Mr. J. F. Kindred - - - - - - - - - - - Electrical

Mr. L. V. Larson - - - - - - - - - - - - Mechanical

Mr. G. E. Sheppard - - - - - - - - - - Ground Equipment

Mr. D. Bishop - - - - - - - - - - - - - Parachutes

4. Comments are listed in Appendix A.

C. CONCLUSIONS:

5. The subject airplanes should be evaluated in accordance with comments as listed in Appendix A.

[redacted]

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AAF (AC Form No. 80-507 (20 Jan 45)
(Old AAFMC-266)

CONFIDENTIAL 39

No. [illegible] MC/EXP-721-36
date: 2 February 1946

[illegible]

6. It is recommended that the following item be tested by the organization specified:

a. [illegible]

(1) Make a comparison as to performance applicable to [illegible]

Distribution:
Training and Transport Branch (Confidential) (2)
[illegible]

Prepared by: [illegible]
Name

Approved by: J. C. Martin, Colonel, AAF
Equipment Laboratory
Engineering Division

Concurred by:

WP-1-29 DEC 45 10M

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APPENDIX A

The following listed data indicates Points Allocated for each Branch considered totaling 100, Credit Points Earned, Percentage Earned, and Possible Potential Credit Points applicable to the evaluation of subject Aircraft.

1. Fairchild Aircraft Division Model M-129.

	Points Allocated	Credit Points Earned	Percentage Earned	Possible Potential Credit Point
Instruments	30	22.5	75%	30
Electrical	30	22.5	75%	30
Mechanical	20	15.0	75%	20
Ground Equipment	15	13.35	89%	15
Parachute	5	4.50	90%	5
	100	77.85	77.8%	100

2. Beech Aircraft Corporation Model 45.

	Points Allocated	Credit Points Earned	Percentage Earned	Possible Potential Credit Point
Instruments	30	24	80%	30
Electrical	30	9	30%	30
Mechanical	20	16	80%	20
Ground Equipment	15	11.25	75%	15
Parachute	5	4.25	85%	5
	100	64.50	64.5%	100

3. Texas Engineering and Manufacturing Company Model TE-1A.

	Points Allocated	Credit Points Earned	Percentage Earned	Possible Potential Credit Point
Instruments	30	15.0	50%	27
Electrical	30	6.0	20%	30
Mechanical	20	5.0	25%	20
Ground Equipment	15	6.9	46%	15
Parachute	5	1.25	25%	5
	100	34.15	34.1%	97

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APPENDIX A

(2) Electrical

(a) Deficiencies

1 The Non-Standard 12 Volt system provided is not acceptable. A USAF 28V D.C. standard electrical system is required. The capacity of the generator should be at least 100 ampere, however, selection should be based on the electrical load analysis.

2 Landing lights not adequate, one 600 watt or two 250 watt lightsin the left wing should be provided.

3 Flashing navigation light system should be in accordance with Specification 94-32265E Amend. No. 1, less the coding features.

4 All electrical equipment should be USAF and AN Standard in lieu of commercial equipment.

5 Instrument lighting unsatisfactory, should be USAF Standard Ultra-Violet and red lighting.

6 The battery will require relocation as a standard AN battery will not fit in the present location.

7 Landing gear position lights not satisfactory, Type C-1 indicators with one red, AN3157-6 light should be used.

8 External landing gear indicating lights (white) not provided.

9 External power relay not provided.

10 Type C-4 utility light not provided.

(b) The above deficiencies are all correctable, however, relocation of the battery may prove difficult and the accessory gear box will require revision to permit installation of a USAF generator.

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APPENDIX A

(3) Mechanical

(a) Deficiencies

1. Canopy defrosting should be provided.

2 Heat supplied by exhaust stack muff with attendant danger of carbon monoxide in the cabin.

3 No map case in rear cockpit.

4 Hand fire extinguisher hard to reach.

5 Foot outlets should be provided for use when heating is required.

(b) Items of Merit

1 Adjustable side outlets for ventilation.

(c) All of the above deficiencies are correctable.

Note: Actual amount of heating, ventilating and defrosting cannot be determined except by test. AF Specification No. 40659-A and No. 40435-A should be referenced in the Model Airplane Specification to give quantitative requirements for these factors.

(4) Ground Equipment

(a) Deficiencies

1 No engine covers provided.

2 No wing covers provided.

3 No propeller covers provided.

4 No canopy covers provided.

5 No jacking provisions on main landing gear.

6 No provisions on main landing gear for mooring.

7 No provisions for using standard USAF towing bar. Present bar is for hand operation only.

8 No provisions on main gear for towing over soft terrain by vehicle.

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Technical Evaluation
Producibility - TEMCO, Fairchild, and Beech T-31

MCPPXA MCP XP-1 18 Feb 49
Attn: Mr. Nate Silverston

1. This Division has attempted to comply with the request of 15 February 1949 to make evaluation covering various factors of producibility of the aircraft in the T-31 basic trainer competition. In the short time available to personnel of this Division to accomplish the work requested, facilities and tooling required, of the five subjects for which coverage is requested, can be covered in a reasonable way. In addition, evaluation of materials and production man hours are presented for consideration with other data available to the project monitor. Statements are based on information gleaned from sales representatives and special requests upon manufacturers' engineering departments. In order to make an adequate evaluation of producibility, it would be desirable to investigate detailed technical production data at the plant which was not possible in this instance.

a. Facilities and tooling

b. Materials

c. Production man hours

2. Texas Engineering & Mfg. Co., Dallas, Texas

Facilities - Approximately 1,000,000 sq. ft. under lease from War Assets, under cognisance of Navy. No additional facilities required for quantities contemplated under Finnster Plan No. 5. In the event of mobilization, it is contemplated that Chance-Voight would expand into part of area now used by TEMCO. Balance would be used by TEMCO in licensee manufacture of T-28, thus leaving no space for T-31.

Tooling - 80% completed on tooling. Adequate for production of a maximum of 7 aircraft per day on a one shift basis, or 12 per day on two shifts. (No Government funds required.)

3. Beech Aircraft Corporation, Wichita, Kansas

Facilities - Approximately 1,000,000 sq. ft. total plant area. Contractor owns complete facilities which are under cognizance of USAF. No additional facilities required for quantities contemplated under Finnster Plan No. 5 or mobilization requirements. In mobilization, Beech would take subcontracting program from Boeing, Wichita.

Tooling - Present tooling adequate for production of a maximum of 8 aircraft per day on a 1 shift basis or 16 per day on 2-1/2 shifts. With 20% subcontracting, production of the T-31 could reach 40 aircraft per day.

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MCPTXA MCPIXP-1 27 3 Feb 49
Attn: Mr. Nate Silverst

Subject: Technical Evaluation
Producibility - TEMCO, Fairchild, and Beech T-31

4. Fairchild Aircraft Division, Fairchild Engine and Airplane Corporation, Hagerstown, Maryland

Facilities - 907,927 sq. ft. total plant area
Company owned 140,806 sq. ft.
Government owned 667,194 sq. ft.
Leased 99,927 sq. ft.

No additional facilities required for Five Year program or for potential mobilization needs. There would be competition between C-119 and T-31 for plant facility. Mobilization requires the transfer of one model, thereby delaying production.

Tooling - Contractor advises that entrant is a prototype airplane with many of the airframe parts being hand made. Contractor will require the Government to underwrite the cost of production tooling development.

5. Materials

a. In general, the TEMCO "Swift" and the Fairchild XNQ are built under present designs entirely of aluminum. The "Bonanza", on the other hand, uses magnesium in wing flaps and ailerons, in the one-third aft end of the fuselage, and the complete empennage. Under the assumption that the Beech "Bonanza" will meet the same military purpose as the XNQ, with 30% less materials total, and using a very substantial amount of magnesium, the "Bonanza" definitely must be preferred in view of current usage of the non-critical magnesium in place of aluminum.

b. The following comparison of total material usage of steel and aluminum is given, together with data on steel and aluminum forgings:

	Fairchild	Beechcraft*	TEMCO
Total Steel	369 lbs.	160 lbs.	67 lbs.
Steel Forgings	151 lbs.	35 lbs.	N.A.
Ratio Forgings to Total	40%	22%	N.A.
Total Aluminum	1929 lbs.	622 lbs.	751 lbs.
Aluminum Forgings	151 lbs.	18 lbs.	40 lbs.
Ratio Forgings to Total	7.8%	2.9%	5.3%
Total Copper	49 lbs.	10 lbs.	None

N.A. - Not available
*Contains 102 lbs. of magnesium in present design.

otal steel, aluminum, and magnesium requirements for the Beechcraft and TEMCO planes are lmost identical; viz., 864 lbs. for the "Bonanza" vs. 818 lbs. for the "Swift." Attention is called however to the lower ratio of aluminum forgings in the Beechcraft. Data n steel forgings were not supplied by TEMCO.

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MCPIXP-1

Feb 49

MCPTEA
Attn: Mr. Nate Silverste[redacted]

Subject: Technical Evaluation
Producibility - TEM30, Fairchild, and Beech T-31

c. For the over-all increment of 56% in total weight empty, the Beechcraft compares unusually well with the lighter "Swift" in total material requirements.

d. Wing redesign for use of magnesium would result in the following estimated replacements:

	Magnesium	Aluminum Replaced
Fairchild	67½ lbs.	749 lbs.
TEM30	245 lbs.	280 lbs.
*Beech	220 lbs.	250 lbs.

*With current use of 102 lbs. of magnesium, total in the Beech "Bonanza" would then be 322 lbs. TEM30 plane has a center wing section of such design to make redesign for magnesium extremely complicated. Therefore, redesign is confined to outer wing panels.

e. Materials-wise, considering forgings and critical materials, the Beech "Bonanza" should be preferred.

6. Production Man Hours

a. In considering the producibility of the competing aircraft, the following contributing factors which affect low cost, high volume production were investigated:

(1) Production man hours

(2) Planning

(3) Tooling

(4) Fabrication

(5) Assembly

(6) Efficiency of plant lay-out

b. The extent of investigation of item (2) to (6) could only be superficial since the presentations did not include sufficient data upon which to base the rating for these phases. However, since minimum labor hours to produce is a good working barometer of over-all production efficiency, that method of evaluation was used, as low production hours automatically demand good planning, efficient tooling, rapid fabrication and well controlled serialized assembly. These must be accomplished in a well laid out plant.

c. In judging producibility, it was necessary to assume that the competing aircraft submitted were all in accordance with the specification as regards performance,

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MCPPA-A
Attn: Mr. Nate Silverston

MCPIXP-1

29

Feb 49

Subject: Technical Evaluation
Producibility - TEMCO, Fairchild, and Beech T-31

as a relatively poor performance factor might result in considerably reduced labor cost to produce.

d. The following is the schedule of estimated labor hours for each model:

TEMCO T.E. Swift	850 hours
Beechcraft Bonanza	1600 hours
Fairchild XNQ (T-31)	7200 hours

The model with minimum man hours, as shown above, required 50% of the labor hours of the next nearest competitor, while the third competitor requires 1000% labor hours as compared with the most producible aircraft.

e. It is recommended that the model requiring the minimum production hours be considered to have relatively greatest producibility.

for Peter Shalken

FREDERICK M. HOPKINS, JR.
Major General, USAF
Chief, Industrial Planning Division

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-15

Texas Engineering and Manufacturing Company, Inc.

Postoffice Box 6191

DALLAS 2, TEXAS

Dayton, Ohio
Feb. 18, 1949

SUBJECT: Supplemental letter to and made a part of letter from contractor dated Feb. 11, 1949 with reference to Technical Evaluation of a Single-Engine Basic Trainer.

ATTENTION: MCPFXA66

Ref: MCPFXA66/NS/bjw, Feb. 4, 1949 Joint letter

The following changes including change in overall cost of the aircraft ($9285.00) as previously quoted has been determined after study of changes in specifications as requested by Air Materiel Command, and discussed with contractor.

1. Price of $9285.00 has been increased to $11,486.00.

(a) New price of aircraft includes and is to a major degree influenced by cost of C145 Engine converted to An requirements including provision for 24-volt electrical equipment, propeller governor drive on the nose section,etc., complete with magneto Drives (2), Vacuum pump drive, Type 1, Generator Drive, Fuel Pump An 1005 Drive, Starter AND 10004 Drive, Tachometer-1 drive 2 pads, Vacuum Pump, Type II Drive, Propeller Governor Drive on the nose section of the engine. New Price however, does not include cost of starter, generator, fuel pump or vacuum pump, on the assumption that these items would be supplied. as G.F.E.

(See letter of proposal attached herein from Continental Motors Corp. to Texas Engineering and Manufacturing Company, Inc.).

(b) ARC 3 Radio Equipment in new price configuration has also been assumed to be GFE item.

(c) In the event contractors existing General Electric V.H.F. Two Way Radio as now installed in the aircraft is retained in lieu of ARC 3 Type Radio and supplied by contractor, price of aircraft less GFE items would be increased by an additional $300.00 and correspondingly reduced by cost of ARC 3 Type Radio from overall cost of aircraft including GFE.

2. Contractors schedule as outlined in paragraph 3 of letter dated Feb. 11, 1949 starting with deliveries in June 1949 would be changed as follows:

1 in October 1949
5 in November 1949
15 in December 1949
25 in January 1950
25 in February 1950
29 in March 1950

Setback in Schedule is principally due to engine manufacturers delivery schedule.

See attached note

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Texas Engineering and Manufacturing Company, Inc.

Postoffice Box 6191

DALLAS 2, TEXAS

Price Summary:

New cost of aircraft less GFE items as described and including engine as additional GFE item, for first 100 aircraft would be $9035.00 and for second 100 $8995.00, due to decrease in cost of engine beyond first 100.

TEXAS ENGINEERING &
MANUFACTURING COMPANY, INC.

Robert McCulloch
President

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Beech Aircraft Corporation
Wichita 1, Kansas

February 18, 1949

Headquarters
Air Materiel Command
Dayton, Ohio

Subject: Proposal for Technical Evaluation of a Single Engine Basic Trainer

Reference: AMC letter MCPXA66/NS/GJW date 4 February 1949

The Beech Aircraft Corporation submits with this letter a proposal on the Beechcraft Model 45 "Mentor" basic trainer as requested in the referenced letter, and supplementary proposals on various modifications.

The basic model 45 is described in Beech Aircraft Corporation Detail specification 104 with revisions to February 14, 1949 and price of the basic airplane and other information requested in the referenced letter is contained in the proposal brochure furnished with this letter. The specification does not cover installation of radio equipment, and the price quoted in the brochure is for the basic airplane without radio equipment. The performance given in the specification is with standard radio antennas, and at 2,650 lbs. gross weight, which includes an allowance of 60 lbs. of radio equipment and /or baggage.

Supplementary proposals covering the use of an AN rear case on the engine, a 24 volt electrical system, and the installation of the ARC-3VHF radio plus a low frequency receiver and interphone equipment are attached. Any additional changes that may be requested are of a minor nature and can be negotiated in the event a contract is made for the airplane.

The effect of these major changes on the performance of the airplane is calculated in the supplementary proposals. It should be noted that all of the minimums shown in the military characteristics for aircraft (Basic Trainer) dated 1 February 1949 are met.

Because of the time required for delivery of the first engine with the AN rear case, the delivery of the first airplane will be 7 months after the receipt of a definitive contract.

Yours very truly,

BEECH AIRCRAFT CORPORATION

J. A. Wells

J. A. Wells,
Vice President and Chief Engineer

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Beech Aircraft Corporation
Wichita 1, Kansas

SUPPLEMENTARY PROPOSALS

Basic Trainer Evaluation

1. AN REAR CASE ON ENGINE

Continental Motors will build and test model engines with the rear case modified to use AN standard accessories. The engines will also be in accordance with AN standards in all other respects that are practical. The engines will be built to Continental Motors specification 1267 dated Feb. 17, 1949. This proposal does not include automatic mixture control.

The drives to be furnished on the rear case are: two magneto drives, one type I vacuum pump drive, one type II vacuum pump drive, two tachometer drives, one fuel pump drive, one starter drive, and one generator drive. The propeller governor drive will be moved to the front of the engine.

The cost of this change is as follows:

Continentals cost for engineering, development, type testing and necessary production tools, patterns and dies -- $120,254.00

Increased manufacturing cost on 130 engines	$ 408.00
Development cost amortized over 130 engines	925.00
Total increased engine cost, per engine	$1,333.00

Beech Aircraft cost for engineering and tooling of new heating and ventilating ducts, modification of firewall and miscellaneous changes necessitated by use of AN accessories, $12,250.00.

Increased manufacturing cost to Beech	$ 96.00
Engineering cost amortized on 100 airplanes	122.50
Total increased Beech cost	$ 218.50

The increased weight from this change is 23 lbs.

2. 24 VOLT ELECTRICAL SYSTEM

Provision will be made in the airplane for a government furnished 17 ampere hour 24 volt battery, AN 3151-A, and clearance will be provided for a 100 ampere 24 volt generator, although it is believed that a 50 ampere generator is sufficient. All contractor furnished electrical equipment will be changed to 24 volt.

Engineering and tooling cost on new battery box, voltage regulator mounting, and miscellaneous changes, $4,500.00

Engineering and tooling cost amortized over 100 airplanes	$45.00
Additional manufacturing cost	9.50
Additional material cost	20.00
Total additional cost per airplane	$74.50

The increased weight from this change is 23 lbs.

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Beech Aircraft Corporation
Wichita 1, Kansas

SUPPLEMENTARY PROPOSALS

Basic Trainer Evaluation

3. RADIO INSTALLATION ARC-3 VHF RADIO, LOW FREQUENCY RADIO, AND INTERPHONE

This equipment will all be installed so as to be readily accessible for servicing, yet so as to not reduce baggage compartment space or adversely affect the C. G. of the airplane.

The ARC-3 receiver, transmitter, and power supply will be installed under the floor behind the fire wall and will be accessible by dropping the equipment on slides vertically downward. In this way, all sides of the units are out in the open for service or adjustment.

The low frequency receiver and interphone amplifiers are installed beneath a removable panel in the baggage compartment floor. A balanced T antenna will be installed under the airplane, with the leadin directly up to the receiver.

The VHF antenna will be installed on top of the fuselage, behind the rear sliding enclosure.

No price will be quoted for contractor furnished equipment in this case.

For installation of government furnished equipment the following quotation is made for 100 airplanes:

Engineering, development and tooling, including re-doing fuselage static test because of openings cut in bottom, and making production drawings: $54,500.00

Engineering and tooling amortized over 100 airplanes	$545.00
Manufacturing cost of doors, mounts, wiring assemblies, installation, adjusting and testing	340.00
Total cost per airplane	$885.00

The weight increase from this installation is as follows:

Radio equipment	108 Lbs.
Wiring	7 lbs.
Structural weight increase	9 lbs.
	124 Lbs.

Weight allowed in specification for radio and/or baggage 60 lbs.

Net weight increase, 64 lbs.

SUMMARY OF WEIGHT INCREASES

AN rear case	23 lbs.
24 volt electrical system	23 lbs.
Radio installation	64 lbs.
Total weight increase	110 lbs.

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Beech Aircraft Corporation

Wichita 1, Kansas

SUPPLEMENTARY PROPOSALS

Basic Trainer Evaluation

EFFECT OF INCREASED WEIGHT ON PERFORMANCE:

The fuel capacity listed in the specification results in a greater endurance than required, and the operating speed used in the specification is higher than required by the military characteristics. In view of the weight increase, the excess of fuel over that required to meet the specified endurance will be considered as optional.

Minimum operating speed required, 125 knots @ 7500 feet

Horsepower required for 125 knots @ 7500 feet, 100 hp.

Specific fuel consumption @ 100 hp. - .51

Fuel for 4.5 hrs. @ 100 hp. - $\frac{100 \times .51 \times 4.5}{6} = 38.5$ gals.

Gallons of fuel, full load - 50.

Gallons considered as optional - 11.5

Weight decrease, 69 lbs.

Increase over specification gross weight, 110 - 69 = 41 lbs.

Specification gross wt., 2650 lbs. New required gross wt. 2691 lbs.
Optional gross wt. 2760 lbs.

Revised performance guarantees at new gross weights:
(Subject to tolerances shown in specification)

ITEM	2691 Lbs. Gross	2760 Lbs. Gross	Military Characteristics Minimum
High speed at 7500 feet	150 knots	149.4 knots	150 knots
Average cruising speed for required endurance at 7500 feet	125 knots	125 knots	125 knots
Endurance at cruising speed at 750 feet altitude exclusive of 30 minute reserve	4 hours	4.59 hours	4 hours
Rate of climb at sea level	900 ft/min.	855 ft/min.	900 ft/min.
Service Ceiling	17000 ft.	16200 ft.	12000 ft.
Takeoff over 50 ft. obstacle	1260 ft.	1325 ft.	1500 ft.
Landing over 50 ft. obstacle	930 ft.	950 ft.	1250 ft.
Stalling speed at sea level	50 knots	52 knots	55 knots max.

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No. of Pages 6

HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE
DAYTON, OHIO

ENGINEERING DIVISION

Date

MEMORANDUM REPORT ON

Date 16 February 1949

SUBJECT: Engineering Evaluation Comments - Basic Trainer Airplane Competition - Fairchild Aircraft Division, Fairchild Model No. M-129

OFFICE Aircraft Laboratory Contract or Order No.

SERIAL No. MCREXA2h-1h15h-23-1 Expenditure Order No. 720-57

A. PURPOSE:

1. To present results of evaluation of the Fairchild Aircraft Division trainer airplane, Model No. M-129.

B. FACTUAL DATA:

2. The evaluation was conducted at the request of MCPPA66, Training and Transport Branch, Procurement Division. It was held at Wright-Patterson Air Force Base, where the physical airplane was made available by the designer.

3. A model specification was available for reference and the designer's personnel were present to answer questions. The requirements for this type of aircraft are set forth in "Military Characteristics for Aircraft (Basic Trainer)," dated 1 February 1949, from Requirements Division, Directorate of Training and Requirements, Office, Chief USAF, as amended by revision sheet (undated and unsigned), received in the Aircraft Laboratory 11 February 1949. The project office stated that everything in the model specification shall be considered as guaranteed. Therefore, many items considered in this evaluation were taken directly from the model specification.

4. The Fairchild M-129 is a low wing monoplane, powered with one Lycoming R680-13 engine. The alighting gear is of the conventional tail wheel type.

5. The results of the engineering evaluation conducted by the Aircraft Laboratory are set forth in Appendix I of this Memorandum Report.

C. CONCLUSIONS:

6. It is concluded that insofar as the Aircraft Laboratory is concerned, the Fairchild Model No. M-129 receives Order of Merit 2 and a corresponding final grade of 86.05 percent.

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HqAMC Form No. 80-34
(20 Dec 46)

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SIGNATURE SHEET

Eng. Div. Memo Report No. MCREXA2[illegible]-23-1
18 February 1949

D. RECOMMENDATIONS:

It is recommended that:

7. In the event of procurement of one or more of the designs entered in this competion the Fairchild Model No. M-129 be accorded considerations commensurate with the conclusions above.

8. In the event that procurement action mentioned in paragraph D-7 above is taken, this Laboratory be given the opportunity of reviewing the design data in order to present more detail comments prior to procurement action for these airplanes.

Distribution:

MCPPXA66

Prepared by NORMAN E. NELSON
(Name)

Approved by H. S. LIPPMAN
Chief, Eval & Reqmts, Ops, Aoft Lab.

Approved by O. J. RITLAND, Colonel, USAF
Chief, Aircraft Laboratory
Engineering Division

Concurrence:

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15 February 1949

APPENDIX I

Grade Chart Tabulation
Aircraft Laboratory Estimates
Fairchild Model No. M-129

1. FACTOR: Aerodynamics . . . . . GRADE 73%

Features

a. Performance — Grade 73%

Item	Min. Req't.	Contractor Guarantees
High Speed at Sea Level	173 MPH	166 MPH
High Speed at Tact. Op. Alt. (7500)	173 MPH	160 MPH
Ave. Cruise Speed for Endurance at Tact. Op. Alt.	144 MPH	Satisfactory
Endurance at Tact. Op. Alt., exclusive of 30 minutes reserve	4 hours	Satisfactory
Tactical Operation Altitude (7500)	7500 feet	7500 feet
Rate of Climb at Sea Level	900 FPM	1050 FPM
Service Ceiling	12000 feet	19300 feet
Take-Off over 50 foot Obst.	1500 feet	950 feet
Landing over 50 foot Obst.	1250 feet	930 feet
Stall Speed at Sea Level	63 MPH	58 MPH

In some instances, the performance values used by this Laboratory were derived from performance curves and tabulated data appearing in the model specification, and were not specific values guaranteed by the bidder.

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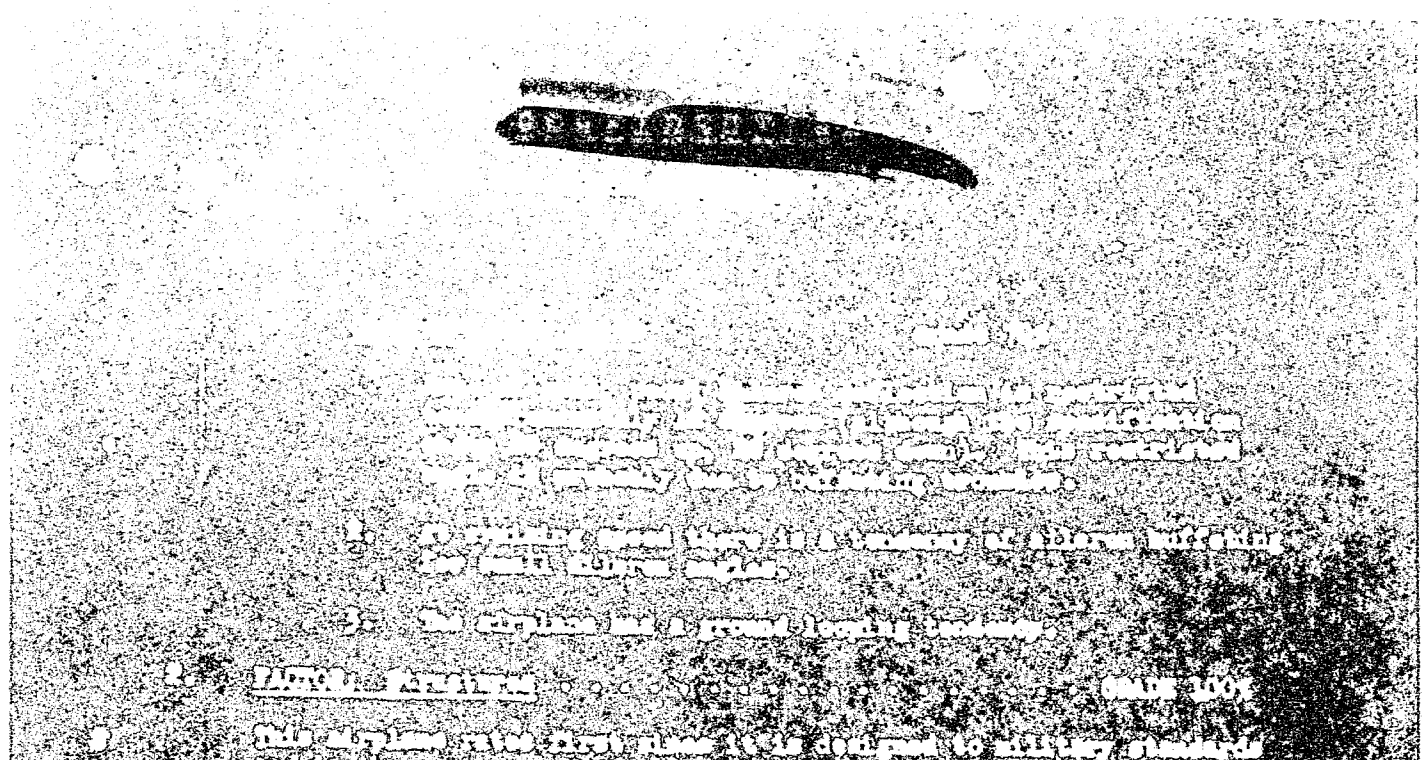

3. FACTOR: Ground Handling . . . . . GRADE 65%

This cockpit appears to be in accordance with usual AAF standards. However, the instrument arrangement is not satisfactory, and the design does not guarantee a standard U.S. Air Force cockpit.

4. FACTOR: Landing Gear . . . . . GRADE 98%

Features	Appraisal in percent	Comments
a. Wheels and Brakes	90	Brake system uses unapproved control units; linkage between front and rear cockpits undesirable.
b. Alighting Gear	90	No steering provisions; shock strut accessibility poor (if these items are corrected the grade would be 100%)
c. Mechanisms	100	

5. FACTOR: General Design . . . . . GRADE 85%

a. Detail Design	75	Pulley brackets riveted in place, sheet formed and not removable; no clips or ties provided between stringers

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Features	Appraisal and percent	Comments
c. Detail Design (Continued)		and bulkheads; elaborate fairings used at junctures of wing and tail surface with fuselage, in addition to large fairing around landing gear; typical heavy conventional construction employing a multitude of stringers, bulkheads, ribs, etc.; control surfaces cloth covered; no magnesium used.
b. Canopy	60	No escape panels; large single sliding bubble with manual operation from rear cockpit impossible; electrical actuation with air bottle emergency; no external manual release.
c. Vibration	75	Anti-vibration mounts inferior.
d. Flutter	77	Incomplete balance on aileron, rudder, and elevator; rudder tab not quite irreversible
e. Emergency Landing Gear	90	Emergency gear extends by gravity, but down locking not assured. (Grade would become 100 if proved.)
f. Replacement of Damaged Parts	90	No interchangeability of stabilizers; wing breakdown inferior.
g. Control System	90	No provisions to prevent start of take-off run with elevator locked in down position, possibly causing the airplane to nose over.
h. Vision	60	7°45' vision angle over nose; forward vision obstructed by windshield frames.

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Features	Appraisal and Percent	Comments
f. Hoisting	90	Cannot be hoisted with canopy closed.
j. Mooring	90	No fittings on landing gear.
k. Jacking	90	No jack points on tail, jack bar must be used.
l. Towing	50	Cannot use standard tow bar; no aft tow from either main gear or tail gear.
n. Seats	100	An approved type seat is specified.
o. Standard Parts.	100	General compliance with AN and AF standard parts.

NOTE: As a result of the actual weighing of this airplane it was found that the Design Gross Weight is 3850 pounds in lieu of the specified 3790 pounds and the C.G. location is 28.3 percent in lieu of the specified 28.0 percent. This will have no adverse effect on the characteristics of the airplane. (This was not taken into consideration in this competition.)

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T-31 Trainer Airplane Evaluation

MCPPXA66 MCRFT 1

1. Reference is made to your R&R of 7 February 1949 wherein a very limited flight test evaluation of aircraft to be considered for procurement as T-31 trainers was requested.

2. The Flight Test Division has flown each aircraft in the configuration as they were delivered by the respective contractors and will submit herein the compilation of the pilots' observations relative to the aircrafts' flying characteristics.

3. The aircraft evaluated were delivered by the following contractors: (1) The Texas Engineering and Manufacturing Corporation whose airplane hereafter will be referred to as the Temco, (2) The Beech Aircraft Corporation whose aircraft is referred to as the Beechcraft, (3) The Fairchild Airplane and Engine Corporation whose airplane will be referred to as the Fairchild. Each aircraft was flown by a minimum of six pilots as follows: Colonel A. Boyd, Lt Col R. E. Horner, Maj L. D. Dennis, Maj R. L. Johnson, Capt W. F. Rankin, and Capt R. A. Popson. As requested in your communication no effort was made to obtain quantitative information on any of the operational characteristics of the airplanes and comments herein refer only to flying qualities of the aircraft with no effort to justify the airplanes as trainers.

4. All of the aircraft are comparable insofar as accessibility to the cockpit is concerned with entries over either wing by means of a sliding canopy. No considerable deficiency in handles or required steps for cockpit entry was noted.

5. The Temco airplane was the smallest of the three aircraft and was quite limited in space in the cockpit. This was especially noticeable in the rear cockpit where visibility was quite restricted by airplane structure and the pilot in the front cockpit. Only one cockpit could be open at a time on this airplane. Visibility from the front cockpit was satisfactory and although somewhat limited by the broad engine installation immediately in front of the cockpit it was possible to taxi without making "S" turns. The restriction to visibility did become noticeable in nose-high attitudes of flight such as while climbing at speeds for best rate of climb. The cockpit controls and accessories of the Temco gave the appearance of being cheaply built, probably because most of the controls were of commercial origin and did not conform with AN cockpit standardization. The steerable tail wheel gave adequate control for taxiing and cross wind take-offs although less effort than considered safe was required to fully swivel the tail wheel. The relatively high wing loading of the aircraft allowed operation in higher winds than normally safe for this class of aircraft. The take-off distance was short and the initial climb out angle was satisfactory, although it required a nose-high attitude for best rate of climb. The airplane has especially light control forces that are well coordinated and provide good response from the airplane. Limited aerobatics disclosed no particular undesirable

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characteristics other than the limitations of the aircraft to perform any accelerated maneuver without losing appreciable altitude, seemingly caused by high power loading and poor stall characteristics. Stalls in all configurations were attempted and disclosed perhaps the biggest deficiency of the airplane's flying characteristics. The airplane has a relatively high stalling speed for airplanes of this class and a secondary stall induced during the recovery is very easy to encounter as high as 25% above the stalling speed. This becomes obvious to the pilot by a pronounced buffet which appears to originate in the wing center section and unless immediate corrective action is taken the entire lifting surface becomes ineffective. It is suggested that this is caused by the contractor's effort to eliminate all tip stall by slotting the tips and placing spoilers at the leading edge of the root section. This configuration does accomplish the objective of giving excellent aileron control even when the rest of the wing is stalled but is not considered desirable because the maximum lift coefficient of the wing is so reduced as to make all aerobatics difficult of accomplishment without encountering the characteristic shudder. The airplane spins in either direction and recovery is positive, although somewhat difficult to time precisely. After the spin is fully developed (5 - 6 turns) normal recovery is effected in about two turns which is more than average or desirable for this type aircraft. The airplane's approach and landing are quite normal with a three-point landing easily accomplished since the stall is quite abrupt and complete. The power plant and controls functioned properly throughout the evaluation with the exception of a seemingly long lag in response of the two-position propeller when changing pitch. The cylinder head temperature instrument indicated excessive temperatures during climbing flight even though the ambient temperature was approximately 20°C below a standard day and the mixture control was in the full rich position.

6. The Beechcraft suffers somewhat from the same limited visibility from the rear cockpit as the other airplanes, although its tricycle gear configuration gives better visibility in this respect than either of the other two aircraft. It is an exceptionally easy airplane to handle on the ground with the nose-wheel steering seemingly effective at all taxi speeds. The cockpit has the attribute of making the pilot feel at home immediately and all controls are well placed and easy to operate with the exception of the wing flap control. Because of its location and the fixed guard on the side of the control it was very easy to jam with the pilot's headset and microphone chords. Take-off and initial climb were easily accomplished with excellent visibility at all times and a good initial climbing angle. The airplane gave the feeling of clean design in rapid acceleration and a relatively high apparent cruising speed for aircraft of this type. All control forces and aircraft response were normal in all maneuvers. The ailerons required more pilot effort than either of the other two aircraft, although this was not considered very objectionable. Aerobatics were easily accomplished with no undesirable characteristics indicated and the approach and landing were normal. The operation of the airplane impressed all pilots with its ease of accomplishment and it is estimated that any pilot could master the aircraft very quickly. The propeller control was not entirely satisfactory in that it tended to overspeed in the high rpm condition and engine speed would vary with air speed although it was intended to be a constant speed propeller. The propeller

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control lever required excessive force to operate. The controllable cooling flap apparently provided sufficient cooling to the engine and, although some cooling flap was required for most flight conditions, the drag did not seem to be excessive. An indicated oil temperature of 100°C was experienced in a climb to 7000 feet and was accompanied by a 10 psi drop in oil pressure.

7. The Fairchild airplane also presented an example of limited visibility from the rear cockpit although the visibility was considered very good for airplanes with conventional landing gear. The high bubble canopy was desirable from this viewpoint and seemed to provide required visibility in all directions under all conditions of operation. The cockpit of this aircraft was very well arranged and represented the nearest conformance with the desired military cockpit. All controls were readily accessible with the possible exception of the trim controls in the rear cockpit which were behind the pilot's left thigh. The Fairchild was the most difficult of all three aircraft to handle on the ground, being representative of a single engine airplane with no ground steering facilities provided. The tail-wheel lock was positive and provided directional stability during the initial part of the take-off run. On take-off the rudder was immediately effective and the ground run was exceptionally short. The initial climb angle was good and the airplane exhibited better climbing performance to 5000 feet than either of the other two aircraft. All controls in flight were normal with the possible exception of the springy feeling of the ailerons. This characteristic was easily adjusted to and normal flight maneuvers including aerobatics were easily accomplished although the airplane suffered from a low rate of roll and aileron buffet at high deflections. It was all but impossible to spin the airplane to the left and stalls in all configurations resulted in a decided break with the right wing dropping off sharply. This characteristic was not considered too undesirable since ample stall warning existed and the airplane actually had to be held in the stall before it occurred. This airplane had approximately a 10 mph lower stalling speed than either of the other two aircraft. On the landing, conscientious effort was necessary in order to touch down on all three wheels. This appeared to be a limitation of elevator power and was exceptionally noticeable with only a pilot in the front seat. Although adequate trim controls were provided about all three axes, the affect of engine torque on this airplane was more noticeable than on either of the other two aircraft. It was easily controllable in all flight conditions and was most noticeable when advancing power at low air speeds.

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8. In summat , it is the opinion of the pilo s of this Division that the Beechcraft airplane has the most reasonable flying characteristics and has no peculiarities of flight which would require correction. The Fairchild airplane would be classed second from the pilot's viewpoint with the Temco a rather poor third. It is desired to point out, however, that it was very difficult to make a comparative evaluation between these three airplanes since they represent almost three entirely different classes of aircraft and each have advantages peculiar to the particular airplane and power plant configuration.

Richard E. Horner

RICHARD E. HORNER
Lt Colonel, USAF
Chief, Test Engineering Subdivision
Flight Test Division

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Replaces AMC Form No. 86-34A-(2) (24 Jun 47)

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TITLE SHEET

MCPPAA66/WL/bjw/2813 4

HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT FIELD, DAYTON, OHIO

MEMORANDUM REPORT ON

Date 22 February 1949

SUBJECT: Technical Evaluation -
Single-Engine Basic Trainer

OFFICE Train., Transp., & Special Acft. Contract or Order No. ——

SERIAL No. Expenditure Order No. 720-[illegible]

A. PURPOSE:

1. To report the results of a Technical Evaluation of Basic Trainer type aircraft submitted in competition to the Air Material Command beginning 14 February 1949.

B. FACTUAL DATA:

1. Authority:

(a) Subject evaluation was conducted by direction of T.I. #2231, Addendum 1, dated 7 February 1949.

(b) The responsibility for monitoring and conducting subject Evaluation was placed on Directorate, Procurement and Industrial Planning, AMC.

2. In response to a canvas of the aircraft industry made by AMC in letter MCPPAA66/WS/bjw dated 4 February 1949, the following three contractors submitted aircraft for this competition:

(a) Beech Aircraft Corporation - Beech, Model 45

(b) Fairchild Aircraft Division of Fairchild Engine and Airplane Corporation - Fairchild M-62-1

(c) Texas Engineering & Manufacturing Co., Inc. - TEMCO T-1A

3. Description of Competing Aircraft:

(a) Beech - Model 45

Gross Wt. - 2650 lbs.
Engine - Continental Motors Corp. E-185-8
HP - 185 @ 2300 rpm.

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or Engine - Aircooled Motors Model 6A0-4-190-B12
HP - 165 @ 2900 rpm. (normal)
195 @ 3200 rpm. (take-off)
Propeller - Beech, constant speed
Landing Gear - Nosewheel type

(b) Fairchild - XNQ-1

Gross Weight - 3790 lbs.
Engine - Lycoming R-680-13
HP - 280 @ 2200 (normal)
295 @ 2400 (takeoff)
Propeller - Hamilton Standard Constant Speed
Landing Gear - Conventional, Tail Wheel Type

(c) TEMCO - TE-1A

Gross Weight - 1840 lbs.
Engine - Continental Motors Corp. Model C-145-2
HP - 145 @ 2700 rpm.
Propeller - Sensenich two (2) position Controllable
Landing Gear - Conventional tail wheel type

Each of the foregoing listed are all metal, low wing, two (2) place, tandem aircraft.

4. A Procurement Inspection (689 Inspection) of the Fairchild XNQ-1 trainer was conducted at the contractor's plant beginning 5 January 1949. The Fairchild Model Specification Report No. R129-000 dated 8 February 1949 described the XNQ-1 trainer with improvements in light of the 689 Board recommendations.

C. PROCEDURE:

1. Inspection:

(a) Air Materiel Command personnel representing all Engineering Division Laboratories, Maintenance Division, Supply Division, Procurement Division, and Industrial Planning Division inspected the competing aircraft and associated data in light of existing HIAD requirements, standard AF design practice, and maintenance and supply problems.

(b) Memorandum Reports, (Appendix E), prepared by inspecting personnel were submitted to MCPPA66 showing the relative superiority of the three competing aircraft and outlining change recommendations for improved AF standardization, utility, and maintenance.

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MEMORANDUM REPORT ON Technical Evaluation - Single-Engine Basic Trainer dtd 22 Feb 49

(c) Recommendations in the Reports referred to in Paragraph C. 1.(b) above, included requirements for minimum acceptability to USAF. These requirements were transmitted to the contractor who was asked to furnish data showing the effect on performance, weight, delivery schedules, and cost.

(d) Maintenance Division was specifically requested to estimate maintenance hours per hour of flight, average life for each airplane in hours, and dollar cost per hour of maintenance. Maintenance Division was unable to estimate these figures.

2. Flight Tests:

Flight Tests to compare qualitatively the ground handling and flight characteristics were conducted by Flight Test Division pilots and a report of observations thereon, is contained in Appendix C.

3. Working Committee:

A working committee, composed of one representative from each of the AMC Laboratories and Divisions participating in the Evaluation, agreed on the number of points allocated for each evaluation consideration based on 1000 points and are listed as follows:

(a)	Performance and Aerodynamics which includes	200
(b)	Structure and Design which includes	300
(c)	Power Plant including Propeller	150
(d)	Equipment including Electrical, Instruments, Mechanical, Ground Handling Equipment, and Parachute	100
(e)	Radio	50
(f)	Maintenance and Repair, including Supply	200
		1000

4. Data:

(a) The relative ratings by points in the "as is" configuration for the considerations outlined in Paragraph C.3. above, and the overall point rating of the competing aircraft are tabulated in Appendix A.

(b) A Summary of Recommendations by Model is shown in Appendix B.

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MEMORANDUM REPORT ON Technical Evaluation - Single-Engine Basic Trainer dtd 22 Feb 49

(c) Flight Test observations are presented in Appendix C.

(d) General comments and discussion by Model are presented in Appendix D.

(e) Overall cost per Airplane per Year based both on initial procurement of 100 airplanes and the scheduled 751 Airplane Program is outlined in Appendix E.

(f) ANC Laboratory and Division reports are attached as Appendix F.

D. CONCLUSIONS:

1. The overall order of merit established for the competing aircraft from the technical viewpoint in subject Evaluation is as follows:

(a) Fairchild XNQ-1

(b) Beech Model 45

(c) TEMCO, TE-1A

2. The overall unit cost to the Government for 100 airplane program, excluding in the case of Fairchild the cost of Government-owned facilities, by model, (overall cost includes airframe, GFP, fuel and oil, maintenance and spare parts) in ascending order of magnitude and based on assumptions listed in Appendix E, is as follows:

(a) TEMCO $24,249.00

(b) Beech $31,366.00

(c) Fairchild $66,458.00

3. The overall unit cost, for 100 airplane program, in dollars per earned point by model is as follows:

(a) Fairchild - $795/point

(b) TEMCO - $436/point

(c) Beech - $400/point

4. The overall cost to procure 751 aircraft as now scheduled on the 5 Year Program, maintain and operate an average inventory of 400 airplanes

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for 5 years is listed in descending order of magnitude:

(a) [illegible] - $15,765,450.00

(b) Beech - $[illegible]

(c) Fairchild - $[illegible]

[illegible]:

It is recommended that:

1. The Board consider that any one of the three articles evaluated herein could be made into a technically acceptable aircraft by making certain changes of relatively minor nature.

2. The aircraft selected be subjected to a further review of specification requirements so as to insure incorporation of all desirable items.

3. The Evaluation Board consider the possibility of utilizing simplified radio equipment in the basic trainer, giving particular attention to the question of ultra-high frequency equipment (ARC-1), which, at present, appear unduly expensive and complex for this type aircraft.

4. The Board establish a policy with regard to compliance with [illegible] Standards versus commercial or CAA Standards in the event the Beech or Ryan model is selected for procurement.

5. In view of the relative technical acceptability of the three articles submitted, the selection of the final model be based on over-all long range costs and suitability for the prescribed mission.

Prepared by [illegible]
Project Engineer

Approved by [illegible]
Chief, Trainer Unit

[illegible]
Project Officer for Trainer Evaluation

Concurrence:

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APPENDIX A

CONSOLIDATED EVALUATION RATINGS

TECHNICAL CONSIDERATION	ALLOTTED POINTS	FAIRCHILD	BEECH	TEMCO
**Performance & Aerodynamics	200	146	200	96
Structural & Design	300	271	252	174
Power Plant Section incl. Props	150	126	102	95
Equipment	100	78	65	34
*Radio	50	44	33	34
Maintenance & Repair	200	170	132	124
Total Score		835	784	557

*Score based on use of Group I Radio Equipment. Use of Group II Radio affected total score by less than 1%.

Above tabulated score indicates order of merit for the competing aircraft in their present, "as observed," configuration.

It must be noted that merit ratings above will be affected upward if corrective action is taken as recommended by Working Committee.

**Accounts for Flight Test Rating.

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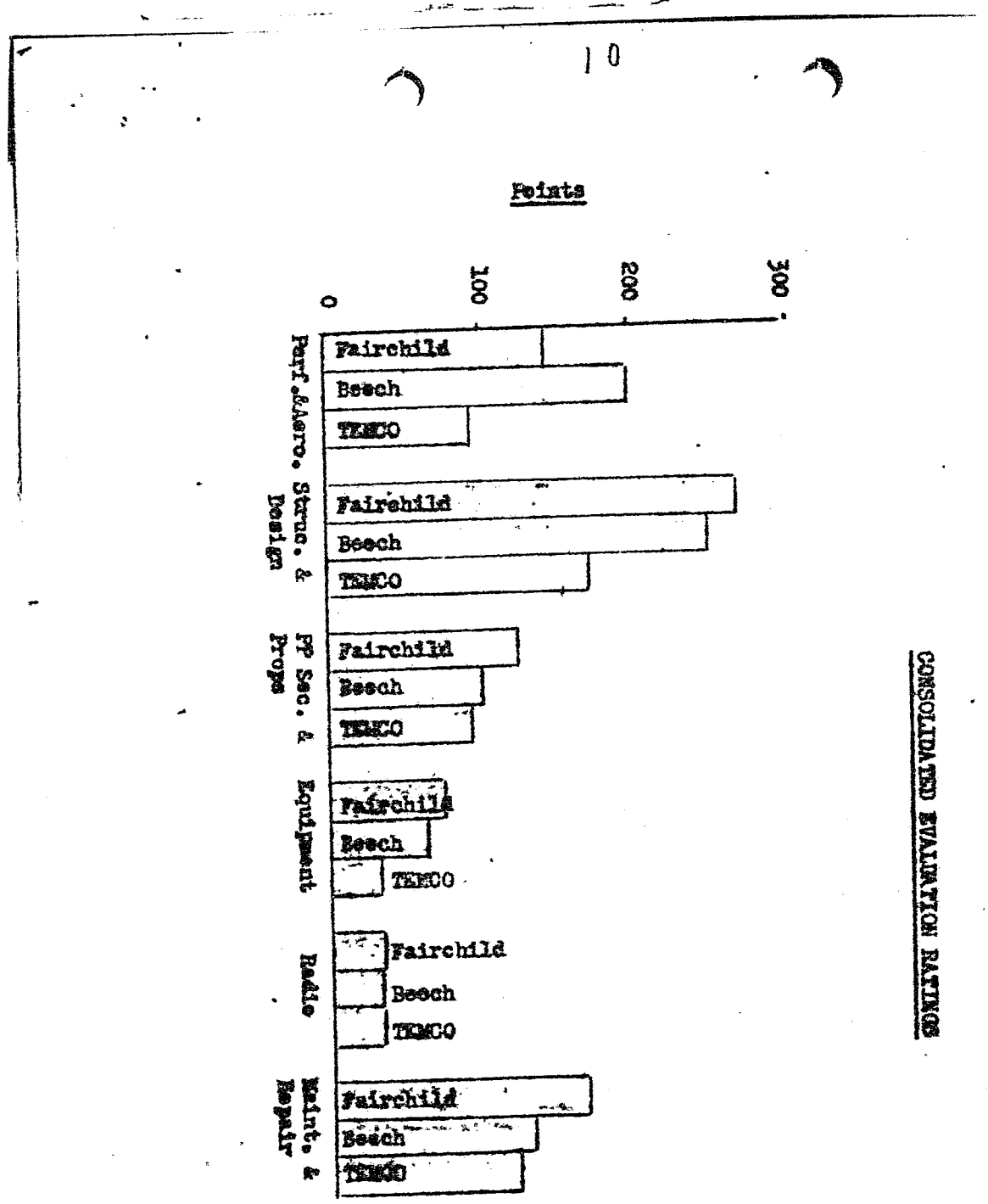

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APPENDIX B

Summary of Data by Model

FAIRCHILD XNQ-1

1. Performance and Aerodynamics

Fails to meet High Speed and Rate of Climb minimums of Military Characteristics

2. Structure and Design - Includes Structure, Cockpit, Landing Gear, and General Design

Forward vision obstructed by windshield frames.

Cannot use AF standard tow bar.

No tail steering provisions. (Requirement will be met if this airplane is selected for procurement.)

Provide two piece stabilizer. (Requirement will be met if airplane is selected for procurement.)

3. Power Plant - Includes Propeller

The Lycoming R-680-13 engine should be modernized to incorporate all the improvements dictated by service experience, including accessory drives for generator and tachometer. The improved engine would meet the requirements of Lycoming Spec. 1068-A dated 8 December 1941.

4. Equipment - Includes Instruments, Electrical, Mechanical, Ground Equipment, and Parachutes

Flight and engine instrument arrangement and types should be in accordance with AF Standard.

Provide the following:

100 Ampere Generator

Generator Overvoltage Protection

- Landing, taxi, and passing lights

Standard Ultra-violet and red lighting

Canopy defrosting

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APPENDIX B

Summary of Data by Model (Cont.)

5. Radio

AF Standard radio equipment should be installed.

6. Maintenance and Repair - Includes

Additional detailed changes are listed in the Laboratory reports contained in Appendix F.

7. Producibility - Reference Industrial Planning Report, Appendix F

Facilities - Of the total of 908,000 sq. ft. of plant area, 667,000 sq. ft. is Government owned. No additional facilities required to meet scheduled rate. To reach mobilization peak for either the T-31 or C-119B, either one of the airplanes would have to be moved from existing facility.

Tooling - Although much of the XNQ-1 tooling can be utilized, the Government will be required to underwrite cost for balance of production tooling required.

Material - Fairchild design presently uses little non-strategic material. New wing design would result in the use of 67l# non-strategic magnesium.

Estimated direct labor to manufacture first 100 airplanes, input 7200 man hours. Airplane designed for good over-all production efficiency.

8. Financial

Contractor financially capable to manufacture these Trainers. 9

9. Quotation

Airframe price (less normal GFP)	$36,716
Major essential changes	2,806
Total airframe price	39,522
Add normal GFP	12,402
Unit cost of airplane	$51,924

Five year program costs for 751 airplanes

Average price for airframe	$18,939
Average cost of GFP	9,268
Average unit airplane cost	$28,207

Note: If Contractor is in production of C-119B aircraft during same period, an average saving in overhead will result of approximately $3,812 due to the Trainer business. Resulting net cost to Government approximately $15,127 ($18,939 - $3,812) less GFP

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APPENDIX B

Summary of Data by Model (Cont.)

BEECH MODEL 45

1. Performance and Aerodynamics

This airplane met or exceeded all minimums required by Military Characteristics.

2. Structure and Design

Elevator tabs should be made irreversible.

Mooring fittings should be increased in number and size.

Tow provisions now not standard. Should be made to accommodate AF standard tow bars.

Non-standard parts (nuts, bolts, etc.). (Contractor will supply all AN or AF standard parts if airplane selected for procurement.)

3. Power Plant - Includes Propeller

Recommend that:

Engine should incorporate standard accessory drives.

4. Equipment - Includes Instruments, Electrical, Mechanical, Ground Equipment, and Parachutes

Provide the following:

AF Standard Instruments

24 Volt Electrical System

100 Ampere Generator

One 600 Watt or two (2) 250 Watt Landing Lights in left wing

Flashing navigation light system

AF and AN Standard electrical equipment

Canopy defrosting

Provisions on main gear for towing over soft terrain by vehicle

Provisions for main USAF standard towing bar

Provisions for main landing gear mooring

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APPENDIX B

Summary of Data by Model (Cont.)

5. Radio

Provide AF Standard radio equipment.

6. Maintenance and Repair - Includes

Additional changes are listed in the Laboratory reports contained in Appendix C.

7. Producibility - Reference Industrial Planning Report, Appendix F

Facilities - Contractor owned facilities of approximately 1,000,000 sq. ft., USAF cognizance. Facilities adequate for scheduled peak of 20 per month.

Tooling - Present tooling adequate for 16 airplanes per day on a 2-1/2 shift basis. With 20% subcontracting, a peak of 40 aircraft per day is possible.

Materials - Present design contains 102# non-strategic magnesium. New wing design would result in additional 220# magnesium.

Estimated direct labor to manufacture 100 airplanes, input 1600 man hours. Low manufacturing hours indicate good over-all production efficiency.

8. Financial

Contractor financially capable to manufacture these Trainers.

9. Quotation

Airframe price (less radio and engine)	$13,702
Major essential changes	1,713
Total airframe price (incl. propeller)	15,415
Add GFP radio and engine	5,115
Unit cost of airplane	$20,530

Five year program costs for 751 airplanes

Average price for airframe	$14,545
Average cost of GFP	4,900
Average unit airplane cost	$19,445

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APPENDIX B

Summary of Data by Model (Cont.)

TEMCO - TE-1A

1. Performance and Aerodynamics - Includes

Airplane failed to meet the High Speed, Endurance, Rate of Climb, and Stall Speed as required by Military Characteristics.

Spin characteristics are poor.

Stick forces versus "G" are very low and a pilot could inadvertently impose higher acceleration than airplane is designed for.

2. Structure and Design - Includes

Strength of this airplane does not meet AF Training airplane requirements.

Cockpit too small vertically and fore and aft.

Forward canopy section traps rear pilot when front section is moved aft, and vice-versa.

Tab is reversible.

Special towing is required.

Non-standard parts used. (Contractor will supply AN and AF standard parts if airplane is selected for procurement.)

Actual weight is 1,937 in lieu of 1,840 pounds as defined in model specification.

3. Power Plant - Includes Propeller

Engine should incorporate standard accessory drives for vacuum pump, etc., and a propeller governor pad for constant and speed operation. A pressure type carburetor should be installed.

4. Equipment - Includes Instruments, Electrical, Mechanical, Ground Equipment, and Parachutes

Provide the following:

Directional Gyro Indicator

AF Standard Instruments

24 Volt Electrical System

100 Ampere Generator

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APPENDIX B

Summary of Data by Model (Cont.)

AF and AN Standard Electrical Equipment

USAF Standard Ultra-Violet and red light for instrument lighting

Flashing navigation light system

Taxi and passing light

Windshield and canopy defrosting

Jack pad on tail

Provisions for hoisting complete airplane

Provisions for mooring from main landing gear

Provisions for towing aircraft with only standard USAF tow bar

5. Radio

Provide AF standard radio equipment.

Inadequate radio compartment resulting in major equipment being disposed throughout cockpit area in accessible locations.

6. Maintenance and Repair

Additionalchanges are listed in the Laboratory reports contained in Appendix C.

7. Producibility - Reference Industrial Planning Report, Appendix F

Facilities - Approximately 1,000,000 sq. ft. under lease from War Assets, cognizance of Navy. Present facilities adequate for scheduled peak of 20 per month with subcontracting. In event of mobilization, Chance-Voight might expand into part of TEMCO area.

Tooling - 80% complete - adequate for 12 airplanes per day on two shift basis. No Government funds required.

Material - TEMCO design uses a minimum of non-strategic material. New wing design would result in use of 24% magnesium.

This airplane requires an estimated direct labor input of 850 man hours to manufacture 100 airplanes and relatively, therefore, has the greatest producibility. Over-all production efficiency is good.

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APPENDIX B

Summary of Data by Model (Cont.)

8. Financial

Contractor financially capable to manufacture these Trainers.

9. Quotation

Airframe price (less radio and engine)	$ 8,425
Major essential changes	750
Total airframe price including propeller	9,175
Add GFP radio and engine	4,471
Unit cost of airplane	$13,646

Five year program costs for 751 airplanes

Average price for airframe	$ 6,285
Average cost of GFP	3,350
Average unit airplane cost	$ 9,635

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APPENDIX C

Flight Test Observations

Fairchild XNQ-1

This airplane was the most difficult of the three competing aircraft to handle on the ground, since it had no steering mechanism on the tail wheel. (Steering requirement is incorporated in Fairchild Specification and will be incorporated if airplane is selected for procurement.)

Ailerons felt springy in flight.

Rate of roll is too low to be satisfactory.

Buffet experience with large ailerons deflection is undesirable.

All but impossible to spin airplane to left.

Stalls in all configurations resulted in decided break with right wing dropping off sharply.

A conscientious effort was necessary to touch down all three (3) wheels. This appeared to be due to a limitation of elevator effect. Exceptionally noticeable with only a pilot in the front seat.

Engine torque more noticeable on this airplane than either TEMCO or Beech, despite adequate trim controls.

Airplane has ground looping tendency.

Beech -Model 45

Ailerons required more pilot effort than either the TEMCO or Fairchild trainers.

Propeller control was not satisfactory in that it tended to overspeed in high RPM condition and engine speed varied with air speed.

TEMCO = TE-1A

Acrobatic maneuvers difficult to accomplish with precision.

Accelerated maneuvers accomplished with appreciable loss in altitude.

Secondary stall induced during recovery from primary stall is encountered at speeds as high as 25% above stall speed.

Spin recovery difficult to time precisely, and requires more turns for recovery than is desirable for the type.

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APPENDIX C

Flight Test Observations
(cont.)

Time to climb to 5,000 ft. relatively long.

Cylinder head temperature instrument indicated excessive temperature during climbing flight with ambient temperature 30° below standard day and mixture control full rich.

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APPENDIX D

General Comments

1. Fairchild - XNQ-1

a. This airplane was designed, constructed, and static tested to requirements of the Navy and therefore more nearly approaches, in all respects, AF standard requirements.

b. Incorporation of the recommendations of the 689 Board will result in an airplane virtually complying with the NIAD and AF standard specifications.

c. The R-680-13 engine used in this airplane was formerly used on AF type airplanes during the war, is an AF approved engine, but is not now in production. The availability of this engine is based on the following alternatives:

(1) Lycoming can obtain approximately 150 surplus new engines (unused) which are now owned by commercial speculators. These can be obtained by the Lycoming Company for approximately $500.00 each. Lycoming then can tear down, inspect, overhaul, and modernize this engine to meet compliance with Lycoming Spec. 1065-A dated 8 Dec 41, and supply a factory warranty with each engine at a price to the Government of approximately $2,500.00 plus cost of the reclaimed engine.

(2) Re-establish production line on the modernized R-680-13, since all tooling is available. Cost to the Government per engine is approximately $4,500.00.

(3) In either case, Lycoming can meet delivery schedule required.

2. Beech - Model 45

a. This airplane employs a preponderance of non-standard parts including nuts, bolts, piping, fluid line connections and, in general, adheres to commercial practise rather than AF standard practice. This is reflected in failure to use forgings wherever possible in lieu of built up metal fittings, hinge brackets, etc.

b. The fixed surfaces of the tail group are magnesium sheet covered. The movable surfaces of the empennage and the ailerons are all magnesium construction.

3. TEMCO - TT-1A

a. Same comment as [illegible] above.

b. This airplane does use magnesium.

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APPENDIX E

AIRPLANE "OVER-ALL COST" ANALYSIS

Owing to the lack of information directly applicable to the competing aircraft, the following assumptions are made for purposes of the cost analysis of this Appendix: (Reference TWX T2685 from UNFK 140/CG AFTRC Barksdale AFB LA dated 18 February 1949).

(a) Hours flown per year (Based on T-6, period between 1 Jan 48 to 31 Dec 48) 625 hrs.

(b) Maintenance cost, dollars per hour flown (Based on T-6, over 7 month period, 1 Jan 48 through 31 Jan 49), made up as follows: $9.72/hr.

(1) Maintenance personnel - $7.48/hr. of flight

(2) Material - $1.74/hr. of flight

(3) Labor hours (T-6) - 2.443 hrs/hr. of flight

(4) Labor cost per hour - 7.48/2.443 = $3.06/hr. maintenance

(c) Since the XNQ-1 airplane has had no service test, it is assumed that this airplane has a number of maintenance shortcomings which will be disclosed only in service. Based on T-6 experience over a 22 month period (April 47 through Jan 49), the maintenance hours per hour of flight of 2.443 was reduced slightly to account for the lower weight of the XNQ-1 airplane to a value of 2.33 hrs./hr.

(d) The maintenance hours per hour flown are assumed to vary inversely as the points earned by the competing aircraft, using the XNQ-1 earned points as a basis of comparison. Therefore, the maintenance hours per hour flown for the

Beech = $2.33 \times \frac{8.35}{7.84} = 2.48$ hrs./hr. flown, and

TMCO = $2.33 \times \frac{8.35}{5.57} = 3.49$ hrs./hr. flown, and

Fair. = $2.33 \times 1 = 2.33$ hrs./hr. flown.

(e) Cost:

Beech - 625 x 2.45 x $3.00 = $4,600.00

TMCO - 625 x 3.49 x $3.00 = $6,540.00

Fair. - 625 x 2.33 x $3.00 = $4,360.00

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APPENDIX E

Table 1

TOTAL "OVER-ALL COST" SUMMARY BY MODEL

	Fairchild	Beech	Temco
Basic Cost/Airplane	100 Apls	100 Apls	100 Apls
Airframe	$39,522.00	$15,415.00	$ 9,175.00
GFP	*12,402.00	**5,115.00	**4,471.00
Total (Airframe & GFP) Airplane Cost	$51,924.00	$20,530.00	$13,646.00
Operation Cost/Airplane			
Estimated Hrs. Flown/Yr.	625	625	625
Fuel Consumption, Gal/hr. (75% hp)	16.88	11.6	9.2
Fuel Cost/Gal.	.19	.19	.19
Fuel Cost/Yr.	$ 2,050.00	$ 1,378.00	$ 1,092.00
Oil Cost/Yr. (Approx. 6% fuel cost)	120.00	83.00	66.00
Total Operation Cost/Yr.	$ 2,170.00	$ 1,461.00	$ 1,153.00
Maintenance Cost			
Hrs. of Maintenance/hr. flown	2.33	2.45	3.49
Total Hrs. Maintenance/Yr.	1455	1530	2180
Maintenance Labor Cost/Hr.	3.06	3.06	3.06
Total Maintenance Cost/Yr.	$ 4,460.00	$ 4,750.00	$ 6,690.00
Spares Cost			
# Spares Cost (20% Airframe Cost)	$ 7,904.00		
## Spares Cost (30% Airframe Cost)		$ 4,625.00	$ 2,755.00
Total Cost/Airplane/Yr.	$66,458.00	$31,366.00	$24,249.00

* Normal GFP on XNQ-1
** GFP Engines & Radio
# Airplane with Normal GFP (XNQ-1)
Airplane with Engines & Radio GFP only (Beech & TEMCO)

NOTE: See Appendix B for detailed airframe and airplane costs.

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APPENDIX E

TABLE II

OVERALL COST TO PROCURE 751 AIRCRAFT AS NOW SCHEDULED ON 5 YEAR PROGRAM, MAINTAIN AND OPERATE AN AVERAGE INVENTORY OF 400 AIRPLANES FOR 3 YEARS

	FAIRCHILD	BEECH	TELCO
Airframe Unit Cost (Based on 751 Apl. Program)	$ 18,939.00	$ 14,548.00	$ 6,285.00
GFP (Based on 751 Apl. Program)	9,268.00	4,900.00	3,350.00
Total Unit airplane cost	28,207.00	19,448.00	9,635.00
Total Cost for 751 airplanes	21,183,457.00	14,605,448.00	7,235,885.00
Operating Cost for 400 A/C for 3 Years			
Estimated hrs. flown for 3 yrs./apl.	1875	1875	1875
Fuel Consumption Gal/hr.	16.88	11.6	9.2
Fuel Cost/gal. dollars	$ .19	$ .19	$ .19
Total Fuel Cost/airplane	6,010.00	4,140.00	3,280.00
Total Oil Cost (approx. 6% Fuel Cost)/apl.	361.00	248.00	197.00
Total Operation Cost/airplane for 3 yrs.	6,371.00	4,388.00	3,477.00
Total Operation Cost for 400 apl.	2,548,400.00	1,755,200.00	1,390,800.00
Maintenance Cost			
Hrs. of Maintenance/hr. flown	2.33	2.45	3.49
Total Hrs. Maintenance for 3 Yrs./apl.	4350	4575	6510
Maintenance Labor Cost/hr.	$ 3.06	$ 3.06	$ 3.06
Total Maintenance Cost for 3 yrs./apl.	13,300.00	14,000.00	19,920.00
Total Maintenance Cost for 3 yrs. for 400 apls.	5,320,000.00	5,600,000.00	7,968,000.00
Spares Cost			
Spares Cost 20% =	$ 4,236,690.00		
Spares Cost 30% =		$ 4,381,634.00	$ 2,170,765.00
Total Overall Cost =	$ 33,288,547.00	$ 26,342,282.00	$ 16,765,450.00

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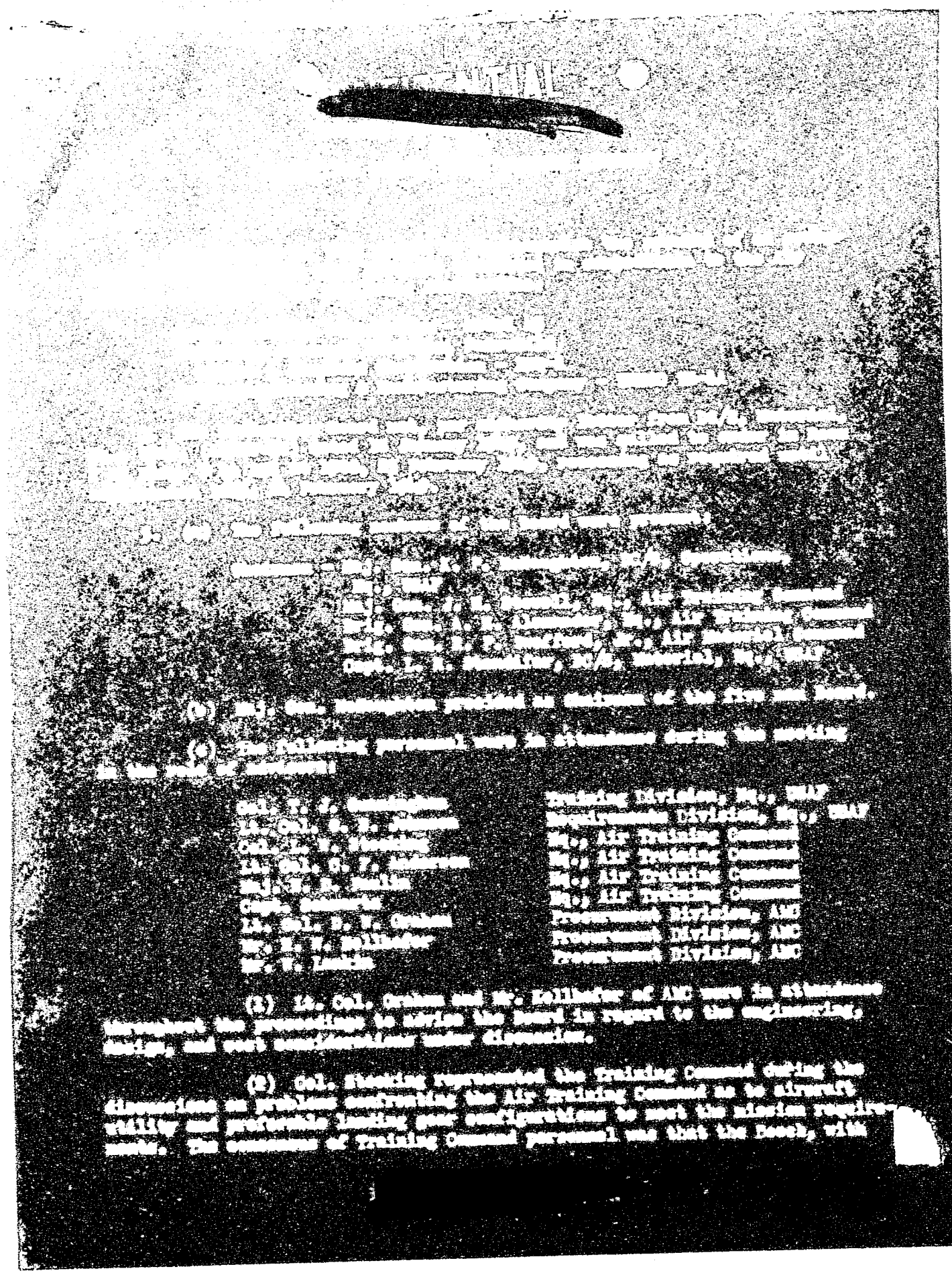
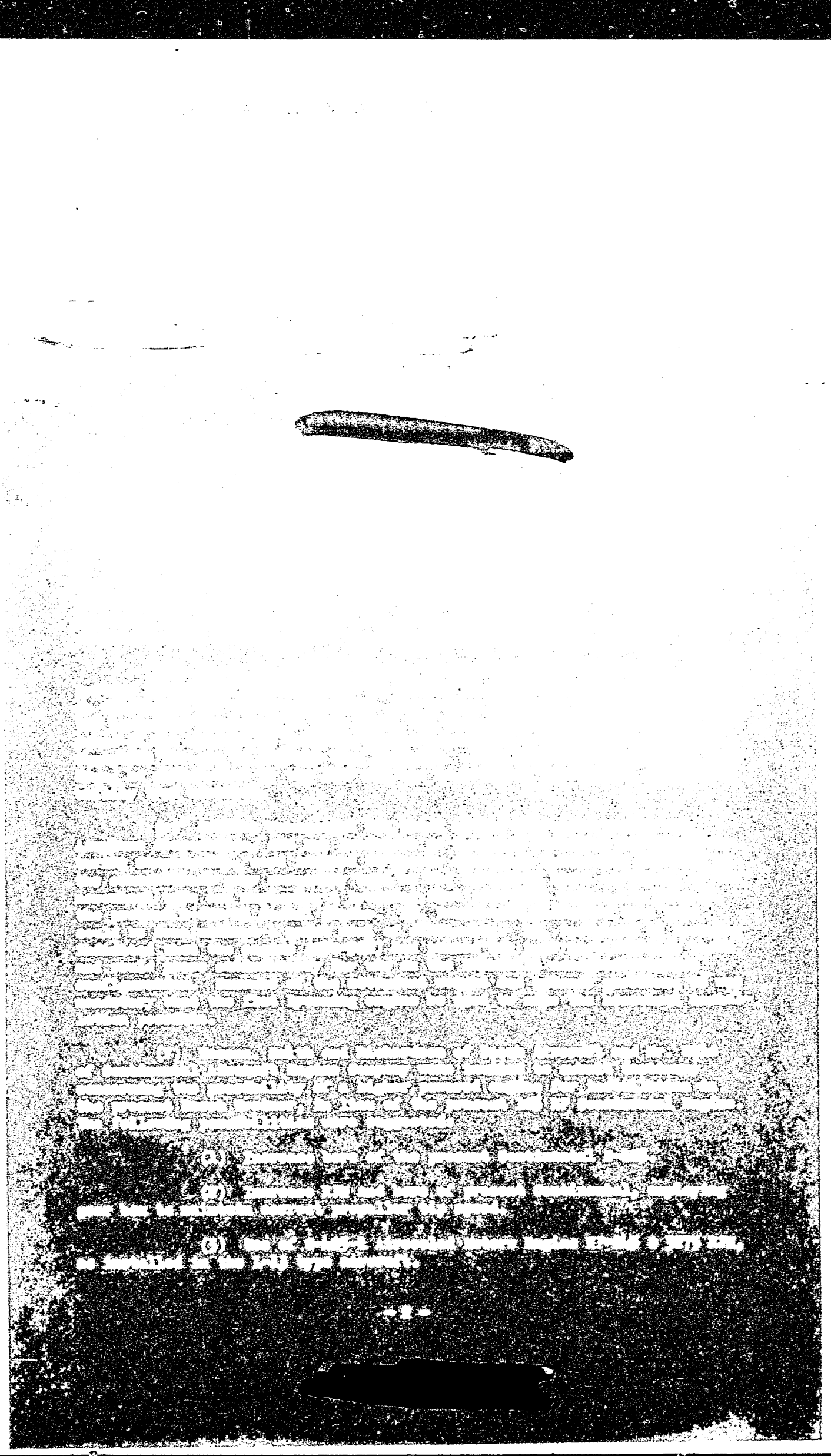


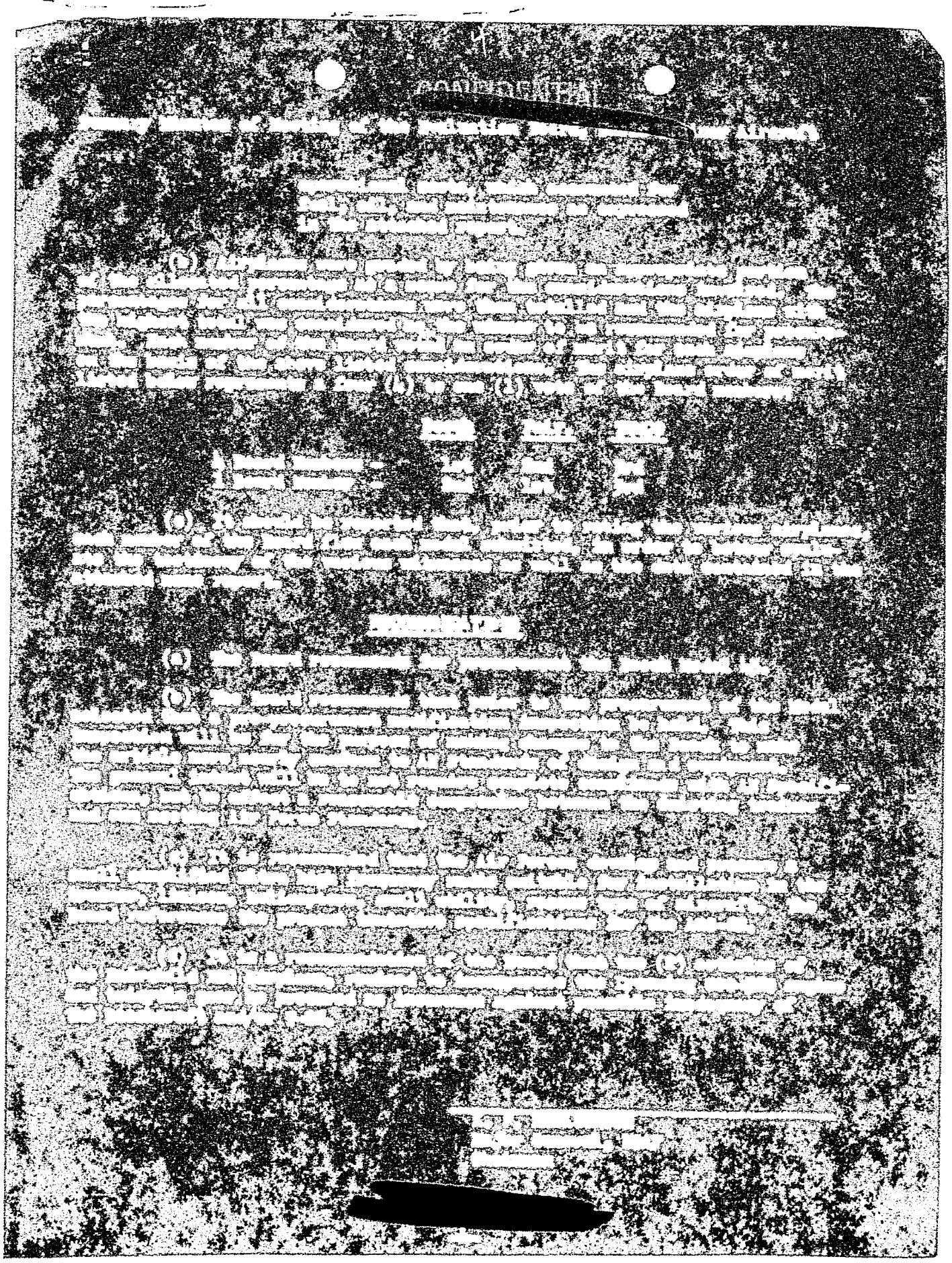


The above possibilities were considered feasible, but the consensus of the Board was to retain the present configuration, with a view to future consideration of increased HP for the Beech if said airplane were procured and if the weight increases, due to changes, made the incorporation of more horsepower necessary.

4. Action Taken by the Board

(a) A discussion was held to determine the considerations for Board evaluation. Among the considerations discussed were those contained in Memorandum Report MCPPXA66-X-117 dated 22 February 1949, attached herewith as Exhibit "A". The Board reached agreement on those listed as follows:

Consideration	Percentage Allocated
(1) Ability to perform mission	40%
This consideration and the allocated percentage accounted for AMC, as well as Training Command (training level) requirements including the performance, aerodynamics including stall characteristics, landing and take-off distances, vision on ground and take-off, etc., and landing gear configuration.	
(2) Technical Considerations	20%
(a) Structure & design - 10% (b) Equipment - 10%	
This accounted for the 2nd, 3rd, 4th, and 5th AMC considerations contained in the Memorandum Report mentioned above.	
(3) Maintenance	25%
(AMC and Training Command)	
Maintenance from the technical, as well as the Training Command viewpoints were included in this item.	
(4) Costs	15%
(a) Procurement - 5% (b) Operational - 10%	
The costs considered included the basic airplane cost including GFP, as well as	



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T-31 27

To: MCFPX466 From Fairchild

24 February 1949

Proposed Selling Prices of Fairchild T-31 Trainer with installation of Lycoming Flat Engine and Tri-Cycle Gear, giving effect to estimated savings on continued production of C-119B's.

Quantity	Proposed Sales Prices T-31's	Estimated Savings on C-119B's (1)	Estimated NET Cost to Government
First 100 Airplanes	$ 45,892.	$ 11,085.	$ 34,807.
Next 209 Airplanes	19,272.	3,850.	15,422.
Cumulative 309 Airplanes	27,887.	6,191.	21,696.
Next 206 Airplanes	16,500.	2,850.	13,650.
Cumulative 515 Airplanes	23,783.	5,000.	18,783.
Next 236 Airplanes	14,700.	2,450.	12,250.
Cumulative 751 Airplanes	20,929	4,100.	16,829.
Even quantities of 500 Airplanes	24,032.	5,000.	19,032.
1000 Airplanes	19,426.	3,800.	15,626.

(1) These figures represent the estimated savings on continued production of the C-119B concurrent with T-31 production, in the period, resulting from the reduction in overhead rate due to the combined volume of C-119B and T-31 business.

FAIRCHILD AIRCRAFT DIVISION

A. F. FLOOD

452.1 — Fairchild T-31 C-119 &

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MCP Form No. 71-520
(Rev 9 Jan 48)

Initiating Agency:
Aircraft & Missiles Section
Procurement Division
MCPPXA-66

DEPARTMENT OF THE AIR FORCE
UNITED STATES AIR FORCE
AIR MATERIEL COMMAND

Blanket Bailment Agreement No. W 33-038 ac- 11023
Bailment Instruction No. 480
Amendment No. 3
RN No. 4761

MCPPXS-8/WL/DMM
Wright-Patterson Air Force Base
Dayton, Ohio

28 February 1949

BAILEE: FAIRCHILD AIRCRAFT CORPORATION
FAIRCHILD ENGINE & AIRPLANE DIVISION
HAGERSTOWN, MARYLAND

1. It has been determined that the national defense will be furthered by amending subject Bailment Instruction as follows:

a. Paragraph 5, PERIOD OF BAILMENT, is hereby amended by extending the date of expiration for the one (1) each Navy Model XNQ-1 Aircraft, BU/Aer Serial No. 75725, and one (1) each Navy Model XNQ-1 Airdraft, BU/Aer Serial No. 75726, to 30 June 1949.

2. Except as hereby modified, either expressly or by necessary implication, all the terms, covenants and conditions of subject Bailment Instruction shall continue in full force and effect.

AUTHORIZED BY Nate Silverston
Contracting Officer

NATE SILVERSTON

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17 March 1949

MEMORANDUM FOR THE CHIEF OF STAFF

SUBJECT: Evaluation of the Basic Trainer Aircraft

1. An evaluation board was appointed by authority of a letter from the Deputy Chief of Staff, Material, Headquarters USAF, for the purpose of evaluating training aircraft submitted in competition and recommending one to be procured as the basic training aircraft for the USAF. This board met at Wright-Patterson Air Force Base on the 23rd and 24th of February 1949.

2. It was the consensus of the board that the Temco aircraft was too light and too deficient in several flying characteristics to perform the training mission. Consideration thereafter was confined to the Fairchild and Beechcraft aircraft. Between these two, there was no doubt that the Fairchild was the more rugged and the more economical from a maintenance standpoint. The Fairchild uses less manpower for maintenance than does the Beechcraft.

3. The board voted 4 to 1 to procure the Beechcraft Model 45. I cast the dissenting vote, my choice being the Fairchild 24Q.

4. The fact that the Beechcraft Model 45 uses a tricycle landing gear appeared to be the main deciding factor in its being selected by the majority of the board. The flying instructor personnel of the Flying Training Division preferred the tricycle landing gear because they felt that the initial accident rate would be materially reduced by the elimination of ground loops. This point of view was accepted by four members of the board. I felt that it was not advisable to go to a tricycle landing gear at this time because a pilot can be transitioned from a conventional type gear to a tricycle gear with no difficulty, whereas the reverse is difficult and time consuming. I believe that the over-all Air Force accident rate would not be reduced but that the period in which accidents normally occur would only be postponed. This point of view is shared by many experienced pilots with whom I have talked. When the Air Force has reached a point where there will be no conventional type aircraft, then consideration should be given to introducing the tricycle landing gear configuration into the basic training program. That point, however, will not be reached until 1953 or 1954 with our present type aircraft. In event the Air Force procures either the Martin AM-1 or the Douglas AD-3 for the ground support mission, the time when conventional type aircraft would be phased out of the program is still further in the future.

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5. When the board recommended the procurement of the Beechcraft there was a fear among its members that it might prove too fragile to take the hard usage demanded of training aircraft and as a result recommended the procurement of two Fairchild XNQ's with tricycle landing gear.

6. The T-28 is powered by the R-1300 engine which is an untried engine and may prove unsatisfactory. In this event, the Fairchild aircraft, powered with a GSO-580 Lycoming engine and a tricycle landing gear could in an emergency replace the T-28. The Beechcraft aircraft would be entirely unsuited as this replacement.

7. My discussions with the training people in the Navy have indicated that they are not interested in an airplane as light as the Beechcraft for the basic training mission. Although they have not made a definite commitment in favor of the Fairchild aircraft, it must be remembered that the Fairchild is their development. At the 689 board meeting on the Fairchild aircraft held at Hagerstown, Maryland, the Navy indicated that they would recommend the procurement of the Fairchild if the Air Force decided to purchase that aircraft. This is an important consideration in view of the present thinking on consolidation of the flying training programs.

8. The Fairchild Corporation has testified that they can produce a tricycle gear model using a flat GSO 580 Lycoming engine without difficulty and without significant increased cost. This will permit the changeover to the tricycle gear trainer when the conventional type aircraft are phased out of the Air Force program.

9. The Fairchild XNQ in its present configuration is powered with a Lycoming 680-13 engine which is a proven Air Force engine. The Beechcraft is powered with a Continental E-185-8 engine which is not a proven engine although it is being used in a somewhat modified form in the L-17.

10. The AMC Technical Evaluation brought out the fact that the difference in the over-all cost between the Fairchild XNQ and the Beechcraft when 751 aircraft are procured and an average inventory of 400 is maintained for a three-year period is less than seven million dollars. This cost does not seem significant in view of the fact that the Fairchild airplane is built to military specifications whereas the Beechcraft incorporates a preponderance of non-standard items.

11. Another fact which should be given consideration is the proposed "Reserve Officers' Training Corps Act of 1949" which is before the present Congress. In the Augmentation Officer Procurement Program

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and the Career Officer Procurement Program of this Act, provision is made for a maximum of 65 hours of pilot training by civilian contractors using light commercial type aircraft. It does not seem reasonable that an additional 130 hours should be given in the Training Command in an aircraft such as the Beechcraft which is very little if any heavier than those aircraft. There should be a progression to a more advanced type of aircraft such as the Fairchild.

12. Although the Training Command members of the board voted for the Beechcraft, General Harper, Commanding General of the Air Training Command, is very strong in his conviction that the Fairchild UC is the superior airplane for the basic training mission.

13. In summary,

a. The Fairchild is a hand book airplane whereas the Beechcraft is not.

b. The Fairchild has a proven engine; the Beechcraft has not.

c. The Fairchild airplane is considerably more rugged and will operate with less maintenance cost than the Beechcraft.

d. Students should be trained on the conventional type gear until there are no conventional type gear aircraft left in the Air Force.

e. The Fairchild aircraft can be converted to a tricycle gear without significant cost.

f. The relatively small differential in cost between the Fairchild and the Beechcraft should not be a deciding factor.

g. The Navy is not interested in the Beechcraft.

h. The Fairchild is a possible replacement for the T-28 in event that airplane does not prove satisfactory.

i. The Beechcraft aircraft will not provide a normal progression to a more advanced type aircraft for those students who have received training under the Reserve Officers' Training Corps Act of 1949.

j. The Commanding General of the Air Training Command favors the Fairchild aircraft and recommends that it should be given consideration for purchase over the Beechcraft.

14. It is my considered opinion after careful analysis of the Air Material Command's evaluation and after having flown the aircraft and

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listened to the arguments pro and con at the board meeting that the Air Force will be in a much sounder position by purchasing the Fairchild aircraft.

RECOMMENDATIONS

1. That the Fairchild XNQ in its present conventional configuration and with the Lycoming R-680-13 engine be procured and continued in the production line until such time as it is known that there will be no more conventional type aircraft utilized in the USAF.

2. That two articles of the Fairchild XNQ aircraft incorporating the Lycoming GSO-580 engine and tricycle landing gear be developed now in order that it may be incorporated in the production line at the proper time.

3. That the Air Force develop and procure a small simplified ultra high frequency radio suitable for installation in the trainer, liaison, helicopter, small utility and rescue types of aircraft.

KENNETH P. McNAUGHTON
Major General, USAF
Director of Training & Requirements.

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AIR STAFF SUMMARY SHEET

Office of Preparation

TO	ROUTE	DESIRED ACTION	INITIALS		
DCS/O	1	Approval	/s/ F.H.S.	AFORT	
DCS/M	2	Coordination	/s/ Everest	Gen McNaughton	6770
Chief of Staff	3	Approval	See Note P. Approved by Gen Vandenberg /s/ McK.		

17 March 1949

Photostat copy passed to Repeat same to obtained from Documents Section Office

SUBJECT: Evaluation of the Basic Trainer Aircraft

SUMMARY:

1. Submitted herewith are a memorandum for the Chief of Staff from the Director of Training and Requirements, dated 17 March 1949, (Incl #1), and three copies of report "Summary Minutes of Meeting of the Evaluation Board, Basic Trainer Aircraft," each accompanied by AMC Memorandum Report No. MCPPSZ66-M-117 dated 22 February 1949.

2. As a result of a canvass of the aircraft industry made by AMC, the following three contractors submitted aircraft forcompetition:

a. Beech Aircraft Corporation - Beech Model 45
b. Fairchild Aircraft Division of Fairchild Engine and Airplane Corporation - Fairchild XNQ-1
c. Texas Engineering and Manufacturing Co., Inc. - Temco TE-1A

3. Attention is inited to paragraph D 1 of AMC report in which AMC rates the competing aircraft in over-all order of merit as follows:

a. Fairchild XNQ-1
b. Beech Model 45
c. Temco TE-1A

The Air Material Command arrived at the above over-all order of merit after consideration of the following factors:

a. Performance & Aerodynamics
b. Structural & Design
c. Power Plant Section including Propellers
d. Equipment
e. Radio
f. Maintenance & Repair

4. The Basic Trainer Evaluation Board, after analysis of the same considerations, recommended by a vote of 4 to 1 the procurement of the Beech Model 45.

5. A difference of opinion therefore exists between the Air Materiel Command and the majority opinion of the Basic Trainer Evaluation Board. The Director of Training and Requirements cast the dissenting vote and based his decision upon the factors contained in the inclosed memorandum (Incl #1). In this

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connection, considerable weight should be given to the fact that the Commanding General of the Air Training Command recommends the procurement of the Fairchild aircraft over the Beechcraft.

RECOMMENDATION

That the Fairchild aircraft be procured and that the recommendations contained in the memorandum for the Chief of Staff (Incl #1) be approved.

/s/
KENNETH P. McNAUGHTON
Major General, USAF
Director of Training & Requirements

2 Incls
1 - Memo for C/S
2 - Eval Bd Rpt (3 copies)

NOTE:

I concur with McNaughton
/s/ H. S. Vandenberg

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21 March 1949

MEMORANDUM FOR THE CHIEF OF STAFF, USAF

SUBJECT: Comments on Basic Trainer Evaluation

1. In evaluating the Fairchild and Beech proposals, it apparently comes to a decision as to which of the aircraft best meets the requirements of the Training Command for this type of aircraft. The following information regarding the two proposals is submitted:

	FAIRCHILD	BEECH
Facilities	Adequate for peacetime. Firm calls for shifting the C-119 for emergency production.	Adequate for peacetime. Possibility of interference with Boeing bomber production in emergency as regards manpower. Could be worked out.
Fuselage.	Satisfactory.	Satisfactory.
Engines.	Lycoming. Have very little business. Ample facilities. Thoroughly reliable engines.	Continental. Adequate facilities. Engine not so well proven, probably satisfactory.
Navy procurement.	Probable, if Air Force adopts Fairchild.	Extremely unlikely the Navy will participate.
Costs.	750 total procurement over 5 years, maintained 400 inactive inventory for 3 years. $33,000,000.	750 total procurement over 5 years, maintained 400 inactive inventory for 3 years. $26,000,000. Beech has $7,000,000 advantage in cost.
Maintenance.	Maintenance costs should be less than Beech.	Maintenance costs estimated to exceed Fairchild.

2. The above indicates there is little to choose from the viewpoint of productive ability and capacity, etc. The long-range program indicates Fairchild to be somewhat more expensive.

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3. In summary, this office feels that the decision should be in favor of the airplane selected by the using service; however, since the Commanding General of the Training Command feels that the Fairchild can do the best job, no objection is offered to changing the majority recommendation of the Evaluation Board.

E. M. POWERS
Major General, USAF
Asst. Deputy Chief of Staff, Material

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HqAMC Form No. 80-34
(20 Dec 46)

TITLE SHEET

HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT FIELD, DAYTON, OHIO

MCPPXA66/ML/mc

MEMORANDUM REPORT ON

Date 23 March 1949

SUBJECT: Engineering Inspection, XNQ-1 Trainer Airplane

OFFICE Training, Transp.& Spec. Airc. Contract or Order No.

SERIAL No. MCPPXA66-M-119 Expenditure Order No. 720-87

A. PURPOSE:

1. To report results of the Engineering Inspection of the Fairchild XNQ-1, Navy Trainer held at the Contractor's plant.

B. FACTUAL DATA:

2. This Headquarters was directed to begin negotiations for the procurement of the Fairchild XNQ-1 airplane to be designated T-31A. The final configuration of the T-31A was to be determined by means of an Engineering Inspection.

3. This inspection was conducted in light of the following general requirements:

(a) A pilot trainer for 130 hours, from primary through basic training

(b) Equipment to permit 20 hours of instrument flying

(c) Night Flying Instruments

(d) Sufficient radio communication equipment for cross country flight

4. Subject airplane which was procured by the Navy from the Fairchild Aircraft, Division of Fairchild Engine and Airplane Corporation, was designed and constructed to Navy criteria as defined by Model Specification (Navy Department, Bureau of Aeronautics) SD-400, dated 1 April 1945.

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MEMORANDUM REPORT ... Engineering Inspection, XNQ-1 ...ainer Airplanes, dated 23 March 1949

5. Model Specification SD-400 was rewritten per U.S.A.F. Spec. 1°01 as Model Spec. No. R92E-000, dated 2 December which specification incorporated AF and AN equipment and designations in lieu of Navy equipment and identifications.

6. Subject airplane is a single engine, all metal, two place trainer, equipped with a Lycoming R-680-13 engine (NRP-280 HP at 2200 RPM, Take-Off 295 HP at 230° RPM), electrically retractable main gear and electrically operated flaps, and bubble type one piece canopy.

7. A new Model Specification No. R129-000 dated ? February 1949 was subsequently submitted along with the XNQ-1 airplane in a trainer competition held at the AMC on 14 February 1949.

8. Subject inspection was conducted at the Contractor's plant substantially in accordance with AMC Regulation 120-5 dated 12 May 1945 to determine the configuration of the T31A Airplane.

9. The Inspection Board was composed of personnel from Air Materiel Command, Training Command, Operations Hq USAF, Materiel, Hq USAF, (Board members indicated by asterisk opposite name on list.) Maj. Gen. McNaughton presided as Chairman of the board, but later appointed Lt. Col. O. B. Johnson of Operations, Hq USAF as chairman. Messrs. Kellhofer and Silverston as well as AMC inspection personnel acted as advisors throughout the discussions.

10. The inspection personnel are listed as follows:

AMC Personnel

NAME		RANK
N. Silverston	Procurement	Civilian
W. Lankin	Procurement	Civilian
R. W. Kellhofer	Procurement	Civilian
F. A. Wright	Power Plant	Civilian
C. H. Corsaw	Propeller	Civilian
* R. C. Anderson	Aircraft Projects	Major
M. Summerfeld	Aircraft Inspection	Civilian
R. M. Worley	System & Components	Civilian
J. F. Randeck	Electrical	Civilian
N. J. Gates	Maintenance Airframe	Civilian
D. P. Ransomer	Maintenance - Engine	Civilian
J. E. Bruggeman	Maintenance - Special Tools	Civilian
E. H. Pelowski	Maintenance - Electronics	Civilian
W. H. Houseworth	Maintenance Equipment Materials	Civilian
G. E. Long	Aero Med	Major
H. R. Beacom	Maintenance - Instruments	Civilian
R. C. Moore	Maintenance - Instruments	Civilian

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MEMORANDUM REPORT on Engineering Inspection, XNQ-1 Trainer Airplane, dated 23 March 1949

Training Command and Hq USAF Personnel

NAME		RANK
* H. P. McNaughton	DC/S Operation, USAF	Maj.General
* E. H. Alexander	Hqs Training Command	Brig.General
T. J. Cunningham	Training Div. Hqs USAF	Colonel
J. E. Roberts	Hqs Training Command	Colonel
* O. B. Johnson	Requirements Division Hqs USAF	Lt. Colonel
A. W. Polkwing	Hqs Training Command	Lt. Colonel
A. J. Fox	Flying Safety	Major
T. W. Furlow		Major
G. W. McLaughlin	R&D, Hqs USAF	Major
* L. R. Standifer	R&D, Hqs USAF	Captain

BUAER Personnel

Captain Moss
Commander Simpson
Lt.Comdr. R. H. Dasteel
Mr. C. F. Blandings
Mr. R. J. Coughlin
Mr. Schaff

FAIRCHILD Personnel

A. J. Thieblot
L. Fahnestock
H. C. Wilben
R. E. Hensen
R. J. Yujuico
T. F. Fletcher
F. K. Bradford
H. C. Billings

Personnel from OIC

S. E. Cleveland	AFPR	Major
C. V. Williams	Contracting Officer	Major

11. PROCEDURE

(a) The inspection committee met at the Fairchild Aircraft Plant on 5 and 6 January 1949. Maj. General McNaughton described the basic mission and characteristics desired for the airplane (See Paragraph 3 above), and instructed inspection personnel to examine the airplane in light of this mission and characteristics desired. Requests for alteration or study (ATSC Form No. 120-5) were prepared by inspection personnel for evaluation and action

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HqATSC Form No. 80-507 (20 Jan 45)
(Old AAFMC-266)

MEMORANDUM REPORT on Engineering Inspection, XR4-1 Trainer Airplanes, dated 25 March 19..

by the Board.

C. CONCLUSIONS:

12. Subject airplane would be acceptable provided that the changes in Appendix 1 listed as "Approved" or "Contractor will Comply" be included in the Model Spec. R129-000, dated 6 February 1945, and are incorporated in the airplane.

D. RECOMMENDATIONS:

13. It is recommended that if procurement of this airplane is made, a 609 inspection be conducted on first production article to insure compliance with the Model Specification contained in the contract.

Distribution:
HQ, USAF - DC/S, Materiel (2)
HQ, Training Command - Wash.,D.C. (2)
HQ, USAF - Flying Safety Div.
(2)(Thru DC/S, Materiel)
Fairchild Aircraft Corp.,(Hagerstown Md.)(3)(Thru AF Plant Rep.)
Procurement Division, ..CF (5)
Aircraft Projects - Engr. Div.MCREDA (2)
Aircraft Lab. - Engr.Div.MCREAA (2)
Equip. Lab.- Engr. Div. MCREXE (2)
Power Plant Lab. - Engr.Div. MCREAP (2)
Components & Systems Lab.- Electronics Sub. Div., MCREAS (2)
Maintenance Div. MCMMXT (2)
Contract Files, MCP XS73 (1)
Aero. Med. Lab, MCREXD (2)
Inspection Section - MCPAL (1)
Training Command Liaison - MC (2)
Buker (Thru Liaison) Commander
Hawkins (2) N.A.M.

Prepared by: WILLIAM L. LAKIN, Project Engineer

Approved by: S. ... BISHOP, Lt.Col., USAF
Train.,Transp.,Spec.
Airc. Branch

Approved by: BEN I. FUNK, Colonel, USAF
Chief, Aircraft & Missiles Section
Procurement Division

Concurrence:

WF-L-29 DEC 45 10M

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APPENDIX I
Memorandum Report - MCPPXA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
1	Radio Installation	Install necessary wiring, etc. to permit use of H-16/UR "boom" type microphone-headset. Install jack adjacent to radio consoles for use of T-17 hand held microphones. Install microphone and headset stowage clips in both cockpits. These clips shall be in accordance with USAF drawing 47B41751.		Approved
2	Radio Installation	Submit complete radio installation proposal showing all "installed" equipment and those equipments for which space and structural provisions are furnished.	Impractical to accomplish mock-up on airplane being inspected.	Approved
3	Radio Installation	Install the following equipments: AN/ARC-3VHF Command, USAF combat interphone and BC-453B range receiver. Furnish space and structural provisions for AN/ARC-19 UHF command as alternate to AN/ARC-3 and for AN/ARN-14 (ODR).	Air Training Command Requirements	Approved. AMC will supply dwgs. covering the ARC-19 eqpt. broken down to smaller units. Contractor will submit proposal to AMC for approval.
4	Radio Installation	Raise radio control console on right side of both cockpits to height of approximately 16 inches from floor. Tilt control console so that controls are normal to the operator's vision.	To improve access to radio controls.	Not Required

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APPENDIX I
Memorandum Report - MCFPA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
10	Radio Installation	Install range receiver antenna on inside of canopy	Reduce aerodynamic drag and boil out	Approved
11	Radio Installation	Install duplicate controls in both cockpits arranged in a row, oriented fore and aft, with controls installed in following order starting at forward end of console: (a) Interphone (b) Range Receiver (c) VHF Command (d) Space for UHF Command (e) Space for AN/ARN-14 (f) VHF Command and range receiver transfer panel. Provide mounting provision for installing standard Navy-USAF radio control panels.		Approved
12	Radio Installation	Install "pick-axe" antenna on tip of vertical stabilizer and enclose within plastic housing. This antenna to be contractor furnished, and complete installation tested in accordance with USAF Specification X-7122.	To provide flush antenna.	Discuss with Contractor re feasibility. Contractor will run a flight test determine best position for antenna. Approved pending study
13	Ammeter and Voltmeter	Install a type J-1(Spec. 32529) ammeter (with proper shunt) and an AN3203-V30 voltmeter in lieu of the combination volt-ammeter now installed.	To facilitate maintenance and supply; to comply with USAF requirements.	Approved.

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APPENDIX I
Memorandum Report - MCPPXA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
5	Radio Installation	Install two (2) each microphone switches on each throttle control; one switch shall be connected as normal "push-to-talk"; the other switch shall be connected so that when energized, regardless of interphone selector switch setting, both occupants are placed on interphone.	Required as part of standard interphone for conventionally powered trainers.	Approved. Most forward button for intercom. (Same as T-28)
6	Radio Installation	Install radio junction box in radio compartment. This junction box shall include all relays, terminal strips, etc. required for radio equipment.	To facilitate maintenance.	Approved.
7	Radio Installation	Install circuit breakers for radio equipment in "solo flying" cockpit only. Properly identify each circuit breaker.	To provide pilot access to circuit breakers during flight	Approved. Same as T-28
8	Radio Installation	Move baggage compartment one station aft. Extend present radio compartment to provide space for AN/ARC-19 (UFH) and AN/ARN-14 (ODR) major components. Provide for installing these equipments with their long axes fore and aft or other means of locating these sets. Provide convenient access to battery	Space and structural provisions for these equipments are required to facilitate service installation.	Approved. Access door shall be made such that it is possible to remove one piece of rad equipment without removing a second piece of equipment. Battery access possibly by "lowering and raising" type (Elevator method)
9	Radio Installation	Install AN/ASA-3 static dischargers in accordance with applicable USAF drawings	To reduce precipitation static.	Approved.

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APPENDIX I
Memorandum Report - MCPPXA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
14	Landing Gear Indicator	Install type C-1 (Spec.21250) landing gear indicators (one for each retractable gear and one red indicator light (AN3157-6) for landing gear position indication in lieu of the instrument now installed. The system shall be installed substantially in accordance with Specification 32300D except that the green indicator lights shown in the Specification are to be replaced with the type C-1 indicators.	To comply with USAF standard requirements	Approved
15	Cockpit Lights	Install one type C-4A, Spec. 94-32294D cockpit lamp assembly in each cockpit. The light shall be located so that it is readily accessible to the operator.	To provide a utility (red or white) light in both cockpits for map reading, etc.	Approved
16	Instrument Lighting	Install an instrument light shield over both instrument panels. Install type B-1, Spec. 32638, ultra-violet lamp assemblies; type A-11, Spec. 32639, red lamp assemblies and rheostat controls for instrument lighting in lieu of the "Dish Pan" lighting. The quantity and location of lamp assemblies shall be such that the instrument panels are adequately and evenly illuminated with either ultra-violet or red light without causing reflections in the canopy, windshield, or instrument cover glasses.	To provide an adequate approved instrument lighting system; to comply with USAF requirements.	Just put red light and shield if necess

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APPENDIX I
Memorandum Report - MCPPXA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
17	Formation Lights	Delete the formation lights on the top of the wings and fuselage	Not required for Trainer Aircraft	Approved
18	Taxi Lights	Install an AN3176 taxi light assembly (with lamp AN3144-4502)	To provide lighting during taxiing operations. To comply with U.S. Army Specification 94-32265E.	Approved. Prefer it in place other than the landing gear
19	Navigation Lights	Install a flashing navigation light system, including upper and lower fuselage lights and controls in accordance with U.S. Army Specification 94-32265E.	To comply with T I No. 2022 ADD. No. 91	Approved. Present system unsatisfactory Delete coding system for this installation however.
20	Passing Light	Install an AN3146-1 passing light assembly (with lamp AN3144-4505, red) in the leading edge of the left wing.	To comply with U.S. Army Specification 94-32265E.	Approved
21	Landing Light	Install an AN3148 landing lamp assembly (with lamp AN3130-4560) in the leading edge of the left wing. Install an AN3022-4B switch on the left side of the cockpits in the vicinity of the landing gear control lever.	To provide adequate lighting for night landing; to comply with U. S. Army Specification 94-32265E	Approved
22	Generator Switch Guard	Install a switch guard in accordance with Drg. No. 45A21662 over the generator control switch in lieu of the guard now installed. Cut the present guard which is over the battery, generator, primer, and starter switches to a size where it will cover only the primer and starter switches.	To provide the proper guard for the generator switch; a guard is not required for the battery switch.	Approved

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APPENDIX I

Memorandum Report - MCPPIA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
23	Electrical Motors	Submit test reports in accordance with Specification AN-M-10A on all electrical motors, which have not previously been approved, to AMC	To assure that all electrical motors conform to Spec. AN-M-10A	Approved
24	External Power Receptacle and Relay	Install an AN2552-1 external power receptacle with three pins in lieu of only two pins. Also install an AN3370-1 relay in the receptacle circuit in accordance with USAF Specification 32300. The relay should be located adjacent to the aircraft bus.	To eliminate arcing on large pins, when the plug is disconnected under load; To prevent "pitting" of the receptacle pins; To reduce the length of "hot" wire in the airplane.	Approved
25	Battery	Install an AN3151 (17 amp. hr.) battery in lieu of the AN3154 (11 amp.hr.) battery.	To facilitate cold weather starting	Approved. Ref. #3 and #8. Study on equip. in this region.
26	Battery Installation	Install a battery sump jar and venting system in accordance with drg. AND10411	To provide an adequate venting and acid fume neutralizing system for the battery to minimize corrosion of equipment, aircraft structure, etc.	Approved. Pending Will investigate with Lab. as to necessity of using Vents & notify Contractor
27	Generator Control System	Install the generator control system including over voltage relay and Field control relay in accordance with the figure in USAF Specification No.32603	To provide over voltage protection; To provide a USAF standard generator control system	Approved
28	Generator	Install a USAF standard generator in lieu of generator now installed. The type of generator to be installed will be recommended upon receipt of an electrical load analysis prepared in accordance with Spec. AN-E-16 which should be submitted to AMC as soon as practicable.	To facilitate maintenance; To provide an adequate D.C. system	Approved. After Generator is selected Check Generator Drive on engine

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ANNEX I
Memorandum Report - MCPTAA66-W-11y, dated 23 March 19[illegible]

CHANGES DICTATED BY MODEL CLASSIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
29	Landing Gear Indicating Lights	Install two white indicator lights, one near each landing gear, so that they are visible to ground personnel. The light circuit should be connected through the wing tip light circuit so that power is connected only when the wing tip lights are "on". The lights shall be "on" only when the respective gear is down and locked.	To comply with Training Command Requirements	Approved
30	Generator Relay Location	Relocate the generator control relay so that it is more accessible for removal	To facilitate maintenance	Study this problem for relocation. Relocation must be done
31	Inverter	Install two inverters (one main and one stand by) with automatic change relay in lieu of one inverter. The type of inverters to be installed will be recommended upon receipt of electrical load analysis prepared in accordance with Specification AN-E-13 which should be submitted to AMC as soon as practicable	To provide stand by power for electrical flight instruments; to assure an adequate A.C. electrical system	Not Approved. No alternate inverter necessary. Suitable inverter will be recommended by AMC upon receipt of load analysis.
32	Generator Cut-Out Relay	Install an AN-3025-1 generator relay in lieu of the relay now installed	The present relay is not approved for use in USAF aircraft; to facilitate maintenance	Approved
33	Generator Voltage Regulator Location	Relocate the generator voltage regulator to a position where it is readily accessible in the cockpit	To facilitate maintenance and adjustment of the regulator. The locations shown in both airplanes (on floor outboard of right rudder pedal and in right console) are unsatisfactory	Approved
34	Battery Relay	Install AN-3420-1 relay in the battery circuit in lieu of the relay now installed	To comply with USAF requirements	Approved

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APPENDIX I
Memorandum Report - MCPPXA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
35	Battery Accessibility	Install the battery on an elevator type tray, so that it is dropped out of the bottom of the fuselage for servicing or move the battery aft	To provide adequate accessibility for service and removal when the radio rack is extended aft.	Action will be taken in the battery but its location will de pend on influenc of other equip. (radio) e , in this region of the airplane. Ref. #3,#8 & #2
36	Rear Cockpit Switches	Delete the generator, battery, landing light taxi light, and all position light switches from the rear cockpit.	Control of these circuits from the rear cockpit is not required by Training Command	Will comply
37	Drains	Fair the drain outlets for a negative pressure instead of a ram pressure	A negative pressure should be at the drain outlets	Contractor wil comply, for drains and study oil breath er pipe.
38	Two Zone Cowling	Provide a two zone cowling	To isolate the engine accessory compartment from the engine proper in order to reduce fire hazards and to prevent overheating of the access- ory compartment during hot weather operation.	Not Reqr'red

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APPENDIX I
Memorandum Report - MCPPXA66 - M - 119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
39	Fuel Strainer	Change the fuel strainer access door so that it is under the strainer	The access door is improperly placed	Will comply
40	Fuel Tank Cap	Provide a chain on the fuel caps	To prevent loss of the cap.	Will comply
41	Oil Tank Cap	Delete the special lock device from the oil tank cap	This is not necessary for a standard oil cap	Contractor will comply
42	Oil Tank	Provide an inspection opening in the oil tank	To permit inspection of the inside of the tank during cleaning operation.	Provided by hopper in oil dilution system. No separate action.
43	Oil Drain Valve	Replace the present "Y" oil drain valves with an approved straight through poppet drain valve.	The straight valve is lighter and is standard for all new aircraft	Contractor will comply
44	Fuel Shut-Off Valves	Provide an AF approved fuel shut-off valve	For standardization and to make certain that a satisfactory valve is being used.	Approved subject to AMC laboratory approval
45	Oil Dilution	Provide an approved oil dilution system	To provide diluted oil for cold weather operations.	Will comply
46	Oil Tank	Provide a hopper in the oil tank which will be in accordance with the Handbook for Aircraft Designers.	To provide for satisfactory dilution and warm-up of the oil system and assist in deaeration of the oil	Will Comply
47	Oil Immersion Heaters	Provide provisions in the oil tank filler necks for insertion of standard oil immersion heaters	To provide for heating of the oil during cold weather	Not Required

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APPENDIX I
Memorandum Report - MCPPIA66 - M - 119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
48	Exhaust System	Remove the exhaust port gaskets	These gaskets burn out easily and cause more leakage than will be experienced with a metal to metal seal.	Gaskets Req.
49	Exhaust Systems	Isolate the exhaust systems from the accessory section and the combustible fluid lines contained therein	To prevent the combustibles from getting onto hot surfaces that will ignite them	Ref.61 -SAME AS 61. Contractor will not c ly for reason given on 61. Major redesigns required to change.
50	Fuel System controls	Paint all fuel system controls red	This is the standard method of identifying these controls quickly	Contractor will comply
51	Carburetor Air Temperature	Provide an approved carburetor air thermometer	To permit the pilot to tell what the temperature of the air going to the carburetor is.	Contractor will comply
52	Carburetor Heat	Provide a carburetor heat system in accordance with the requirements detailed in the Handbook for Aircraft Designers	To provide sufficient heat to take care of any cold weather or icing hazards	Present system to be used until serv test dictates change
53	Vacuum pump suction relief valve	Relocate the vacuum pump suction relief valve so that it isn't mounted directly to the vacuum pump and so that it does not receive full engine vibration	To prevent damage to the valve and cause improper operation of the valve	Contractor will comply if vacuum instruments used.
54	Carburetor Air Filters	Provide carburetor air filters in accordance with specification AN-I-8	To provide protection to the engine during operations in dusty atmospheres	Contractor will comply

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APPENDIX 1
Memorandum Report - MCIPA66-2-119, dated 23 March 1949.

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
55	Color Coding	Provide color coding for all power plant removal break connections in accordance with AF specification 93-24105.	To assist maintenance personnel in identifying the proper disconnect points.	Contractor will comply.
56	Power Plant Controls	Eliminate the present slop in the engine controls and make them meet Handbook requirements. It is recommended that solid push-pull rod controls be utilized.	The present installations have more slop than is permitted by Handbook requirements.	Contractor will eliminate transient slop in airplane.
57	Fuel booster pumps	Delete the line mounted fuel booster pumps and install approved tank mounted pumps.	To prevent fuel system failure due to vapor lock when operating at altitude with hot gasoline.	Not approved. Accept present system.
58	Fuel tank caps	Provide a standard AF filler cap for the fuel tanks.	To utilize a standard AF piece of equipment.	Not approved. Present cap retained.
59	Dust Plugs	Provide dust plugs for the air inlet to the engine induction system, the oil cooler and the exhaust outlet.	To provide protection against dust while the plane is setting on the ground.	Contractor will comply.
60	Fire and Heating Doors	Provide a spring loaded door opening into the engine accessory compartment which can be used for ground fire fighting & ground heating of the compartment during cold operations.	No adequate means now exist for getting into the engine accessories for fighting ground fires or providing warm-up heat.	Contractor will comply in the nose by compartmentation, present fuel drain door if possible.
61	Exhaust Shrouding	Provide at least 3/4" clearance between the exhaust pipe and the exhaust shrouding at all points.	To prevent excessive heating of the exhaust pipe	Present system accept able. If later ch heating requir them, compliance will be attained (Rev. 1). Contractor will not comply. Major re- designs will be req

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APPENDIX I
Memorandum Report - MCREA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
62	Propeller Control System	Replace existing Simmonds flexible control for propeller governor with pushrods and bellcranks	Excessive lost motion in existing system precludes accurate speed setting. In addition, vibratory induced motion of flexible section forward of firewall will cause oscillation of speed setting.	Contractor will use cable system to comply with requirement.
63	Propeller-Cowl Clearance	1. Relocate cowl to provide minimum clearance of 1" between cowl & propeller blade trailing edge with blades in full high pitch position.	1. With 20° blade angle range & with full propeller blades in full high pitch minimum clearance between cowl & propeller is less than specified by Handbook.	1. Present minimum clearance with 20° propeller in high pitch position is 3/4" and will be considered adequate.
		2. Redesign cowl hinge to provide propeller-cowl clearance when cowl is in the raised position.	2. For engine checks with cowl in open position propeller rotation is interferred with. Hinge should be designed to maintain minimum propeller clearance with cowl open.	2. Contractor will revise hinge position to permit prop rotation with cowl open.
		3. Propeller Spinner	3. To insure proper propeller operation under dusty conditions.	3. Propeller spinner will be considered as GFP & supplied with propeller.
64	Parking Locks	The parking lock should be designed so that it will be impossible for the aircraft to leave the ground without prior release of the control lock.	Safety. Ref. Para. 9.326 of the H. I. A. D.	Contractor not required to comply.
65	Cable Guard	Provide cable guard at the main gear emergency extension jack-shaft quadrant.	To insure engagement in the event of slack cable.	Contractor will comply.

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APPENDIX I
Memorandum Report - MCPPXA66-M-119, dated 23 March 1967

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
66	Stabilizer Tip	Provide more rigidity in the construction of the stabilizer tips	To prevent distortion of tips by ground handling personnel	Contractor will comply
67	Special Tools and Ground Handling Equipment	Provide special tools and ground handling equipment in accordance with Spec. AN-D-17		Contractor will comply. Will come up when subject of spares arises
68	Seats	The seats should meet the requirements of Spec. AN-S-49, Amendment 2		Contractor wi. furnish LOC seat (Similar to T-28) AMC personnel to check most recent spec.
69	Egress Panels	Provide emergency egress panels in the canopy to be used in the event of jamming of canopy in closed position or turn-over with canopy closed.	Safety	This item to be studied with regard to possible jettisoning feature of present canopy
70	Marking	Eliminate painting of wheel brake parking handle a red color	Red color paint is reserved for emergency controls only	Contractor will comply
71	Cable Guard	The actuating cable for the right gear emergency release lock should be enclosed by means of a guard	To prevent inadvertent disengagement of the lock by personnel working in the wheel well.	Contractor will comply
72	Instrument Hood	No hood in airplane		This will be provided by Contractor.
73	Seat	Request seats be built according to Spec. AN-S-49, amendment 2		Study with ref. #68
74	Fairing, Fillets, Tips	Requested that the fairing, fillets, tips be fabricated of harder material and the horizontal stabilizer tips be quick change	Eliminate excessive maintenance. Present airplane has only a relatively small number of flying time & yet has numerous dents	Contractor will comply

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APPENDIX I
Memorandum Report - MCPPEA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
75	Fire Extinguisher and Pre-heater Door	Request spring loaded fire extinguisher and pre-heater door be incorporated		Contractor will comply.
76	Tail Wheel	Steerable lockable tail wheel	Allow for S-ing when taxing.	Contractor will comply. AMC will furnish P-51 steerable tail wheel drawings to contractor.
77	Gear Locking Mechanism	Guard or cover to prevent mud and grit from accummulating on surface of lock.	To prevent the possibility of the gear not locking.	Contractor will comply. Proposal to be submitted by Contractor for AMC approval.
78	Stabilizer	R. H. and L. H. Stabilizer	Eliminate buying complete stabilizer should either left or right hand become damaged.	No action. Experience to determine future design of stabilizer for future procurement.
79	Engine access for ground heating	Provide access thru cowling or engine covers to ground heat the engine	Conform to handbook of instruction for aircraft designers.	Contractor will comply.
80	Airplane cover, drawings only	Provide drawings only for covers for the entire airplane. This is in addition to the propeller, engine and canopy covers to be furnished with the airplane.		To be covered when spare parts and special tools are considered for this aircraft.
81	Main Landing Gear Towing Lugs	Turn towing lugs of main landing gear 90°	Use standard aircraft tow bars.	Contractor will comply.
82	Special Tools & Ground Handling Equipment	Provide necessary special tools & ground handling equipment required to service the airplane.	Conform to AN-D-17	To be considered when spares & tools are evaluated for procurement

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APPENDIX I
Memorandum Report - MCREXA66-1-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
83	Interference of Top Cowling	Change in top cowling at both sides to establish at least 1-1/2 inch clearance between the cowling and prop. when the cowling is raised.	Prop. cannot be rotated with cowling up when checking magneto	Ref. #65
84	Generator Air Blast Tube	Change in design of generator blast tube.	To allow better accessibility to magneto	Contractor will comply.
85	Wing Tips	Request 12 inch removable wing tip be included in lieu of present wing tip. Delete hand hold.	Aid in replacement of tips damaged by ground loops or other obvious reasons.	Will comply. Hand hold eliminated. 10 to 12" wing tip removable.
86	Access door to Fuel Strainer Drain	Access door to fuel strainer drain is on the opposite side of lower cowling from the strainer.	Lower cowling would have to be removed to drain the fuel strainer.	Ref. #60. Will be used for fire extinguisher access. Spring loaded door to be made.
87	Safety Mechanism on Landing Gear Switch	Add a safety mechanism to Landing Gear switch to prevent movement of switch to "wheels up" position unintentionally. Should be same type device now installed for emergency lowering, i. e. lever must be pulled out before it can be raised.	With present landing gear switch there is nothing to prevent the student from unintentionally moving switch to up position and allowing wheels to be raised before full flying speed is attained.	Contractor will make a suitable safety latch retracting handle; possibly a detant in handl operating slot, so that handle displacement reqd. before operation.

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APPENDIX I
Memorandum Report - MCPPXA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	Subject	Action Desired	Reason	Decision
88	Moving of device for emergency gear operation to new location	Device for emergency lowering of landing gear presently installed should be removed from the switch used for normal operation of wheels and located in a separate position.	To prevent inadvertent actuation of the mechanism for emergency lowering of gear during normal gear operations	Not required No action
89	Cockpit Ventilation	Provide more fresh air ventilation to both cockpits	Crew comfort	Contractor will provide m air. If service experienc dictates additional cockpit cooling, thru use of shade Contractor to submit proposal on ram air.
90	Landing or Taxi Lights	Install landing lights if required by Training Command - and if not install a taxi light	To increase safety of night operations	Contractor will supply L. Lights
91	Passing Light	Install passing light.	To increase safety of night operations	Contractor will comply
92	Manifold Pressure Gage Line Purge Valve	Install manifold pressure gage line purge valve in accordance with Air Forces Spec.#40779. Location - on non shock mounted portion of instrument panel to right of manifold pressure gage	Handbook requirement for direct manifold pressure gage	Contractor will comply
93	Flush Static Ports	Install flush static system in accordance with USAF Spec. No.27380-C	Handbook requirement	Contractor will comply
94	Free Air Thermometer	Install type C-13B free air thermometer on windshield of front cockpit so that it is visible from front cockpit. Recommend center section of windshield approx. 4-3/4" down from top of windshield and 1-1/4" to left of center line when viewed from engine side.	Standard bi-metallic USAF free air thermometer	No action. Can be installed at some future time

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APPENDIX I

Memorandum Report - MCPPXA66-M-119, dated 23 March 1949

CHANGES DICTATED BY MODEL SPECIFICATION

REQUEST NUMBER	SUBJECT	ACTION DESIRED	REASON	DECISION
95	Fuel Quantity Gage	Install fuel quantity gage in accordance with USAF Spec. 21100-B. Indicator to be calibrated in pounds.	To assure satisfactory fuel quantity gage installation.	Contractor will supply gage calibrated in lbs in accordance with Spec. 21100-B.
96	Tachometer Generator	Provide standard pad drive for tachometer generator Type AN5547-2 in accordance with drawing AND 20005 on R680-13. The R680-10 and O50-580 are equipped with standard pad drive.	Screw drive no longer standard.	Will be complied with. Check with Lycoming on R-680-13 engine.
97	Instruments and Instrument Panel Arrangements	Install and arrange instruments as shown on attached sketch. Instruments to be front mounted. Instrument types and specs. shown on sketch. Cowl flap position Indicator not required if R-680-13 or R-680-10 engine used; airplane. Compass to be installed on vertical centerline. Front and rear panel to be the same.	To provide standard instruments and standard arrangement for this type	Contractor will comply with above and attached instrument panel layout.
98	Cockpit lighting	Request a cockpit mockup of the instrument lighting be accomplished.		Contractor will comply.
99	Airplane Hoisting Sling	Eliminate sling from miscellaneous equipment list. To be included in special tools exhibit.		Will be considered when spare parts are listed for procurement.
100	Handhold	Provide handholds (Two)	Ease of exit from cockpits (front only)	Approved.

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

AFMPD

24 March 1949

SUBJECT: Procurement Directive 49-33 - (T-31 Aircraft)

TO: Commanding General
Air Materiel Command
Wright-Patterson AFB
Dayton, Ohio

1. In accordance with Public Law 547, the President has approved the release of $8,261,500 from Supplemental 1948 funds, for the procurement of one hundred (100) T-31 aircraft, (Fairchild XNQ). Therefore, your command is authorized to proceed with immediate procurement of subject aircraft.

2. In the procurement of the T-31, it is desired that

a. Initial spares be held to a minimum and that arrangements be made to have contractor keep adequate spare stocks.

b. The contractor furnish all possible equipment normally supplied as Government-Furnished Property at a handling charge not to exceed two to three per cent of cost of such equipment.

3. This directive does not dispense with the necessity for conformance with applicable procurement regulations and directives.

BY COMMAND OF THE CHIEF OF STAFF:

E. M. POWERS
Major General, USAF
Asst. Deputy Chief of Staff,
Materiel

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ROUTING AND RE[illegible]RD SHEET — A[illegible] MATERIEL COMMAND

Use this form for inter-office correspondence within headquarters.
Number all comments consecutively.
Use entire width of sheet, both sides.
Use authorized office symbols to designate addressor and addressee.
Note warning signal at lower left of form. Remaining space is sufficient only for proper spacing of typewritten signature.
Place initials of dictator and typist, telephone number and location to right of signature.
Separate comments by horizontal lines across page.

SUBJECT: Survey of G.F.P. Stocks for T-31 Aircraft.

TO: MCPPXA-15
Att: Lt. Col. Burhanna

FROM: MCPPXE-11

DATE: 30 Mar '49

COMMENT NO. 1.

1. Per your verbal request this date, attached is a list of those GFP items contained in Fairchild Model Spec, R129-000, dated 8 February 1949, which are presently available in Supply Division stocks.

2. Those items not readily identified as AF equipment, or not identified as to type, or by AF and/or vendor's spec. and drawing number could not be inventoried.

3. An engine inventory conducted approximately 1 February 1949, revealed that a sufficient quantity of engines were available in War Assets storage to fulfill T-31 requirements. Should a reinventory show that sufficient quantities still exist they can be recalled to GFP stocks and furnished to Fairchild as G.F.P. However, due to the urgency of your request for inventory this could not be ascertained today; such reinventory would require at least one week.

4. It is reiterated that the attached list constitutes an informal inventory of Supply stocks only and does not represent a GFP list in any form to this office. An Initial GFP list must be established at a future date in accordance with the procedures outlined in DOI 70-19.

5. Accessories buyers' comment that present instruments are models that are no longer recommended. Instruments, whether GFP or CFE should be of best design available.

L. W. Burt Capt. USAF

M. J. COFFIELD
Colonel, USAF
Chief, Aeronautical Equipment
Section, Procurement Division

WCP/LWB/vnp
2-1159

Incl: List of GFP Items

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WF-L-15 FEB 49 4 Mil 240M
AMC Form No. 5 (Rev 29 Jul 47)

(CONTINUE ON OTHER SIDE)

This form replaces AMC Form No. 19-5, which will be used until stocks on hand are exhausted.

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G.F.P. AVAILABLE FOR T-31
(100 Aircraft 30% Spares)

Electronics Equipment

Qty Minimum	Item	Dwg or Spec.No.	Weight Pounds
1	AN/ARC-3 UHF Command		72.0
1	BC-453B Range Receiver		11.0

Power Plant

See Paragraph 3 of R & R attached.

Accessories

1	Light Assy Fixed Landing	42-200
1	Relay Overvoltage	42-1520
1	Relay Gen. Fld. Control	42-1525
2	Belt, B-14	45-1705
2	Belt, Shoulder Harness B-15 (If B-15 not available B-16 will be furnished)	45-1710
1	Kit Aero First Aid	45-7600
2	Indicator Bank & Turn C-1	60-5500
2	Indicator Rate of Climb C-2	60-6800
2	Transmitter Fuel & Oil Pressure	61-2330
4	Gage Fitting Assy	61-2331
2	Tube, Flush Static	60-9700
1	Tube, Pitot	60-9650
4	Bulb Elec. Resistance	61-8906

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ZSCAD Form No. 6 (4 APR 47)

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HCGOMT/ 5-4102
Wright-Patterson
Air Force Base
Dayton, Ohio

HEADQUARTERS
AIR MATERIEL COMMAND

APR 13 1949

TECHNICAL INSTRUCTIONS

SERIAL NO: TI-2249-12

SUBJECT: Procurement Directive No. 49-33 (T-31 Aircraft)

TO: Directorate, Procurement and Industrial Planning
Directorate, Supply and Maintenance

1. Problem Presented:

a. To procure one hundred (100) T-31 aircraft and initial spares.

(1) Initial spares will be held to a minimum and arrangements will be made to have the contractor keep adequate spare stocks.

(2) Provisions will be made under which the contractor will furnish insofar as possible all equipment normally supplied as "Government Furnished Property" at a handling charge not to exceed two or three percent of the cost of such equipment.

2. Factual Data:

a. In accordance with Public Law 547, the President has approved the release of $8,261,500 from Supplemental 1948 funds, for the procurement of one hundred (100) T-31 aircraft, (Fairchild XNQ).

b. This directive does not dispense with the necessity for conformance with applicable procurement regulations and directives.

3. Authority:

a. CS, USAF by letter dated 24 March 1949, subject: "Procurement Directive 49-33 - (T-31 Aircraft)."

4. Action Desired:

a. Directorate, Procurement and Industrial Planning will accomplish that which is required under "Problem Presented."

[redacted]

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TI-2249-12, Subject: "Procurement Directive No. 49-33 (T-31 Aircraft)."

b. Directorate, Supply and Maintenance will assist as required in determining spare parts requirements.

BY COMMAND OF GENERAL McNARNEY:

OFFICIAL:

BRYAN L. DAVIS
Colonel, USAF
Adjutant General

BRYAN L. DAVIS
Colonel, USAF
Adjutant General

DISTRIBUTION:

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SUPPLY AND MAINT.

PROC. & IND. MOB. PLNG.*

OTHER

MCPPXA66/HL/rd

15 April 1949

SUBJECT: Equipment List, GFP and CFP, T-31A Airplane

TO: Fairchild Aircraft
Division of Engine and Airplane Corporation
Hagerstown, Maryland

Through: USAF Plant Representative

1. This confirms verbal transmittal of the CFP and GFP equipment lists to the contractor through Mr. Fahnestock. These lists, one copy each of which are inclosed herewith, are to be incorporated in the revised model specification, Report No. R-129-000.

2. The Air Materiel Command's comments, which are a part of the inclosed CFP list and which are based on Model Specification Number R29D-000 (XMQ-1 with GSO-580 engine), are for the contractor's information and guidance in preparing the new model specification. Contractor's attention is invited to the comments which may be contrary to 689 comments (Procurement Inspection of 5 January 1949). In event of discrepancy between laboratory comments and those of 689 board, the latter shall be used.

3. Contractor's attention is further invited to the fact that part of the inclosed CFP list was formerly GFP, and was established by the Air Materiel Command laboratories in greater detail than was listed in contractor's Model Specification Number R29D-000, submitted to Air Materiel Command for review early this year. This equipment listed should be included in the new model specification, provided no conflict exists with the 689 board decisions.

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SUPPLY AND MAINT.

PROC. & IND. MOB PLNG.*

OTHER

Hq AMC ltr MCPPXA66/WL/rd dtd 15 April 1949, subj: Equipment List, GFP and CFP, T-31A Airplane.

4. In general, the inclosed information should be used with discretion by the contractor in light of a further review of the revised specification to be submitted to Air Materiel Command for approval in the near future.

FOR THE COMMANDING GENERAL:

Nate Silverstein

BEN I. FUNK
Colonel, USAF
Chief, Aircraft & Missiles Section
Procurement Division

Incls:
As noted above

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WF-L-15 APR 49 2 M-I

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CFP - T-[illegible] (PP[illegible])

ITEM	QUANTITY
POWER PLANT EQUIPMENT	
Control - Constant Speed	1
Engine - Lycoming Model R-680-13 (Mod.)	1
Cock, Drain Oil Tank Sump (Straight Thru Poppet Type)	1
Cap and Adapter Tank Filler, Oil	1
Propeller Spinner	1
Control Quadrant, Engine	2
Pump, Booster, Adel	1
Strainer, Fuel Aero Supply	1
Flexible Engine Mounts, Lord	4
Valve, Primer Pump, Stromberg	1
Fuel Shut-Off Valve	1
Filter, Carburetor Air	1
INSTRUMENTS	
Fuel Quantity Indicators, Transmitters and Amplifiers (Calibrated in Pounds)	2
Valve, Manifold Pressure Gage Line Purge	2
Accelerometer, Type B-4	2
Indicator, Airspeed, Type K-2	2
Compass System, Gyrosyn, Type J-2	1
Indicator, Attitude Gyro, Type J-3	2
Altimeters, Type C-12A	2
Gage, Manifold Pressure, Type D-18	2
Indicator, Tachometer, Type E-33	2
Generator, Tachometer	1
Indicator, Carburetor Temp. Type G-6	2
Indicator, Head Temp. Type G-4	2
Compass, Standby, Type B-21	1
Clock, Type A-11	2
Indicator, Flap Position, Type A-4	2
Transmitter, Flap Position, Type A-4	1
Voltmeter	2
Ammeter, Type J-1	2
Indicator, Oil Temp. Type G-5	2
Indicator, Oil Pres. Type B-22	2
Indicator, Fuel Pres. Type C-32	2
Indicator, Landing Gear Pos. Type C-1	4
Gage, Air Pressure, Type E-4	1
Inverter (AN31870)	1

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CFP - T-31A AIRPLANE

ITEM	QUANTITY
ELECTRICAL	
Engine Generator Equipment	
Generator, Type O-4	1
Regulator, Generator Voltage	1
Relay, Generator Cutout	1
Switch Control, Cutout	1
Light Assembly, Overvoltage	2
Circuit Breaker	1
Relay, Control	1
Base, Voltage Regulator	1
Guard, Generator Switch	1
Position Light Equipment	
Light Assembly - Left Wing Tip	1
Light Assembly - Right Wing Tip	1
Light Assembly - Tail (White) AN3158-1	1
Light Assembly - Tail (Yellow) AN3158-2	1
Light Assembly - Bottom Fuselage AN3177-1	1
Light Assembly - Top Fuselage AN3177-3	1
Flasher Assembly - Type C-2	1
Switch, Flasher	1
Switch, Wing and Tail Dimming	1
Switch, Control, Position	1
Switch, Fuselage	1
Circuit Breaker	1
Switch, Control, Tail	1
Resistor, Tail Yellow - 10 W, 30 ohms.	1
Resistor, Wing Tip and Tail White - 25 W, 10 ohms	1
Passing Light Equipment	
Light Assembly, with (Lamp, clear) AN3146-1	1
Light Assembly, with Filter (red) Adams and Westlake	1
Switch, Control	1
Circuit Breaker	1
Wing Flap Equipment	
Actuator, Lear Aviation, Inc.	1
Switch, Limit	2
Switch, Control	1
Circuit Breaker	1
Airspeed Tube Heating Equipment	
Switch, Control - Toggle	1
Circuit Breaker	1

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CFP - T-31A AIRPLANE

ITEM	QUANTITY
ELECTRICAL	
Engine Thermocouple Equipment	
Connector	2
Resistor	2
Leads (AN-W-8A)	
Carburetor Air Thermometer Equipment	
Circuit Breaker 5 amp.	1
Inverter Control Equipment	
Switch, Control	1
Circuit Breaker	1
Warning Light, Invertor Failure	1
Landing Gear Retracting Equipment	
Actuators - Delco EX 95932	2
Relay - Type C-1	2
Switch, Limit, Microswitch Co.	4
Switch, Control, D.E. Mossman	1
Circuit Breaker (AN3161-5)	2
Circuit Breaker (AN3161-P5)	2
Switch, Safety	2
Emergency Cutout Switch, Microswitch Co.	1
Engine Starter Equipment	
Starter, Direct Cranking Eclipse 756-22B	1
Switch, Ignition	1
Relay, Control (AN3212-1)	1
Circuit Breaker (AN3371-1)	1
Coil Induction Vibrator	1
Switch, Starter Control (AN3022-8)	1
Switch Primer	1
Landing Light Equipment	
Switch Control	2
Circuit Breaker(AN3022-4B)	1
Relay, Control	1
Instrument and Cockpit Lighting Equipment	
Lamp Assembly (Red) Type A-11	8
Switch, Control	2

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ITEM	QUANTITY
Instrument and Cockpit Light Equipment (cont'd.)	
Lamp Assembly (Ultra-Violet) Type B-1	8
Rheostat	2
Resistor Bank	2
Switch, Control (AN3021-2)	2
Circuit Breaker (AN3161-P5)	2
Rheostats (AN3155)	
Lamp Assembly, Flood with (AN3034-1)	8
Lamp (AN3121-313)	8
Rheostat (AN3155-25-30)	2
Circuit Breaker (AN3161-5)	1
Lamp, spot, type C-4A	2
Circuit Breaker (AN3161-5)	1
Taxi Light Equipment	
Light Assembly, with --- Grimes SK272	1
Lamp (clear) ---- GE4570 or equal	1
Switch Control	1
Circuit Breaker (AN3022-2B)	1
Fuel Booster Pump Equipment	
Circuit Breaker	1
Switch, Control	2
Battery and Bus Equipment	
Battery, 24V 17 A.H.	1
Receptacle, External Power - D.C.	1
Relay, Battery Disconnect	1
Relay, External Power - D.C.	1
Shunt, Ammeter - 200 Amp., 50 M.V.	2
Switch Control, Disconnect	1
Clamp, (Battery Hold Down)	2
Fuel Level Warning and Safety Equipment	
Light Assembly (AN3157-6)	2
Circuit Breaker	2
Grounding Jacks, Fuel Nozzle (AND10439)	2

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CFP - T-31A AIRPLANE

ITEM	QUANTITY
Landing Gear Warning Equipment	
Light Assembly (red) AN3157-6	2
Light Assembly (white)	2
Circuit Breaker	1
Warning Horn, Type J-2	1
Switch, Control AN3210-1	1
Circuit Breaker	1
Canopy Operating Equipment	
Actuator, Westinghouse Elec. 5-C-1079 frame 310 type CDH	1
Switch, Control 8834, Cutler Hammer	1
Switch, Limit (AN3210-1)	2
Relay, Allied Control (AN3161-5)	1
Switch, Momentary Contact (B05D35)	2
Switch, Remote (AN3021-7)	1
Switch, Control (AN3021-7)	1
Miscellaneous Equipment (Weight Empty)	
Case, Aircraft Data, Type A-1	1
Mirror, Rear View	1
Combined Map Case and Flight Report Holder	2
Seat, Pilot's Type	2
Cylinder, Hydraulic Actuating, Brake	2
Strut, Main Gear	2
Bottle, Air-Canopy-Walter Kidde Co.	1
Valve, Air Canopy	1
Valve, Air Release - Canopy- Walter Kidde Co	1
Motor, Air-Canopy - Aer Equip. Corp.	1
Gear Box and Clutch Assembly - Canopy	1
Static Ground Wire Assembly	1
Extinguisher, Fire, Aircraft Type A-2	1
Bracket, Pilot's Relief Tube, Horizontal	2
Horn, Pilot's Relief Tube	2
Tee, Pilot's Relief Tube	1
Wheel, Main Landing Gear 7.50 x 10	2
Brake, Main Landing Gear 7.50 x 10	2
Casing, Main Landing Gear 7.50 x 10-6 ply	2
Tube, Inner, Main Landing Gear 7.50 x 10	2
Tail Wheel 10"	1
Casing 10" 6 ply S.C.	1
Tube 10"	1

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CFP - T-31A AIRPLANE

ITEM	QUANTITY
RADIO	
Radio Set AN/ARC-3	
Switch	2
Relay - Price Elec. Corp. P/N 5724-15-HPX (or equal)	1
Receptacle (AN3102-20-27S)	1
Lamp Assembly (AN3157-4)	2
Lamp (AN3121-313)	2
AF Combat Interphone	
Relay, Price Elec. Corp. P/N 5724-15-HPX (or equal)	1
Receptacle	1
Required Cordage CO-219	
Required Cordage CO-119B	
Jack JK-33-A	2
Microphone Switch	4
Hanger (for T-17 Microphone)	2
Dust Cap Assemblies (for JK-33A Jacks)	2
Control Panel C-383/AIC	2
Amplifier AM-26A/AIC	1
Mounting MT-28/ARN-5	1
Plug PL-152A	1
Mixer Amplifier AM-142/AIC	2
Mounting Plate MT-556/AIC	2
Plug	2
Adapter	2
Filter F-21/ARA-9	2
Jack	2
12 ft. Cordage	
Handbook Operating Instructions USAF Combat Interphone	1
Radio Receiving Equipment (Range) BC-453-B)	
Lamp Assembly	2
Lamp Assembly	2
Switch (AN3021-3)	2
Relay, Price Electric Corp. PN 5724-15-HPX (or equal)	1
Receptacle	1
Resistor RC31AE105M	1
Static Dischargers AN/ASA-3	
Static Dischargers AN/ASA-3	12
Handbook of Instructions for AN/ASA-3	1

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GFP - T-31A Airplane

ITEM	QUANTITY
Radio (continued)	
Radio Set AN/ARC-3 (continued)	
Transmitter Assembly -(continued)	
Crystal (7650, Kcs., "G" Band) CR-1A/AR	1
Crystal (7450, Kcs., "H" Band) CR-1A/AR	1
Mounting MT-238-A/ARC-3	1
Plug U-15/U	1
Plug PL-151/A	1
Plug PL-259/A	2
Adapter M-359-A	2
Cable (8 ft.) RG-8/U	
Receiver Assembly	
Radio Receiver (W/Handbook of operating instructions) R-77A/ARC-3 including tubes	1
Crystal (8007.69, Kcs., "A" Band) CR-1A/AR	1
Crystal (8155.71, Kcs., "B" Band) CR-1A/AR	1
Crystal (8392, Kcs., "C" Band) CR-1A/AR	1
Crystal (8036.25, Kcs., "D" Band) CR-1A/AR	1
Crystal (8380, Kcs., "G" Band) CR-1A/AR	1
Crystal (8140, Kcs., "H" Band) CR-1A/AR	1
Mounting MT-237-A/ARC-3	1
Plug PL-153-A	1
Plug PL-259-A	1
Adapter M-359-A	1
Power Supply Assembly	
Power Junction Box J-68/ARC-3	1
Dynamotor DY-22/ARC-3	1
Dynamotor DY-21/ARC-3	1
Mounting MT-236/ARC-3	1
Plug PL-148-A	1
Plug PL-153-A	1
Plug U-15/U	1
Plug U-16/U	1
Control Assembly	
Control Panel (on as is)	2
Antenna Assembly	
Plug PL-259-A	1
Adapter M-359-A	1
8 ft. Cable RG-8/U	

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GFP - T-31A Airplane

ITEM	QUANTITY
Power Plant	
Pump, Engine Driven, Fuel	1
Propeller, Hamilton Standard consisting of: 1 Hub 2 Blades	1
Instruments	
Indicators, Bank & Turn, Type C-1	2
Indicator, Rate of Climb, Type C-2	2
Tube, Flush Static	2
Tube, Pitot	1
Bulb, Electrical Resistance	4
Transmitter, Fuel and Oil Pressure	2
Gage Fitting Assembly	4
Electrical	
Relay, Overvoltage, Type E-2	1
Relay, Generator Field Control, Type M-2	1
Light Assembly, Landing with (Lamp)	1
Miscellaneous Equipment (Design Useful Load)	
Kit, Aeronautical First Aid	1
Miscellaneous Equipment (Weight Empty)	
Belt, Lab., Safety, Type B-14	2
Belt, Shoulder Harness, Safety, Type B-15 or Alternative B-16	2
Radio	
Radio Set AN/ARC-3	
Transmitter Assembly	
Transmitter T-67/ARC-3, includes tubes	1
Crystal (6450, Kcs., "A" Band) CR-1A/AR	1
Crystal (7010, Kcs., "B" Band) CR-1A/AR	1
Crystal (7660, Kcs., "C" Band) CR-1A/AR	1
Crystal (7810, Kcs., "D" Band) CR-1A/AR	1

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NF - T-33A Airplane

ITEM	QUANTITY
RADIO - Radio Set AN/ARC-3 (cont'd.)	
Miscellaneous Equipment	
Handbook of Operating Instructions for radio set AN/ARC-3	1

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MCRE Form No. 44
(15 June 47)

REQUEST FOR MODEL OR TYPE DESIGNATION CHANGE OF STATUS EQUIPMENT

ITEM NUMBER:

DATE: 15 April 1949

1. NAME OF ARTICLE AFFECTED:
FAIRCHILD TRAINER

2. PROCUREMENT SPECIFICATION AND/OR DRAWING NUMBER:
FAC Report No. 129-000A dated 20 April 1949

3. PERTINENT INFORMATION

A. ITEM (IS) [redacted] A NEW ITEM.

B. ITEM (IS) (IS NOT) AN IMPROVEMENT OVER AN EXISTING ITEM NOW KNOWN AS:
XNQ-1 (Navy Trainer)

C. ITEM WILL REPLACE OR SUPPLEMENT THE PRESENTLY ADOPTED ITEM: _____

D. ESTIMATED UNIT COST IN QUANTITY PROCUREMENT IS: $10,000.00

4. RECOMMENDATIONS

A. ITEM TO BE CLASSIFIED AS:
STANDARD

B. ITEM TO REPLACE OR SUPPLEMENT:
[redacted]

C. RECLASSIFICATION OF THE REPLACED OR SUPPLEMENTED ITEM TO BE:

D. SPECIAL PROVISIONS (TO BE [redacted]) PROVIDED FOR THE TRAINING OF USAF PERSONNEL IN ITS OPERATIONS AND MAINTENANCE.

110

E. USING ARMS, SERVICE TEST BOARDS AND TECHNICAL COMMITTEES CONCUR IN THE PROPOSED ACTION AS FOLLOWS:
AIR TRAINING COMMAND

F. ITEM HAS BEEN DEVELOPED TO MEET: (AF REG. 65-74)
- [X] MILITARY CHARACTERISTICS — *(Number and Date)* 1 February 1949
- [ ] DEVELOPMENT DIRECTIVE — *(Number and Date)*
- [X] OTHER REQUIREMENTS — *(Reference)* P.D. No. 49-33 dated 3/24/49 & T.I. 2249-12 dtd 13 Apr 49

G. ITEM DOES NOT MEET THESE REQUIREMENTS IN THE FOLLOWING RESPECT:
_____

H. RELATED EQUIPMENT INCLUDES EXISTING ITEMS WHICH MUST BE MODIFIED AND NEW ITEMS MUST BE STANDARDIZED AND ARE:
_____

I. ITEM IS INTENDED FOR:
- [X] IMMEDIATE PROCUREMENT AND ISSUE.
- [ ] PROCUREMENT AND ISSUE WHEN EXISTING STOCKS OF ITEMS HAVE BEEN SUPERSEDED OR DEPLETED.
- [ ] FUTURE PROCUREMENT AND ISSUE IN CASE OF EXPANSION.

J. PHOTOGRAPHS ILLUSTRATING THIS ITEM ARE:
ATTACHED

K. GIVE A RESUME OF REASONS FOR ENTRY, REMOVAL, OR CHANGE OF CLASSIFICATION AND A PERTINENT DESCRIPTION OF THE CHARACTERISTICS OR CHANGE IN CHARACTERISTICS OF THE ITEM:

The airplane described as follows: All Metal, (Aluminum Alloy), semi monocoque construction 2 Place Tandem, monoplane; Conventional tail wheel landing gear, with main gear retractable; Bubble-type canopy, electrically operated on slides; R-680-13 (Lycoming) Radial Engine - 220 HP (Normal); Hamilton Std. Constant Speed Propeller; Night Flying Instruments; 24 Volt Electrical System; VHF Radio, Range Receiver and USAF Combat Interphone; Endurance at 45% (Normal Rated Power) - 7.45 hrs.; High Speed (SL) 114 knots; Range at 45% MEP - [redacted] miles

APPROVED:

INITIATED BY W. LARKIN PHONE 28135

S. W. BISHOP, Lt. Colonel, USAF
BRANCH CHIEF — LABORATORY OR SECTION CHIEF
Chief, Training Equipment Support & Spec. Items Br.

Type Designation T-37A-FA has been assigned and an Authority for Change of Status of Equipment in accordance with WD Cir No. 347, 1948 (Revised) is hereby granted.

C. O. KISSINGER

11 MAY 1949

MARVIN G. TOLL, Chief,
STATUS OF EQUIPMENT & SERVICES BRANCH
ENGINEERING STANDARDS SECTION

110

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18

ROUTING AND RECORD SHEET — MATERIEL COMMAND

Use this form for inter-office correspondence within headquarters.

Number all comments consecutively.

Use entire width of sheet, both sides.

Use authorized office symbols to designate addressor and addressee.

Note warning signal at lower left of form. Remaining space is sufficient only for proper spacing of typewritten signature.

Place initials of dictator and typist, telephone number and location to right of signature.

Separate comments by horizontal lines across page.

SUBJECT: Availability of Hamilton Standard Propellers (Hub 4-E-20, Blade, 6135A-0, Constant Speed Control 1-6120) for T-31A trainer (Fairchild).

TO: MCMSXR27 FROM: MCPPXA66 DATE: 19 Apr 49 COMMENT NO. 1

1. Confirming conversation with Mr. Beck, it is requested that an investigation be conducted to determine the availability of subject propeller assemblies in the quantity of 100, plus spares for subject airplane.

2. The existence of these propellers should be ascertained in WAA stock, WAA surplus consignees, Air supply, or any other source, in the quantity shown in paragraph 1 above.

3. It should also be indicated whether the equipment is new, [illegible], whether adequately preserved, and whether Air may obtain [illegible] dates of availability.

4. It is further requested that a reply be submitted to this [illegible] at the earliest possible date, giving answers to the foregoing, as well as the number of assemblies which are available.

[signature]
[illegible]
[illegible]
[illegible]
[illegible]

TO: MCPPXA66 FROM: [illegible] DATE: 22 April 49. 2.

1. In accordance with the above letter, initial action to determine the quantity of the Propeller Assy. and Governor Assy. available for recall from [illegible] It is requested that [illegible] be contacted for information pertaining to [illegible].

[signature]
[illegible]
[illegible]
[illegible]

MLP/ma
6-4106
P-166
B-215

111

WF-L-15 FEB 49 4 Mil 2464M
AMC Form No. 5 (Rev 29 Jul 47)

(CONTINUE ON OTHER SIDE)

This form replaces AMC Form No. 10-5, which will be used until stocks on hand are exhausted.

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Flight Test Program, T-31 Airplane (Fairchild Trainer)

MCRFT MCPFIA66 18 Apr 1949 1
ATTN: L. H. Sibilsky

1. This office is in possession of a Procurement Directive setting forth instructions to procure one hundred (100) T-31A Trainer Aircraft.

2. Subject airplane has been subjected to more than eight hundred (800) hours of flight testing in addition to successfully passing Navy Static Test. The enclosed report No. TED No. BIS 2197, which is loaned to your office for your examination, describes Bureau of Aeronautics Flight Tests of the XNQ-1 airplane which airplane is essentially the T-31A.

3. While the initial procurement is for one hundred (100) aircraft, the long range Training Program will involve a considerably larger number than the present quantity. Since the T-31A airplane differs from the Navy XNQ-1 by 689 and Evaluation Personnel Changes (Evaluation held 14 February 1949), it appears that additional flight tests of subject airplane are in order.

4. It is requested that in light of the tests already performed on this airplane outlined in Bureau of Aeronautics Report indicated in Paragraph Two above, the Flight Test Division recommend a Flight Test Program adequate to insure satisfactory airplane for use in the Training Program. This Flight Test Program may involve:

(a) A quantitative flight test of the first production airplane

(b) Accelerated Service Test of a group of the first two or three production airplanes

(c) A combination of (a) and (b) above

5. It is further requested that if the recommended Flight Test Program requires the instrumentation of aircraft, the instruments be listed by Flight Test Division for the information of the Contractor, so that it may be permitted to submit cost quotations for the installation of instrumentation at the factory.

Incl:
One Copy Report No. TED No.
BIS 2197

KEN I. FUNK
Colonel, USAF
Chief, Aircraft & Missiles Section
Procurement Division

NL/mc
28138

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In reply please refer to: CA-W-711

19 April 1949

From: Fairchild Aircraft Division
Fairchild Engine & Airplane Corporation
Hagerstown, Maryland

To: Chief, Bureau of Aeronautics
Navy Department
Washington 25, D. C.

Subject: Model XNQ-1 Airplanes
Extension of Loan

1. Through the cooperation of the Bureau of Aeronautics, Navy Department, and the United States Air Force, this Contractor has been able to secure on loan for test purposes two (2) Model XNQ-1 Airplanes bearing Navy Serial Nos. 75725 and 75726.

2. The XNQ-1 Airplane was recently entered by this Contractor in a trainer evaluation held by the United States Air Force at the Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. As a result of winning this evaluation, the Contractor is currently conducting negotiations with the United States Air Force Covering the procurement of trainer aircraft based on the XNQ-1 design. In order to facilitate the incorporation of changes that might be deemed desirable in these trainer airplanes, it would be greatly appreciated if the Contractor were permitted to retain the two XNQ-1 Airplanes for an additional period of approximately one (1) year.

3. The Contractor, therefore, respectfully requests that it be advised as to whether the Bureau of Aeronautics has any objection to the continued loan of the XNQ-1 Airplanes and, further, whether there would be any objection to the Contractor modifying these airplanes for the purpose of testing possible design changes. It is understood, of course, that there will be no charge to the Navy Department in connection with the loan or modification of these airplanes and that the Contractor will return the aircraft to their original configuration prior to redelivery of the airplanes to the Government if the Bureau of Aeronautics does not desire to accept them in their then modified condition.

FAIRCHILD AIRCRAFT
DIVISION OF
FAIRCHILD ENGINE & AIRPLANE CORPORATION

H. T. WALKER
CONTRACTS ADMINISTRATOR

HTW:dbs
cc: BAR, Baltimore
AFPR, Fairchild Aircraft
Hq AMC MCPPIA66, W-P Air Force Base

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AMC Form No. 10-7 (Rev 1 Apr 48)

INSERT OFFICE SYMBOL AND FULL SIGNATURE IN APPROPRIATE BLOCK

CG, CO OR DEPUTY

AIR INSPECTOR

MCPPXA66

PUBLIC INF. OFFICE

COMPTROLLER

PERSONNEL & ADM.

RESEARCH & DEV.

INTELLIGENCE

SUPPLY AND MAINT.

PROC. & IND. MOB. PLNG.

OTHER

MCPPXA66/WL/mc
21 April 1949

SUBJECT: T-31A Airplane, Summary of Cost Proposal

TO: Fairchild Aircraft
Division of Engine and Airplane Corporation
Hagerstown, Md.

Thru: AF Plant Representative

Ref: (a) AMC Letter MCPPXA66/WL dated 15 April 1949
Subject: Standard Aircraft Charts and Characteristics Summary

(b) AMC Letter MCPPXA66/WL dated 15 April 1949
Subject: Equipment Lists, GFP and CFP

(c) AMC Letter MCPPXA66/WL dated 15 April 1949
Subject: Request for Proposal including Handbook Data, Aircraft Data, Special Tools

1. This confirms and summarizes the proposal items to be included in Contractor's quotation for subject airplane. Contractor was verbally requested, during its representative's visit to AMC on 8 April 1949, and during subsequent telephonic conversations, to submit price quotations covering the following items:

(A) One hundred T-31A airplanes in accordance with:

(1) Revised model specification based on all 689 "Board Approved" changes and study items which have been resolved by the Contractor, and trainer evaluation changes not in conflict with approved 689 changes.

(a) Model specification shall include the GFP and CFP list informally given the Contractor, and confirmed in AMC letter, reference (b), with the exception that the R680-13 engine is now CFP in lieu of GFP.

(b) AMC approves the deletion of oil dilution in subject airplane engine installation, provided

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Hq, AMC Ltr. 21 April 1949 to Fairchild Aircraft, Subj: T-31A Airplane, Summary of Cost Proposal

adequate ground preheat provisions for the engine, oil lines and oil tank are made. This is being accomplished by compliance with 689 Inspection Items No. 60 and 75.

(c) An oil tank hopper is required per 689 Inspection Item No. 46. The oil tank hopper should be designed in accordance with the Handbook of Instructions for Aircraft Designers.

(d) Delete space and structural provisions for ARC-14 Radio components (contrary to Inspection Items No. 3 and 8).

(e) Wing hoist lugs not to be included in specification but separate quotation to be submitted.

(f) Tail jack points not to be included in specification but separate quotation to be submitted.

(g) Incorporate a standard generator and tachometer drive, relocate the automatic mixture control to the carburetor entrance duct, and incorporate the improvements developed in Lycoming R-680-10 engine into the R-680-13 where possible.

(h) Include a dustproof spinner with each propeller installation. No spares required.

(i) Install Battery to Inverter (on-off) switch.

(j) Contractor will provide hand hold with no protruberance on outside of the sliding canopy in lieu of present hand hold.

(B) Spare Parts for aircraft in (A) above.

2. Contractor was further requested to base price quotations on the following items per AMC letters references a, b, and c:

(a) Standard aircraft characteristics charts and Summary charts

(b) Equipment Lists, GFP and CFP

(c) Handbook data, Aircraft data, Special Tools

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OTHER

Hq, AMC Ltr. 21 April 1949 to Fairchild Aircraft, Subj: T-31A Airplane, Summary of Cost Proposal

3. Contractor was advised in Paragraph 1A(1)(a) above that the R-680-13 engine is changed from CFP to CFP. The propeller is retained as CFP. All other equipment as submitted in reference (b) will remain CFP as originally disclosed to the Contractor.

4. Study items listed below except for Item (a), are evaluation comments informally transmitted to Contractor and are to be subjects of separate proposal to AMC when Contractor finally resolves the problems concerned.

(a) 689 Inspection Item #69 - Study to determine possibility of jettisoning present canopy without change.

(b) General Aerodynamics

(1) Contractor to submit comments regarding restricted aileron deflection (approximately 12°) although model specification defines deflection as 20° up, 20° down.

(2) Contractor to submit comments on aileron buffeting tendency for small aileron deflections at cruising speeds.

(c) Landing Gear - Contractor will investigate linkage between front and rear cockpit brake control units, to eliminate excessive deflection in linkage (cable).

(d) Vibration - AMC considers the anti-vibration mounts inferior to AF standard. Contractor will investigate use of dynafocal mounts or equal.

(e) Flutter - Contractor will submit comments on investigation into incomplete balance of aileron, rudder and elevator.

(f) AF Standard Filler Cap:
Contractor will investigate possibility of incorporating AF Standard Fuel Filler Cap.

(g) Contractor to furnish comments and state deviation, if any, regarding canopy defrosting.

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OTHER

Hq, AMC Ltr. 21 April 1949 to Fairchild Aircraft, Subj: T-31A Airplane, Summary of Cost Proposal

5. In addition to the foregoing, Contractor is requested to outline a recommended flight test program involving the first production article and to submit same to AMC.

FOR THE COMMANDING GENERAL:

Ben I. Funk

BEN I. FUNK
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

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1. It is recommended that three aircraft be obtained for flight test purposes. The first production model should be instrumented for performance, cooling, and stability tests. The other two aircraft should be standard production models without special test equipment and would be required for from 60 to 90 days to obtain accelerated service tests.

2. It is estimated that the Phase I test, to be conducted by the contractor, should not require more than 20 hours flying time in view of the large amount of testing which has already been conducted on the prototype XNQ-1 aircraft. Emphasis should be placed on evaluating the changes between the XNQ-1 and the T-31A. In general, the Phase I program should consist of tests for safety of flight and functioning of equipment. The tests should include: a check for proper carburetor setting; cooling on the ground, in climb, and in level flight at the critical altitude for maximum continuous cruising power with the mixture leaned for best economy; functional tests of the aircraft including a check of the carburetor heat and cockpit heating systems; if any modifications are made to the T-31A which would change the stability and control characteristics as compared to the XNQ-1, the effect of the modifications should be qualitatively checked; tests of any additional items which, because of design changes, are considered as being warranted by the contractor. It is recommended that the contractor's outline for the Phase I program be submitted to the Procurement Division and Flight Test Division for approval.

3. It is proposed that the Phase II program, not to exceed 30 hours flying time, be conducted at the contractor's plant and that the aircraft and instrumentation be maintained by contractor personnel during that time. The Phase II program will consist of the following:

a. Check contractor's guaranteed performance plus the additional performance necessary for the Pilot's Handbook of Operating Instructions.

b. A spot check of engine cooling.

c. Qualitative and partial quantitative stability tests. Items which were listed as being marginal as a result of tests on the XNQ-1 will be tested quantitatively as well as any additional data which are considered necessary because of design changes or pilots' observations. The marginal items reported for the XNQ-1 were: elevator and rudder trim tab controls not sufficiently sensitive; longitudinal static stick-fixed and stick-free stability in the approach configuration; stick force per g; lateral stability in approach configuration; aileron forces in sideslip; lightening of rudder forces near full rudder deflection; [illegible] effectiveness in approach configuration; yaw due to aileron in approach and landing configuration; stall warning.

d. Complete pilot's observations on the aircraft including a night flight.

[redacted]

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4. In view of the large amount of flying conducted on the XNQ-1 it may not be necessary to conduct Phase II tests with the possible exception of structural demonstration. It is not possible to outline a Phase III program until after completion of Phase I and II tests.

5. Phase IV tests which will consist of additional cooling, stability, and control and any other miscellaneous tests not obtained during the Phase II program will be conducted at Wright-Patterson Air Force Base. The accelerated service tests will be conducted at Wright-Patterson Air Force Base and the aircraft will be maintained by Flight Test Division personnel.

6. Special instrumentation requirements are listed below. All items of special test equipment are to be supplied by the Flight Test Division and installed by the contractor except where otherwise noted.

a. Pilot's cockpit

(1) Correlation counter

(2) Sensitive elevator trim tab position indicator

(3) Angle of yaw indicator

(4) Accelerometer

(5) Sensitive manifold pressure, air-speed, and altimeter instead of the standard instruments.

(6) Camera control

(7) Aileron, elevator, and rudder force repeater indicators with controls for the force amplifiers.

b. Rear cockpit

(1) Sensitive manifold pressure gage

(2) Carburetor air temperature gage

(3) Test free air temperature gage

(4) Altimeter

(5) Neptune fuel flow counter (1/10 gallon)

(6) Correlation counter

(7) Camera controls

(8) Controls for Brown recorder

(9) Cowl flap and oil cooler flap position indicators if applicable

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Flight Test Program, T-31 Airplane (Fairchild Trainer)

MCPFXA66 MCRFT 1 (contd)

(10) Tachometer (type C-9A)

(11) Carburetor ram gage

c. Brown recorder

(1) Cylinder head temperatures (all cylinders)

(2) Cylinder base temperatures (all cylinders)

(3) Spark plug elbow temperatures (all cylinders, rear plug)

(4) Engine mount temperature

(5) Magneto temperature

(6) Generator temperature

(7) Accessory compartment, 6" to rear of engine ~~or~~ engine C/L

(8) Oil in

(9) Oil out

(10) Fuel temperature

(11) Carburetor air temperature

(12) Mixture temperature

(13) Exhaust shroud

(14) Free air temperature

(15) Correlation counter

d. Photo panel

(1) Correlation counter

(2) Angle of bank indicator

(3) Air-speed indicator, standard system

(4) Air-speed indicator, swivel system

(5) Altimeter

[redacted]

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(6) Clock

(7) Free air temperature (type C-10)

(8) Aileron position, left and right

(9) Aileron trim tab position indicator

(10) Rudder and rudder tab position indicator

(11) Elevator and elevator tab position indicator

(12) Angle of yaw and attack

(13) Master control force indicators for aileron, elevator, and rudder

(14) Rate of roll

(15) Accelerometer

(16) Camera

e. The following equipment should be furnished by the contractor:

(1) Photo recorder assembly, less camera and instruments

(2) Swivel pitot and static head boom assembly less transmitter assembly

(3) Angle of yaw and attack boom assembly less transmitter assembly

(4) Miscellaneous tubing, fittings, brackets, thermocouples, leads, and disconnects as required

(5) Furnish the Instrumentation Section, Flight Test Division, with a control stick and rudder pedals which will be equipped with strain gages

f. Miscellaneous comments

a. The instrumentation proposal should be submitted to the contractor for comments relative to additions or revisions to the equipment.

b. A drawing showing the proposed location of the test equipment should be submitted to the Flight Test Division for approval prior to installation of the equipment.

c. The contractor should notify the Flight Test Division well in advance of the time the equipment furnishing instrumentation will be required in order to prevent delay to the test program.

d. A contract should be initiated for the equipment. A copy of this should be sent to the Instrumentation Section, Flight Test Division, and

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that organization will furnish whatever assistance is necessary relative to specifying equipment nomenclature for the bailment contract.

e. Provisions have not been made in the instrumentation plan for measurement of airflows past the cylinder baffles and through the oil cooler or for measurements of cooling air temperatures because of the amount of time accumulated on the XNQ-1 aircraft. This omission should be correlated with and approved by the Power Plant Laboratory.

f. The inclosures are returned as requested. Report No. TRD No. EIS 2197 does not contain any quantitative cooling data and only a very small amount of quantitative stability data. However, it is requested that, if possible, an additional copy of this report be supplied the Flight Test Division for reference purposes. The report is not very comprehensive in view of the 800 hours flight test time mentioned in Comment No. 1. If additional reports are available on cooling or the power plant installation they should be submitted to the Power Plant Laboratory, AMC, in which case it might be possible to eliminate or reduce the cooling test program.

3 Incls
1. Rpt TRD No. EIS 2197
2. Wind tunnel data
3. Abstract SR No. FT-339

RICHARD E. HORNER
Lt Colonel, USAF
Chief, Test Engineering Subdivision
Flight Test Division

LMS/mac
2-4120
Bldg 8
Area B

cc: MCRFTI
MCRFXC
MCRFTP

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PROC. & IND. MOB. PLNG.*

OTHER

MCPFA66/GL/rd

26 April 1949

SUBJECT: Fairchild XNQ-1 Trainer,
Test Reports.

TO: Bureau of Aeronautics
General Representative,
Central District,
Wright Field,
Dayton, Ohio

1. This office is in receipt of a procurement directive instructing the procurement of one hundred T-31A trainers. The T-31A is the Air Force designation of the Fairchild XNQ-1 Navy trainer.

2. It is requested that triplicate Navy reports covering the following items on subject airplane be forwarded this office for study by Air Materiel Command and file:

Flight Tests, including performance, stability, engine cooling, range and endurance, etc.

Structural Static Tests

Engineering Acceptance Inspection

Vibration and Buffetting

3. For your information, this office has already received one copy of Flight Report TED No. NIS 2197.

FOR THE COMMANDING GENERAL:

Mate Sincerbox

JOHN I. FUNK
Colonel, USAF
Chief, Aircraft & Missiles Section
Procurement Division

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UNITED STATES SENATE
Committee on
Expenditures in the Executive
Departments

Senate Investigations Subcommittee
(Pursuant to S. Res. 52, 81st Congress)

April 26, 1949

Major General Thomas D. White
Director of Legislation and Liaison
Department of the Air Force
Washington, D. C.

Dear General White:

A complaint has been forwarded to the Subcommittee alleging that the Air Force has recently purchased Fairchild training planes at an apparently excessive price of $80,000 each, while other planes capable of equal performance are available at less than one-fourth of this price.

In accordance with a conversation between Colonel Masters and Mr. Adlerman, Assistant Counsel to the Subcommittee, it is requested that copies of the contracts be furnished to the Subcommittee with a memorandum explaining the purchase.

Your cooperation in this matter will be appreciated.

Very truly yours,

/s/ William P. Rogers

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9 Unit

Supplemental FY 1949 Estimated Program Cost for 100 T-35 (Fairchild ENG) aircraft

MCPR MCP71466 27 April 49 1

Attn: Mr. R. V. Burns

1. There is listed below for your information a breakdown of program cost for the pending procurement of 100 T-35 (Fairchild ENG) aircraft. All figures have been quoted by the Contractor with the exception of Flight Tests which were estimated. The spare parts estimates were submitted by Supply Division.

Item 1.	100 T-35 airplanes, Unit Price $57,000.00 Note: This price is based on unit airframe price of $41,000.00 and GFP changed to CPF figured at $16,000.00. Ample stocks exist. No additional funds required.	Total Price 5,700,000.00
Item 2.	Technical Data Note: Includes all Handbooks, Aircraft Characteristics Charts, Lubrication Charts, and Flight-Filming.	65,000.00
Item 3.	Flight Test (Estimated)	100,000.00
Item 4.	Tools and Ground Handling Equipment (5% of airframe cost)	82,000.00
Item 5.	Spare Parts	2,357,054.00

Breakdown of Spares:

(a)	Airframe 20%	820,000.00
(b)	GFP 100%	1,192,200.00
(c)	Contractor Engines 20%	296,000.00
(d)	Contractor Spares 20%	85,854.00

* Airframe spares based on 20% airframe unit cost of $41,000.00. This figure includes spare parts necessary and accessories.

** Spare parts for items furnished CPF which were normally GFP based on 100% of unit GFP cost of $11,922.00. This figure determined by deducting cost of engine $4,774.00 from estimated GFP cost of $16,696.00

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[redacted] 4 Apr 49 2.

[redacted]
Attn: Mr. R. W. Burns

[redacted] This figure based on 50% of cost of 200 engines at $4,775.00 each.

[redacted] This figure based on 25% of cost of 200 engines at unit cost of $4,775.00 each.

[redacted] of cost of 200 engines at unit cost of [redacted]

Total Estimated Program Cost For 200 Airplanes $ 4,211,000.00

Total Maintenance Program Cost For 200 Airplanes $ 4,211,001.00

KATE SILVERSTEIN
Buyer
Trainer Unit, Aircraft Section.

[redacted]
Buyer
Trainer Unit, Aircraft Section.

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10

ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

Use this form for inter-office correspondence within headquarters.
Number all comments consecutively.
Use entire width of sheet, both sides.
Use authorized office symbols to designate addressor and addressee.
Note warning signal at lower left of form. Remaining space is sufficient only for proper spacing of typewritten signature.
Place initials of dictator and typist, telephone number and location to right of signature.
Separate comments by horizontal lines across page.

SUBJECT: Surplus Propeller Assemblies for T-31 Airplane. 4-548

TO: MCPPXA66 FROM: MCPPXE5 DATE: 28 Apr. 49. COMMENT NO. 1

1. Confirming telephone conversation this date between Mr. Lankin and Mr. Kochendorfer, the following information is submitted:

a. There is available in War Assets stock at Aircraft Components Corporation, Alexandria, Virginia - 123 each 2B20-251/6135A-9 Propeller Assemblies. Available information indicates that there are no 1Q12-G Governors in W.A.A. stock.

2. It is proposed that the 123 each Propeller Assemblies be made available to Fairchild with the understanding that these Propeller Assemblies will be overhauled and modified on agreement between Fairchild and Hamilton Standard. It is further proposed, that the Governors for this airplane and any additional Propeller Assemblies required, will be furnished by Fairchild. Governors are available from various private surplus stocks which could be utilized by Fairchild to meet complete requirements of this airplane.

3. While the above proposal will not meet complete requirements for G.F.P. on this airplane, it will partially satisfy these requirements, and result in a substantial savings to the Government.

4. It is requested that this office be advised immediately of the decision of the Aircraft Section, as this material is now frozen pending a withdrawal notice to W.A.A.

M. J. COFFIELD
Colonel, USAF
Chief, Aeronautical
Equipment Section
Procurement Division

CAK/ht
3-0106
Rm 276
Bldg 11A

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(CONTINUE ON OTHER SIDE)

AMC Form No. 5 (Rev 29 Jul 47)

This form replaces AMC Form No. 10-3, which will be used until stocks on hand are exhausted.

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TO MCPPXE5 FROM MCPPXA66 DATE 29 Apr 49 COMMENT NO. 2
Attn: Mr. Kochendorfer

1. It is requested that the 123 propeller assemblies mentioned above in Comment 1 be immediately withdrawn from War Assets Stock and placed in Air Force Stock. These propellers will be retained in Air Force Stock until the Government can make a commitment to the airplane Contractor at which time instructions will be issued to you regarding shipment of these propellers to the Contractor.

2. The plan is that the airplane Contractor will subcontract the overhauling and modification of the 123 installations to the Hamilton Standard Propeller Company, 100 of which will be installed in the T-31A airplanes on contract. The balance of 23 overhauled and modified propeller installations will then be returned to Air Force Stock as partial fulfillment of the spare parts requirements.

120

EUGENE I. FUNK
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

WL/mc
28138

To: MCPPXA66 From: MCPPXE5 3 May 1949 No. 3

1. Action has been initiated to withdraw 123 Propeller Assemblies suitable for use on the T-31 airplane, and in addition, 36 each [illegible] Assemblies and 56 each 1-Q12G Governors have been located. This material had been requested shipped to Middletown Air Materiel Area as G.F.P. stock.

2. Request this office be advised of any further action desired.

M. J. OSFIELD
Colonel, USAF
Chief, Aeronautical
Equipment Section
Procurement Division

CAK/ht
3-0106
Rm 276
Bldg 11A

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AMC Form No. 10-7
(Rev 1 Apr 48)

INSERT OFFICE SYMBOL AND FULL SIGNATURE IN APPROPRIATE BLOCK

CG, CO OR DEPUTY

AIR INSPECTOR

MCPTIA66

PUBLIC INF. OFFICE

COMPTROLLER

PERSONNEL & ADM.

RESEARCH & DEV.*

INTELLIGENCE

SUPPLY AND MAINT.

PROC. & IND. MOB. PLNG.*

OTHER

MCPTIA66/HL/mc
29 April 1949

SUBJECT: T-31A Airplane Flight Test Program Proposal

TO: Fairchild Aircraft
Division of Engine and Airplane Corporation
Hagerstown, Md.

Thru: AF Plant Representative

1. Contractor is requested to submit proposal covering the flight test program outlined in the following paragraphs.

2. The test program recommended is to be performed on the first production airplane and will consist of Phase I and Pase II tests.

(a) Phase I - These tests will be conducted by the Contractor, flight time not to exceed 20 hours. Emphasis will be placed on evaluating the changes between the XNQ-1 and the T-31A, and will consist of tests for safety of flight and functioning of equipment. These tests will include:

(1) Check for proper carburetor setting

(2) Cooling on the ground, in climb, and in level flight at the critical altitude for maximum continuous cruising power with the mixture leaned for best economy.

(3) Functional tests of the aircraft including a check of the carburetor heat and cockpit heating system.

(4) Qualitatively check effect on stability and control due to changes.

(b) Phase II - These tests will be conducted at the Contractor's plant, flight time not to exceed 30 hours. Contractor's personnel will maintain the airplane and instrumentation during this test period. The Phase II program will consist of the following:

(1) Check Contractor's guaranteed performance plus the additional performance necessary for the Pilot's Handbook of Operating Instructions.

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OTHER

Hq AMC letter 29 April 1949 to Fairchild Aircraft thru AF Plant Representative
Subj: T-31A Airplane Flight Test Program Proposal

(2) A spot check of engine cooling

(3) Qualitative and partial quantitative stability tests. Items which were listed as being marginal as a result of tests on the XNQ-1 will be tested quantitatively as well as any additional data which are considered necessary because of design changes or pilots' observations. The marginal items reported for the XNQ-1 were: elevator and rudder trim tab controls not sufficiently sensitive; longitudinal static stick-fixed and stick-free stability in the approach configuration; stick force per g; lateral stability in approach configuration; aileron forces in sideslip; lightening of rudder forces near full rudder deflection; rudder control effectiveness in approach configuration; yaw due to ailerons in approach and landing configuration; stall warning.

(4) Complete pilot's observations on the aircraft including a night flight.

3. The special instrumentation required for the foregoing tests are listed below. All items of special test equipment are to be supplied by the Flight Test Division and installed by the Contractor except as otherwise noted.

(a) Pilot's cockpit

(1) Correlation counter

(2) Sensitive elevator trim tab position indicator

(3) Angle of yaw indicator

(4) Accelerometer

(5) Sensitive manifold pressure, air-speed, and altimeter instead of the standard instruments.

(6) Camera control

(7) Aileron, elevator, and rudder force repeater indicators with controls for the force amplifiers.

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PROC & IND MOB PLNG.*

OTHER

Hq AMC letter 29 April 1949 to Fairchild Aircraft thru AF Plant Representative
Subj: T-31A Airplane Flight Test Program Proposal

(b) Rear cockpit

(1) Sensitive manifold pressure gage

(2) Carburetor air temperature gage (type C-10)

(3) Test free air temperature gage (type C-10)

(4) Altimeter

(5) Neptune fuel flow counter (1/10 gallon)

(6) Correlation counter

(7) Camera controls

(8) Controls for Brown recorder

(9) Cowl flap and oil cooler flap position indicators if applicable

(10) Tachometer (type E-9A)

(11) Carburetor ram gage

(c) Brown recorder

(1) Cylinder head temperatures (all cylinders)

(2) Cylinder base temperatures (all cylinders)

(3) Spark plug elbow temperatures (all cylinders, rear plug)

(4) Engine mount temperature

(5) Magneto temperature

(6) Generator temperature

(7) Accessory compartment, 6" to rear of engine on engine C/L

(8) Oil in

(9) Oil out

(10) Fuel temperature

(11) Carburetor air temperature

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OTHER

Hq AMC letter 29 April 1949 to Fairchild Aircraft thru AF Plant Representative
Subj: T-31A Airplane Flight Test Program Proposal

(12) Mixture temperature

(13) Exhaust shroud

(14) Free air temperature

(15) Correlation counter

(d) Photo panel

(1) Correlation counter

(2) Angle of bank indicator

(3) Air-speed indicator, standard system

(4) Air-speed indicator, swivel system

(5) Altimeter

(6) Clock

(7) Free air temperature (type C-10)

(8) Aileron position, left and right

(9) Aileron trim tab position indicator

(10) Rudder and rudder tab position indicator

(11) Elevator and elevator tab position indicator

(12) Angle of yaw and attack

(13) Master control force indicators for aileron, elevator, and rudder

(14) Rate of roll

(15) Accelerometer

(16) Camera

(e) The following equipment should be furnished by the Contractor:

(1) Photo recorder assembly less camera and instruments

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Hq AMC letter 29 April 1949 to Fairchild Aircraft thru AF Plant Representative
Subj: T-31A Airplane Flight Test Program

(2) Swivel pitot and static head boom assembly less transmitter assembly

(3) Angle of yaw and attack boom assembly less transmitter assembly

(4) Miscellaneous tuting, fittings, brackets, thermocouples, leads, and disconnects as required.

(5) Furnish the Instrumentation Section, Flight Test Division, with a control stick and set of rudder pedals which will be equipped with strain gages

4. Contractor is requested further to:

(a) Submit Test Program Proposal with recommendations relative to additions or revisions to the AMC program and/or equipment.

(b) Prepare and submit to AMC for approval, drawing or drawings showing the proposed locations of the test equipment prior to installation in the airplane.

(c) Notify AMC well in advance of the date on which GFP instrumentation will be required in order to avoid delay of the test program.

FOR THE COMMANDING GENERAL:

ELLIS I. FUNK
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

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AFOTR
Gen McNaughton/ek/67707
29 Apr 1949

MEMORANDUM FOR MR. SYMINGTON

SUBJECT: Selection of the T-31 Basic Training Aircraft

1. There is submitted herewith for your information an analysis of the reasoning which prompted the Air Staff to select the Fairchild XNQ as the future basic trainer.

2. The selection of the Fairchild XNQ aircraft over the Beechcraft and Temco aircraft was dictated by: the superiority of its technical evaluation as evidenced by the Air Materiel Command's Technical Evaluation Board, its adaptability to the training mission, and the possibility of joint Air Force-Navy procurement.

3. Ten days prior to the meeting of the Evaluation Board, these aircraft were assembled at the Air Materiel Commans where they were subjected to a very thorough technical evaluation which considered: performance and aerodynamics, structure and design, power plant (including propellers), equipment, radio, and maintenance and repair. The Air Materiel Command, by using a standard method of evaluation of 1000 points, awarded the Fairchild XNQ 835 points, the Beechcraft 784 points, and the Temco 557 points. The superiority of the Fairchild XNQ is further emphasized by the fact that of the six factors considered, the Fairchild received the highest rating in five.

4. In consideration of the adaptability to the training mission, the Fairchild XNQ by virtue of its more rugged construction, its proven power plant, its increased weight and horsepower, and its conventional landing gear, lends itself much more readily to the present basic training program. Graduates of this program must be capable of transitioning without difficulty to the 800 horsepower, 6000 lb. T-28 single-engine advanced trainer. It is the consensus of the senior experienced training officers in the Air Staff, and in the Air Training Command, that an aircraft of lesser horsepower and weight than the Fairchild would not be suitable for this purpose in that it would not be able to provide a steady progressive learning curve from solo to completion of the basic course. It was further the consensus of these same officers that so long as there are conventional landing gear aircraft such as the F-51 and F-47 still in the Air Force inventory, basic training should be accomplished on the conventional type landing gear. The Fairchild XNQ can be converted to a tricycle landing gear without significant cost when the time is propitious for the conversion to the tricycle landing gear type.

5. Discussions with Training personnel in the Navy have indicated that they are not interested in an airplane as light as the Beechcraft or

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the Temco for their basic training mission. Although they have not made a definite commitment in favor of the Fairchild aircraft, it must be remembered that the Fairchild is their development. At the 689 Board Meeting held on the Fairchild aircraft in Hagerstown, Maryland, the Navy personnel indicated that they would recommend the procurement of the Fairchild aircraft if the Air Force decided to purchase that aircraft. The report of the Supply Division of the Air Materiel Command states further that "From the standpoint of special tools and ground handling equipment, the Fairchild appears preferable in consideration of the advantages of unified procurement; also there is presently available to the Air Force a greater percentage of usable equipment for this plane.

6. Although the Air Materiel Command's Technical Evaluation brought out the fact that the Fairchild aircraft was most expensive of the three in its initial procurement, the maintenance cost would be less per hour flown due principally to the fact that the Fairchild airplane is built to military specifications whereas the Beech and Temco aircraft incorporate a preponderance of non-standard items.

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T-31 *6 Encl 4-541.

Surplus R-680-9 and -13 Lycoming Engines.

MCPTMA-66 MCPTR5 27 April '49 1
Attn: Mr. W. Lankins

Attached is a list of R-680-9 and -13 engines which are available through the War Assets Administration at no cost to the Government. Since the War Assets Administration is in the process of being deactivated, it is suggested that, if the engines are required, shipping instructions be issued as soon as possible.

M. J. COFFIELD
Colonel, USAF
Chief, Aeronautical
Equipment Section
Procurement Division

J.Bakanauskas/ms
30158
Bldg 11A, Rm 278

1 Incl:
List

MCPTR5 2 May 1949 2

1. It is requested that the 39 Lycoming engines listed with Comment 1 (11 R-680-9's and 28 R-680-13's) be immediately withdrawn from War Assets stock and placed in Air Force stock. These engines will be retained in Air Force stock until the Government can make a commitment to the airplane Contractor at which time instructions will be issued to you regarding shipment of these engines to the Contractor.

2. The plan is that the airplane Contractor will subcontract the overhauling and modification of the 39 engines to the Lycoming Division. The overhauled engines will probably be used for the partial fulfillment for the spares requirements of the engines.

[illegible]
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

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4-541

SURPLUS R-680-9, -13 ENGINES

ENGINE	QUANTITY	CONDITION
R680-13	17	No time since overhaul
R680-13	7	Serviceable
R680-13	2	Condition is "New".
R680-13	2	Repairable
R680-9	5	No time since overhaul
R680-9	1	Repairable
R680-9	5	New.

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WCPFA66/WL/mcs
3 May 1949

WCPFA66

SUBJECT: Surplus Propellers and Engines - T-31A Aircraft

TO: Fairchild Aircraft
Division of Engine and Airplane Corporation
Hagerstown, Md.

Thru: AF Plant Representative

1. Contractor is advised that 123 propeller assemblies have been found in surplus stock. Those installations which are in serviceable condition will be furnished the Contractor who will arrange with the Hamilton Standard Company for overhaul and modification of the installations. 100 of these propeller assemblies following overhaul and modification will be installed in 100 T-31A airplanes, and the balance of 23 will be supplied the Air Force as partial fulfillment of the propeller spare requirements. Attention, however, is called to the fact that the propeller control I-Q126 will be CFF, since this item is not contained in surplus stock.

2. In the case of the engines, 39 R-680-9 and -13 engines have been located in surplus stock (28 R-680-13 and 11 R-680-9). These engines will be supplied to the Contractor who will arrange with Lycoming Division for engine overhaul and modification. When the work is completed on the engines in question the Contractor will supply them to the Air Force as partial fulfillment of the spare engine requirements.

3. In view of the foregoing, Contractor should list the propeller assembly in the model specification as CFF, and the propeller control and engine as CFP.

FOR THE COMMANDING GENERAL:

BEN I. FUNK
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

124

No. 57544

7

QUADRUPLICATE

PURCHASE REQUEST

Date of Initiation:

Submitted to:

Section 1

ITEM	QUANTITY	UNIT	ESTIMATED UNIT PRICE	DESCRIPTION OF SUPPLIES OR SERVICE TO BE PURCHASED	UNIT PRICE	ACTUAL TOTAL PRICE
				Procurement of 100 T-31A Trainer Aircraft, together with Spare Parts, Ground Handling Equipment Data and Flight Tests "See Exhibit A, attached"		

TOTAL ESTIMATED COST	EXP. ORD. NO. / PROJECT NO.	ITEM NUMBER	PROP. CLASS	TOTAL ACTUAL COST
$ [illegible]	[illegible] / 110 A		01-R	$

Section 2

DELIVER TO:

DESIRED DELIVERY SCHEDULE—MAXIMUM ACCEPTABLE EXTENSION OF DESIRED DELIVERY SCHEDULE .... MONTHS

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
194	194										

F. O. B. POINT: Hagerstown, Maryland

POINT OF INSPECTION: Contractor's Plant

Section 3

REMARKS: (Reference Subjects by number in space below and list all exhibits and attachments)
1. Recommended Source 2. Sole Source 3. Should Serial Number be Assigned 4. G. F. P. 5. Tools, patterns, etc. to be loaned by Gov't. 6. Authority 7. General Remarks

1. Fairchild Aircraft, Division of Engine and Airplane Corp., Hagerstown, Md.
2. Fairchild Aircraft, Division of Engine and Airplane Corp., Hagerstown, Md., per P.D. [illegible]
3. To be assigned
4. In accordance with model specification No. 129-000A dated 20 April 1949
5. None
6. T.I. [illegible] dated 16 April 1949; Authority C/S USAF letter dated 24 March 1949
7. See Attached Sheet

Section 4

INITIATION: [illegible]

APPROVED BY: (A)
[illegible], BRIG.GEN., USAF
Chief, Procurement Division
SYMBOL [illegible] DATE 4 May 49

APPROVED BY: (B)
SYMBOL DATE

INITIATED BY: [illegible]
PHONE [illegible] SYMBOL [illegible]

APPROVED BY: (C)
[illegible], LT.COL., USAF
[illegible]
SYMBOL [illegible] DATE 4 May 49

APPROVED BY: (D)
[illegible], COLONEL, USAF
Chief, Aircraft & [illegible]
SYMBOL MCPPXA DATE 4 May 49

APPROVAL OF FUNDS: The supplies and services to be obtained by this instrument are authorized by, are for the purpose set forth in and are chargeable to [illegible]

[illegible] $ (E) DATE

Actual cost approved for $..........

(F) BUDGET AND FISCAL OFFICER DATE

(G) INITIATING ACTIVITY DATE

[illegible]

NOT ON UNAPPROVED LIST (Initial and date)

CONTRACT NUMBER

PURCHASE ORDER NUMBER 125

1837

Paragraph 7, "General Remarks"

1. Most items of equipment normally CFP were changed to CFP with the exception of several instruments, propellers, ARC-3 and BC-453 Radio.

2. Thirty-nine surplus engines (28 R-680-13, and 11 R-680-9) will be furnished to the Contractor for modification and reconditioning by the vendor, to be used for partially fulfilling spare engine requirements.

3. 123 surplus propellers will be furnished the Contractor for modification and reconditioning by the vendor; 100 of the reconditioned propellers to be installed on the aircraft and 23 to be used to partially fulfill spare propeller requirements. These do not include governors which are not available as surplus and which must be Contractor furnished.

EXHIBIT A

4 May 1949

ITEM 1

One Hundred AF Model T-31A Airplanes in accordance with Contractor's Specification 129-000A, dated 20 April 1949, at a unit price of $54100.00, and at a total price of . . . 5,410,000.00

ITEM 2

Spare Parts for the airplanes called for in Item 1 above in accordance with Appendix 5 Air, including packaging and crating at a cost not to exceed 1,713,000.00

ITEM 3

Special Tools and Ground Handling Equipment for the airplanes called for under Item 1 above, in accordance with the 5 Air Appendix. The total price to be paid for such special tools and ground handling equipment, including packing and crating, shall not exceed $2,000.00

ITEM 4

Technical data for the airplanes called for under Item 1 above shall be furnished as follows:

(a) Pilot's Handbook at a total price of	11,000.00
(b) Erection and maintenance at a total price of	3,300.00
(c) Structural Repair Handbook at a total price of	16,500.00
(d) Parts Catalog at a total price of	22,700.00

ITEM 5

Standard Aircraft Characteristics Charts and Characteristics Summary Sheets in accordance with Exhibit REOA9-4 dated 25 September 1948 and including Correction Sheets 1 and 2 thereto dated 1 January 1949 and 17 March 1949 respectively. The price of this item is 3,100.00

ITEM 6

Microfilming and Indices in accordance with Specification L0981A dated 3 September 1947, at a total price of 8,100.00

ITEM 7

Flight Testing, Phases I and II estimated cost 100,000.00

TOTAL $ 7,370,000.00

[illegible]

100 Airplanes, Special Tools and Ground Handling
Equipment, Data, etc. — — 110 % Funds [illegible]
& Spare Parts — — 110 % Funds [illegible]
TOTAL $ [illegible]

Spare Parts are broken down as follows;

AIRPLANE SPARES [illegible]	[illegible]
SPARE ENGINES 50% or 50 SPARE ENGINES $3500 X 100 X 50%	175,000
ENGINE SPARES 12% of Installation Engines and Spare Engines $3500 X 150 X 12%	63,000
ELECTRONIC EQUIPMENT	
Spare Components	15,000
Spare Parts	5,000
PROPELLERS	
Spare Propellers	56,000
Spare Parts	78,000
OTHER GFP	
Installation	250,500
Spare Components	150,300
Spare Parts	100,200
	$ 1,713,000.

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Mr. William [illegible] Rogers
Chief Counsel, Senate Investigations Subcommittee
Committee on Expenditures in the Executive Departments
United States Senate

Dear Mr. Rogers:

We refer to your letter dated April [illegible], 1949, requesting the Fairchild trainer procurement.

Similar complaints relative to the procurement of the Fairchild trainer have been made to the Chief of Staff, United States Air Force, by the two competitors and a thorough review of this matter was made by the Chief of Staff before proceeding with this procurement.

Of the three aircraft companies submitting proposal, it was the considered opinion of the Air Staff and the Commanding General, Air Training Command, that the Fairchild trainer was best qualified to accomplish the required training mission. All factors, such as initial cost, maintenance, gasoline consumption, as well as the flight and engineering characteristics of the subject aircraft were thoroughly appraised.

Currently the contract with Fairchild is in the process of negotiation and as soon as a contract has been executed, a copy will be forwarded to you.

We hope you will understand our position in this matter.

Sincerely,

126

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CO, CO OF DEPUTY

AIR INSPECTOR

PUBLIC INF. OFFICER

COMPTROLLER

PERSONNEL & ADM.

BRANCH 5 DIV.

K. B. WOLFE
Major General, USAF
Director, Procurement &

127

AAC Form No. 8
(Rev. 1 Apr 48)

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AIR INSPECTOR

PUBLIC INF. OFFICE

COMPTROLLER

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RESEARCH & DEV.*

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OTHER

1949

FINDINGS AND DETERMINATION

The USAF proposes, under Purchase Request 57544, to enter into a contract with Fairchild Aircraft Division of Fairchild Engine and Airplane Corporation for the production of one hundred T-31 aircraft (Fairchild XNQ-1), spare parts, data, special tools, ground handling equipment, and flight tests.

I hereby find that:

a. This procurement, the estimated cost of which is $7,276,100.00, chargeable to Supplemental Fiscal Year 1948 Funds, is for the production of one hundred T-31 aircraft (Fairchild XNQ-1), spare parts, data, special tools, ground handling equipment, and flight tests.

b. The articles to be procured are of a technical and specialized nature. This is the procurement of the Air Force configuration of the Navy XNQ-1 Trainer, designed and constructed by Fairchild Aircraft under an experimental Navy contract. A major portion of the engineering and some of the tooling fabricated for the experimental airplanes can be utilized in the production of the T-31 airplanes.

Placement of this procurement with this source will insure the benefit of techniques, tooling and equipment previously developed. The Government will further benefit by having this Contractor produce the T-31 trainer as it has acquired considerable know-how, as a result of years of close coordination and engineering liaison with the Training Command, in the manufacturing of over four thousand similar type trainers during the last war.

The procurement of this trainer is directed by P.D. 49-33 dated 24 March 1949 which is the result of an evaluation between existing trainers of this type.

Upon the basis of the findings set forth above, I hereby determine that pursuant to Section 2 (c)(14) of Public Law 413, 80TH Congress, negotiation of a contract for the above described procurement is authorized.

(Signed) A. S. Barrows

A. S. BARROWS
Under Secretary of the Air Force

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2

Fairchild Aircraft
DIVISION OF FAIRCHILD ENGINE AND AIRPLANE CORPORATION
HAGERSTOWN • Cable Address "Faircraft" • MARYLAND

In reply please refer
129EPC19

5-149

6 May 1949

Subject: T-31 Airplane
R-680-13 Engine Modifications

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPPXA66

Thru: AF Plant Representative
Hagerstown, Maryland

1. As a result of a study conducted jointly by the Lycoming Division of AVCO Manufacturing Corporation, and the Fairchild Aircraft Division, certain modifications are considered necessary or desirable for the R-680-13 engine to be used in the T-31 Airplane. The following is a list of the items which both Fairchild and Lycoming consider to be necessary to properly prepare the engines for satisfactory installation and maintenance:

(1) Install one generator drive type XIIA, AND20002.
(2) Install one tachometer generator drive, type XVA, AND20005. Only one tachometer generator drive can be furnished.
(3) Relocate automatic mixture control for carburetor so as to be in the carburetor intake duct.
(4) Qualification test the modified engine to satisfactorily pass the requirements of Specification AN-9502-D, as previously passed by the R-680-13 engine.
(5) Install a new thrust bearing cap similar to that used on the R-680-10 engine.
(6) Install modified rocker arms similar to those used on the R-680-10 engine.
(7) Install a modified R-680-13 ignition manifold.
(8) Install a breather and tube assembly similar to that used on the R-680-10 engine.
(9) Install a PS-7 carburetor.

2. Based on the experience which Lycoming has gained from Unsatisfactory Reports in the past, they recommend that the following items also be incorporated into the engines used on the T-31 Airplane, although the Fairchild Aircraft Division cannot recommend these changes because of lack of experience and information regarding them. Such items should be made the subject of a joint discussion at Headquarters, AMC, so that the Contractor will know what action to take thereon:

4/4/49
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FAIRCHILD AIRCRAFT

Subject: [illegible]

In reply please refer
139EPC13
6 May 1949

(c) Install a new crankcase and cylinder hold-down similar to the R-680-13 engine.

(d) Install crankshaft [illegible] on the R-680-13 engine.

3. The above items will be discussed during a joint meeting between AAC and Fairchild Aircraft Division representatives. It is desired that any deletion reached as a result of this discussion be put into effect at the earliest possible time. [illegible] in the T-31 airplanes can be modified as soon as practical.

[illegible]

[illegible]

[illegible]

[illegible]

cc: Denver
MCPPAC/EL/pam
Contractor's letter forwarded for [illegible] action.

[illegible]

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9 May 1949

BRIEF OUTLINE OF TRAINER COMPETITION

On 30 September 1948, the Acting Director of Training and Requirements, DCS/Operations, recommended that the Army procure Fairchild M-62 to meet approved new pilot training program as follows: From FY 1949 funds - 334 articles.

On 23 October 1948, certification papers were forwarded to the Secretary of Defense requesting approval of procurement of 100 XM Fairchild Trainers - amount $3,201,500. On January 6, 1949, the President approved the release of funds.

The Board of Review [illegible] that competition on 25 September 1948 recommended that aircraft not be procured until all existing aircraft of this type in the Army Air Forces had been evaluated. Evaluation of M-62 was held on 25 February 1949 and the Board reconvened. Placement of each Model 45. The vote was as follows:

	Beech	Fairchild	Ryan
4 members	1st	2nd	3rd
1 member	2nd	1st	3rd

A summary sheet to the Chief of Staff, dated 18 April 1949, signed by General [illegible], recommending procurement of the Fairchild. The Chief of Staff approved [illegible] 1949.

On 27 April [illegible] Director of Procurement of the Fairchild [illegible].

[illegible] of 100 Fairchild.

[illegible] for details of the evaluation. [illegible] review details of the procurement.

[illegible] of the Board of Review [illegible] of contract [illegible].

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On 8 May 1949 AMC advised that negotiations are proceeding. They are currently considering quotations of the Fairchild Company.

Documents are available substantiating all of the above statements.

J. F. BERLING
Colonel, USAF
Asst. Deputy Chief of Staff, Material

Incls.
1-Ltr fr Mr. Baty to Sec AF
2-Sec AF reply to Mr. Baty
3-Ltr from Senate Investigating Comm
4-SAF reply to Senat Invest Comm

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T-31 Airplanes

MCREEE25 MCPPXA66 11 May 49 2
Attn: Mr. Columbo

1. Further to telephone conversation between Mr. Columbo and W. Lankin of this office, TI-2249-12 dated 13 April 1949 directed that as many items as possible normally supplied as GFP should be made GFP. The only items made GFP therefore were those which were currently in stock in excess to present program requirements. This was interpreted to mean that no additional procurement of GFP to fulfill the requirements for this airplane would be made.

2. The model specification for subject airplane currently being prepared by the Contractor will list as GFP all the equipment recommended by Equipment Laboratory as to type designation, nomenclature, specification, and drawing numbers. The equipment to be installed in subject aircraft will as nearly as possible be Air Force standard and approved.

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3. Attention is called to the fact that all approved 689 Inspection Board changes and Evaluation Board recommendations were given the Contractor who will incorporate same in subject airplane.

BEN T. FUNK WL/mc/28138
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

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B & D ... T & B - D

MEMORANDUM FOR: Mr. A. S. Barrows DATE: 20 May 1949

SUBJECT: Procurement of Fairchild T-31 Training Airplane

1. Procurement Directive 49-33, dated 24 March 1949, authorized immediate procurement of 100 T-31 aircraft (Fairchild XNQ). A copy of the directive is attached.

2. The procedures specified in paragraph 2 of the directive, as pertain to the assumption by the contractor of functions normally performed by offices of this Command, are questionable.

3. The contractor was requested to submit cost estimates consistent with the directive and his estimates are summarized in Exhibit "B". Exhibit "A" is a summary of cost estimates under normal procurement procedure.

4. Exhibit "C" is a cost proposal by the contractor whereby he will go even further than desired in the directive and also undertake to perform the entire maintenance and supply service for the 100 aircraft in operation over a five year period. This proposal is further based on the assumption that only two operating bases will be involved at which all facilities will be provided by the government, that aircraft will fly 1000 hours per aircraft per year, etc. An accurate estimate of the feasibility of such a program would entail an extensive study into operating policies and plans of the Training Command, operating costs, cost of facilities, and many other factors. Consequently, the contractor's proposal (Exhibit "C") is of little significance at this time.

5. The contractor has stated that he cannot comply with paragraph 2.b. of the directive whereby he is to "furnish all possible equipment normally supplied as GFP at a handling charge not to exceed two to three per cent of cost." Rather, as you will notice in Exhibit "B", he is requesting 4.5% O. & A. rate added to the cost of such equipment and then a 7% profit on the total.

6. There are other criticisms of the policy suggested in the directive which could be considered, particularly in regard to numerous duplications of existing functions within AMC, lack of control over component suppliers, lessening of standardization in common items, etc.

7. I feel that we can buy a better airplane cheaper and with much less confusion through the normal procurement procedure. It is my recommendation that Procurement Directive 49-33 be rescinded, and that a directive be issued specifying procurement of the T-31 airplane in the normal manner, consistent with Exhibit "A".

/s/
K. B. WOLFE
Major General, USAF
Director, Procurement
and Industrial Planning

4 Incls.
Ex. "A", "B", "C"
Proc. Dir 49-33

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EXHIBIT "A"

Normal Procurement

	Unit	Total (100)
XNQ Airplane	$39,477.89	$3,947,789.00
-Evaluation Items	902.88	90,288.00
Basic T-31	$40,380.77	$4,038,077.00
Spares (20%)	$ 8,076.15	$ 807,615.00
Special Tools and Equipment (1%)	403.80	40,380.00
Miscellaneous (Handbooks, etc.)	1,321.25	132,125.00
Airframe Price	$50,181.97*	$5,018,197.00*

*G. & A. expense at 4.5% and profit at 7% are included.

Government Furnished "GFP"

GFP Items	$ 9,242.00	$ 924,200.00
GFP Spares (30%)	2,772.60	277,260.00
Total Cost	$62,196.57	$6,219,657.00

Spares will be procured in the normal manner and shipped direct to Air Force Stock.

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EXHIBIT "B"

Procurement Directive 49-33

		Unit	Total (100)
Airframe Price (From Exhibit "A")		$50,181.97	$5,018,197.00
Contractor Furnishing "GFP"			
"GFP Items	$10,379.57		
G. & A. at 4.5%	467.08		
Cost to Contractor	$10,846.65		
Profit at 7%	759.27	$11,605.92	$1,160,592.00
"GFP" Spares (30%)	$ 3,113.87		
G. & A. at 4.5%	140.12		
Cost to Contractor	$ 3,553.99		
Profit at 7%	227.78	$ 3,481.77	$ 348,177.00
Contractor Stocking Spares (Five Year Program)			
Warehouse (To be built by Government at Hagerstown)		($ 3,400.00)	$ 340,000.00
Operation	$290,000.00		
G. & A. at 4.5%	13,050.00		
Cost to Contr.	$303,050.00		
Profit at 7%	21,213.00		
	$324,263.00	($ 3,242.63)	$ 324,263.00
Total Cost		$71,917.23	$7,191,229.00

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EXHIBIT "C"

Contractor's Proposal

(Further expansion of Proc. Dir. 49-33)

		Total (100 Airplanes)
Total Cost (From Exhibit "B")		$ 7,191,229.00
Maintenance and Supply Services (Five year Program)		
Supply Functions	$ 580,000.00	
Maintenance, Repair & Overhaul	3,607,500.00	
Sub Total	$4,187,500.00	
G. & A. at 4.5%	188,437.00	
Cost to Contractor	$4,375,937.00	
Profit at 7%	306,316.00	
Cost to Government		4,682,253.00
Total Program Cost		$11,873,482.00

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C-87 Cont. & Corr.

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DEPARTMENT OF THE AIR FORCE
Washington

Office of the Under Secretary

ASB:emb

23 May 1949

Lt. General H. A. Craig,
Deputy Chief of Staff, Materiel,
United States Air Force,
Pentagon Building,
Washington 25, D. C.

Dear General Craig:

Referring to the attached memorandum from General Wolfe, you will note that the difference is about $10,000.00 each of $1,000,000.00 between Exhibit "A" and Exhibit "B".

When you and I discussed this, both of us were under the impression that the contractor would be willing to furnish the "CFP Items" for about a 2% to 3% handling charge. However, you will note from Exhibit "B", attached, that the contractor asks for 4.5% handling charge plus a profit of 7% on the "CFP Items". He also wants both the 4.5% and the 7% on handling "CFP Spares". Furthermore, the contractor goes one step further - he wants us to build for him a warehouse at Hagerstown, at a cost of $340,000.00 to handle spare parts.

I would like to have your reaction to the contractor's idea of expense plus profit on the "CFP Items" if he were required to furnish them. My own reaction is that he is aware of the directive, copy of which is attached, and, therefore, feels that he is able to set his own prices.

My personal reaction is that he is trying to hold us up and I wish it were possible to reopen the competition and find out what kind of a proposition we could get from Beech. It would be interesting to reopen the competition and ask for quotations based on General Powers' directive of 24 March 1949, attached herewith.

Waiting further advice, I am

Sincerely yours,

/s/
A. S. BARROWS
Under Secretary of the Air Force

1 Incl.
Memo dtd 20 May 49
to Mr. Barrows fr
General Wolfe

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AMC Form No. 8
(Rev 1 Apr 48)
INSERT
OFFICE SYMBOL AND
FULL SIGNATURE IN
APPROPRIATE BLOCK

CG, CO OR DEPUTY

AIR INSPECTOR

MCPPXA66

PUBLIC INF. OFFICE

COMPTROLLER

PERSONNEL & ADM.

RESEARCH & DEV.*

INTELLIGENCE

SUPPLY AND MAINT.

PROC. & IND. MOB. PLNG.*

OTHER

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SMAMA—Aug 48—900M

ACTION NO 44

MAY 26

MCPPXA66/WL/mc
14 : 28 May 1949

T-31 Airplane, R-680-13 Engine Modifications

Fairchild Aircraft, Division of
Fairchild Engine and Airplane Corporation
Hagerstown, Md.

THRU: AF Plant Representative

Ref: Contractor's Letter 129EFC19 dated 6 May 1949

1. As a result of a conference held at AMC on 9 May 1949 in which Mr. Bryan of Fairchild, Lycoming Engine representatives, and AMC personnel participated, Contractor is advised that items listed in Paragraph 1 of reference letter are approved by AMC for inclusion in the modified R-680-13 engine.

2. In the case of Items 1 and 2 of Paragraph 2 of reference letter the inclusion of the new crank case was also approved by AMC. The cylinder heads similar to the R-680-10 and mating rocker covers of the type used on that engine will not be used but in lieu thereof R-680-13 cylinder heads will be retained and rocker covers will be thickened to prevent rocker cover deflection. The thickening of the rocker covers was made possible by the availability of an additional 1/2" on the engine overall diameter.

3. The engine designation will be retained as R-680-13 with suffix description (R-680-13 modified). The modified engine will be described by a new or revised Lycoming engine specification.

FOR THE COMMANDING GENERAL:

KEN I. FUNK
Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

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5-572

May 25, 1949

Commanding General
Air Material Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPPG-15

Gentlemen:

Our Dayton representative has advised us of an informal request from the Air Force for our comments regarding the possible conversion of surplus R920/61354-9 propellers for use on T-31 aircraft.

It is our understanding that there is a quantity of some 125 used propellers in the hands of War Assets which would be made available for such conversion and in addition it would be necessary for us to supply 27 new propellers to complete the total requirement. Assuming that this information is correct, we would comment as follows:

(1) We have no knowledge of the condition of the 125 used propellers, except that they have been classified as serviceable and are packed in an assembled condition. There may or may not be Historical Record Cards with these propellers showing the total hours they have been in service or the time since last overhaul.

(2) It would be an exceedingly costly job to inspect each of these propellers since the inspection of blade thrust washers is very important and this would involve dis-assembly of each propeller. The AMC undoubtedly recalls the heavy rejection of thrust washers from used and new R-69 blades furnished to this Contractor as GFE for R-35 propeller blades.

(3) Should the AMC desire to use these propellers for T-31 aircraft, this Contractor would accept such propellers as GFE subject to acceptance by our Inspection Department at this plant. If the contract called for 125 used propellers, it would be the responsibility of the AMC to furnish acceptable material to complete 125 propellers, or reduce the quantity of used propellers and increase the quantity of new propellers. On the basis of the AMC furnishing acceptable material, this Contractor would modify such propellers to incorporate the extended range feature required for the T-31 aircraft at a price 15% below our quoted price for new R920/61354-9 propellers.

(4) Should the AMC desire this Contractor to accept the 125 propellers "as is" and furnish 125 modified propellers, we estimate the cost would be approximately 4% below the quoted price of new R920/61354-9 propellers.

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(5) It was originally anticipated that we would furnish 150 new 2820 propellers for this T-31 requirement and we quoted a price of $1715 net each on that basis. However, if we are to supply only 27 new propellers, it would be necessary for us to increase that quoted figure by $170 net each. In addition, it is estimated that spare parts to be manufactured for the T-31 propellers would increase in price approximately 10% if only 27 new propellers were ordered instead of 150.

(6) We would also like to point out that new propellers would carry the usual warranty for material and workmanship; whereas, for modified surplus propellers, we would be able to warrant only the labor and material actually furnished by us.

We suggest that serious consideration be given to the fact that the ratio of the total remaining service life of the 125 used propellers to their total modification price may not be as favorable as the ratio of total service life of 125 new propellers to their total purchase price. If such were the case, the AMC would obtain more propeller flight hours per dollar invested by procuring only new propellers for T-31 aircraft. Moreover, it must be apparent to the AMC that the purchase of new propellers would eliminate the problem of accountability associated with the modification of used propellers and would provide the AMC with a completely warranted article.

Very truly yours,

United Aircraft Corporation
Hamilton Standard Propellers Division

R. W. Russell
Assistant Secretary

WWR:ee

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ASC-251-D
(15-10-43)

A. G. P.	
PRIORITY	
ROUTINE	X
MULTIPLE ADDRESS	

TELETYPE MESSAGE

AIR SERVICE COMMAND TELETYPE NETWORK

MCPPIA66/HB/ss

FROM: ANC

DATE: 31 May 1949

HEN I. FUNK, Colonel, USAF
Chief, Aircraft and Missiles Section
Procurement Division

NAME, RANK AND TITLE OF AUTHENTICATING OFFICER

TO: Deputy Chief of Staff/Material
Hqs USAF
Washington 25, D. C.

CLASS: ATTN: AFMED

TEXT OF MSG MCPPIA66-5-135 Re telephone conversation this date with Major Squires procurement of Trainers from Beech and Temco, Beechcraft quotes $17,000.00 each for "off the shelf" Beechcraft Model 45 in quantities of three. Delivery three to four months from date of contract. Texas Engineering Manufacturing Co. quotes $11,000.00 each for "off the self" Temco Trainer in quantities of three. Delivery five to six months from date of contract. Above quotes are for complete airplane and includes radio equipment. Above figures do not include 20% spare parts requirements or data. Beech Trainer will be designated T-34, Temco Trainer T-35. Total cost to Government for the above six airplanes including 20% spares $100,800.00. SIGNED: PROCUREMENT DIVISION.

CC: MCPC-4
Col. Bishop

COORDINATION

C. G. OR C. O.	CONTROL OFFICE	MAINTENANCE	P & T	SUPPLY	BUDGET & FISCAL	OTHERS

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: Unit

MCPPXA66/MS/mc

3 June 1949

BEN I. FUNK, Colonel, USAF
Chief, Aircraft & Missiles Sect.
Procurement Division

TO: AFMPD
Attn: Major Squires

MCPPXA66-6-9. Re procurement of Trainers from Beech and Temco revised quote furnished as follows: Temco Trainer, airplane less engine $9,000.00, AN Rear Case $16,019.00, 24 Volt System $1,000.00, Installation $2500.00, Spare Parts $2,000.00 Total $30,519.00 Each in quantities of three. Beech Trainer $15,500.00 less engine, AN Rear Case $16,117.00, 24 Volt System $1,000.00, Installation $3,000.00, Spare Parts $3100.00 Total $38,717.00 Each in quantities of three. Total for six airplanes including 20% spares $207,708.00. The airplanes in this configuration will provide the AF with trainers which substantially meet the evaluation recommendations with the exception of commercial radio installation. Temporary Tooling used in lieu of permanent AN Rear Case estimate. SIGNED: Procurement Division.

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DEPARTMENT OF THE AIR FORCE
DEPUTY CHIEF OF STAFF, MATERIEL
WASHINGTON

7 June 1949

Honorable Arthur S. Barrows
Under Secretary of the Air Force
Wright-Patterson Air Force Base
Dayton, Ohio

Dear Mr. Barrows:

As you know, General Craig is at present in the hospital and will be for several more days. I have discussed your letter of 23 May with regard to the Fairchild trainer proposal with General Craig and feel that the following is in accordance with his views.

We agree that Fairchild's proposal is out of line under the circumstances in that they are including the same 4.5% handling charge and 7% profit for furnishing the GFP as that proposed on the Airframe contract.

Fairchild's proposal for "Contractor Stocking Spares (Five Year Program)", Exhibit "B" indicates a misunderstanding of the general plan. Our intent is to have the contractor stock a minimum of spares which can be purchased on a call contract by the Air Force as our requirements demand, contract to be financed by maintenance funds. The Fairchild plan apparently envisages the build-up of a considerable spare part reserve, hence the new Government furnished warehouse at $340,000. To me, this appears totally unreasonable; Fairchild should be able to maintain a minimum spare stock without any such outlay or guarantee on the part of the Air Force.

Three courses of action appear feasible at this time:

a. To accept General Wolfe's recommendation and follow our usual procurement practice.

b. Since this is a Government-owned design (Navy) to circularize industry (Including Fairchild) for the construction of the 100 T-31 aircraft on the basis of the procurement directive.

c. To re-open negotiations with high level Fairchild personnel with a view to reducing or eliminating the 7% profit which is currently included in their proposal for furnishing the GFE.

I believe that following course b would cause a strong adverse reaction from the aircraft industry as a whole. Heretofore it has been

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The practice to award the production contract to the developing company unless that company lacks the necessary facilities, production know-how or financial ability. At this particular time, it would be undesirable to create a general conflict with industry.

It is recommended that we exhaust the possibilities of course c before making a final decision. Should this effort prove unsuccessful it is recommended that we follow course a, for the present. General Kessler has discussed this matter with General Shepard and has requested that General Shepard bring the matter up with Mr. Ward of Fairchild. I believe that General Shepard is to discuss this matter with you before opening negotiations.

/s/ Francis H. Griswold
FRANCIS H. GRISWOLD
Major General, USAF
Acting Deputy Chief of Staff, Materiel

1 Incl
Mr. Barrows ltr of
23 May 1949 to Gen.
Craig with 1 Incl

THIS A TRUE COPY

J. D. Frye
J. D. FRYE
Major, USAF.

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Aer-AC-62

NAVY DEPARTMENT
BUREAU OF AERONAUTICS
WASHINGTON 25, D.C.

4344 2

8 June 1949

From: Chief of the Bureau of Aeronautics
Fairchild Aircraft Division
Fairchild Engine & Airplane Corporation
Hagerstown, Maryland

Subject: Model XNQ-1 Airplanes
Extension of Loan

Reference: (a) Fairchild ltr. CA-F-711 dtd. 14 Apr. 1949.

1. Reference (a) contained a request to certificate the loan of the two XNQ-1 airplanes for a period of approximately one year. These aircraft were delivered to the Air Force on a loan basis in October and November of 1948 for purposes of evaluation and refinement pertinent to Air Force negotiations for procurement. It was understood that the aircraft would be in the custody of Fairchild Aircraft Division under an existing blanket bailment agreement between Fairchild and the Air Force.

2. The continued loan of these aircraft, as requested in reference (a), is satisfactory to the Bureau of Aeronautics. Since it is to the interest of the Government to utilize already existing experimental aircraft for testing possible production design changes, this Bureau has no objection to the Air Force authorizing additional use of the XNQ-1 aircraft for that purpose.

J. T. Hurley
Capt., USN
By Direction

CC: NATC
NAR, Baltimore
AFPR, Fairchild Aircraft
Hq., MC, MCR-366, Wright-Patterson
Air Force Base

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JOHN L. MC CLELLAN, ARK., CHAIRMAN
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RUSSELL B. LONG, LA. MARGARET CHASE SMITH, MAINE
WILLIAM P. ROGERS, CHIEF COUNSEL

United States Senate

COMMITTEE ON
EXPENDITURES IN THE EXECUTIVE
DEPARTMENTS
SENATE INVESTIGATIONS SUBCOMMITTEE

June 17, 1949

Major General Thomas D. White, USAF
Director, Legislation and Liaison
Department of the Air Force
Room 4-D-923, Pentagon Building
Washington 25, D. C.

In replying
refer to: S-10

Dear General White:

Reference is made to your communication of May 5, 1949, concerning the procurement of the Fairchild trainers by the United States Air Force.

Your letter of reference states that the Fairchild trainers were procured by the Air Force after three aircraft companies had submitted proposals. It would be appreciated if you would furnish the Subcommittee with specific details concerning those factors on each of the three aircraft, namely, initial cost, maintenance, etc. which were considered by the Air Force prior to the award of this contract to Fairchild.

Your cooperation in this matter will be appreciated.

Very truly yours,

William P. Rogers

Office Memorandum • UNITED STATES [illegible]

TO : Mr. [illegible], Buyer for Trainer Aircraft DATE: [illegible]

FROM : Chief, Training, Transport, and Special Aircraft Branch

SUBJECT: T-31 Primary Trainer

The Chief, Procurement Division, has advised me that an early decision from the Office of the Secretary of the Air Force as to the method of procuring the T-31 aircraft is unlikely. Consequently, further negotiations in connection with the procurement of primary training aircraft should be held in abeyance for the time being.

S. W. BISHOP
Lt. Colonel, USAF
Chief, Training, Transport,
and Special Aircraft Branch

Copy to:
MCPP - Brig. General H. A. Shepard
MCPPXA - Col. Ben I. Funk

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TSCAD Form No. 6 (4 APR 47) CONFIDENTIAL MCGOXT/5-5277
Wright-Patterson
Air Force Base
Dayton, Ohio

HEADQUARTERS
AIR MATERIEL COMMAND

29 June 1949

TECHNICAL INSTRUCTIONS

SERIAL NO: TI 2249-12, Amendment 1

SUBJECT: Procurement Directive No. 49-55 (T-31 Aircraft)

TO: Directorate, Procurement and Industrial Planning
Directorate, Supply and Maintenance

1. TI 2249-12 dated 13 April 1949, is hereby amended to change subject to read as follows:

   a. "Procurement Directive No. 49-55 (T-31 Aircraft)."

2. Authority:

   a. CS, USAF by letter dated 19 April 1949, subject: "Numbering of Procurement Directives."

BY COMMAND OF GENERAL McNARNEY:

OFFICIAL:

BRYAN L. DAVIS
Colonel, USAF
Adjutant General

OFFICIAL
AIR STAFF

BRYAN L. DAVIS
Colonel, USAF
Adjutant General

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ROUTING AND RECORD SHEET

AIR MATERIEL COMMAND

Use this form for inter-office correspondence within headquarters.

Use authorized office symbols to designate addressee and addresser.

Use office initials of dictator and typist, telephone number and location to right of signature.

Number all comments consecutively.

Note warning signal at lower left of form. Remaining space is sufficient only for proper spacing of typewritten signature.

Use entire width of sheet, both sides.

Separate comments by horizontal lines across page.

SUBJECT GFP vs CFP on T-31A Trainer

TO MCPPXE // FROM MCPPXA66 DATE 1 July 1949 COMMENT NO. 1

Atten: Mr. Denning

1. You are aware that subject airplane contractor (Fairchild) is to supply equipment normally GFP as CFP by directive from Headquarters USAF.

2. Due to difficulties experienced by the contractor in obtaining committments from vendors on delivery dates of equipment, consideration is being given to change the CFP (normally GFP) back to GFP.

3. It is requested that an estimate be made of the time required for GFP delivery to contractor (accounting for normal lead time).

4. The attached list, most of which is listed as CFP, may be used for the time evaluation requested. The CFP normally GFP of course should be considered as GFP for the present purpose.

5. It is requested that reply hereto be expedited.

Incl.
FAD list

W. A. DAVIS
Colonel, USAF
Act'g Chief, Aircraft and Missiles Section
Procurement Division

WL/bc/28138
Bldg. 15 Room 113

14A

MCPPXA66 MCPPXE-11 7 Jul 49 2

1. A survey of the GFP tentatively suggested for subject trainer reveals that a complete GFP complement will not be available until 18 months after the Aeronautical Equipment Section receives a release to procure.

2. This information was given verbally to Mr. Lankin of your office by Mr. Denning on 7 June 1949 with the request that if such release were to be made to the Aeronautical Equipment Section it be made as quickly as possible.

3. It is requested that your office advise this Section definitely as to whether or not the T-31A is to be a GFP aircraft and if a set back of existing aircraft delivery schedules (in order to coincide with GFP availability) can be satisfactorily accomplished.

4. It is further suggested that your planning list, as published by Programs Monitoring Office, be re-implemented through another PPN planning release, to cover the additional items shown in the GFP list attached to Comment 1 above, before the official PPN procurement release.

1 Incl:
w/d

M. J. COFFIELD
Colonel, USAF
Chief, Aeronautical Equipment Section
Procurement Division

WCP:ch
2-1159

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WF-L-15 FEB 49 4 MR 3400M

(CONTINUE ON OTHER SIDE)

AMC Form No. 5 (Rev 29 Jul 47)

This form replaces AMC Form No. 18-3, which will be used until stocks on hand are exhausted.

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FAIRCHILD AIRCRAFT

In reply please refer to: CA-W-1030

25 July 1949

oc 6861

Subject: Model T-31A Airplane
Result of Contract Negotiations

Branch

To: Commanding General
Air Materiel Command
Wright-Patterson Air Force Base
Dayton, Ohio

Attention: MCPPXA66

Reference: (a) AMC letter MCPPXA66/WL/mc, dated 21 April 1949
(b) FAD letter, CA-J-800, dated 16 May 1949

1. Attached hereto, as Exhibit A, is a summary of the T-31 airplane price as negotiated between representatives of the Air Materiel Command and the Contractor during the week of 18 July 1949.

2. The items of work as agreed to in negotiation are as follows:

A. 100 T-31A airplanes in accordance with Model Specification R129-000A, dated 20 April 1949, at a unit price of $52,861.23.
(Note: Whereas Page 56 of Model Specification referred to above specifies propeller as Government Furnished Property, this proposal includes furnishing of such item as Contractor Furnished Property.)

TOTAL $5,286,123.00

B. Spare parts for the above airplanes in the amount of $2,365,322.00

C. Special tools and ground handling equipment in the amount of 1% of the basic T-31 airplane selling price . . . . . $ 52,861.23

D. Handbooks and aircraft data as follows:

(1) Pilot's Handbook in accordance with Specification AN-H-8b and AN-H-7b . . . . $ 4,541.09

(2) Erection and Maintenance Handbook in accordance with Specifications AN-H-13a and AN-H-7b . . . . . $ 21,857.43

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(3)	Structural Repair in accordance with Specification AN-S-13 and AN-S-7b . . .	$ 20,672.80
(4)	Illustrated Parts Catalog in accordance with Specification AN-S-85a and AN-S-7b	$ 33,307.60
(5)	Maintenance Parts Breakdown in accordance with Specification AN-M-9a	$ 2,507.45
(6)	C.F.P. List in accordance with Specification AN-M0714J	$ 536.37
(7)	Production List in accordance with Appendix 5-AAF	$ 3,621.40
(8)	ATA List - Packaging and Preservation - AN-P-13a	$ 2,089.54
(9)	Inspection Maintenance Guide	$ 2,757.64
(10)	Lubrication Charts in accordance with Specification AN-L-32	$ 807.86
(11)	Standard Aircraft Characteristics Charts and Summary Sheets will be furnished in accordance with Exhibit NEG49-4, dated 25 September 1948, including Correction Sheets 1 and 2, dated 1 January 1949 and 17 March 1949, respectively, for a total price of	$ 3,801.01
	TOTAL PRICE OF DATA	$ 95,899.19
E.	5000 Cycle Test of the production landing gear will be accomplished at a total price of	$ 17,355.59
F.	Phase II Flight Testing will be accomplished for a total additional price of	$ 16,609.07
	TOTAL OF PROPOSAL	$7,834,170.08

3. The major items which were discussed during the negotiations were as follows:

A. Maintenance of Adequate Supply of Spare Parts at Contractor's Facility

The negotiation instructions had requested that the contractor maintain a thirty-day supply of spare parts to be delivered as required by the Government, and that the Contractor further submit a proposal with regard to the handling of the Supply functions. The Contractor has previously submitted a proposal

Subject: Model T-31A Airplanes
Result of Contract Negotiations

to the Air Material Command covering the supply and maintenance functions for the 100 T-31 airplanes. At that time, the Contractor stated that it did not appear economical for the Contractor to assume a portion only of the supply functions, since the duplicate responsibilities involved might result in confusion and additional cost. During the week of negotiations, Contractor's personnel met with the Procurement Division representatives and with representatives of the Supply Division to determine if a portion of the functions of the Supply Division might be assumed by the Contractor. In this meeting, the Supply Division took the following position:

(1) That the Supply Division was entirely agreeable to the Contractor's assuming all of its functions with regard to the T-31A aircraft.

(2) That the Supply Division did not feel that any split of its functions between the Contractor and its own organization would result in an overall benefit to the Government.

The above position was based on the fact that the Supply Division has existing personnel, facilities and equipment which would be duplicated by the Contractor under the requested program. For example, many of the instruments and other equipment items which would be required to be stored in the Contractor's facility are already in the specialized depots of the Supply Division.

As a result of the above, no further effort was made to explore this problem. However, the Contractor pointed out that it was entirely willing to perform any function suggested by the Air Material Command as long as it could be assured of reasonable contract protection.

B. Price Protection Provision

The Contractor, in its letter of proposal, had requested a Form II-B redetermination provision, whereas the Air Material Command negotiators recommended an incentive form of contract. The Contractor objected to the incentive type of contract on two bases:

(1) That the incentive type includes a ceiling which limits the upward cost of the contract without a floor insofar as a downward adjustment is concerned.

(2) An additional ceiling, insofar as allowable profits are concerned, is imposed by the Vinson-Trammel Act.

The Air Material Command negotiators pointed out that the incentive form did not require as much effort to administer as the redetermination type and that the risk to the Government was too great. It was finally agreed that a modified incentive type of contract would be utilized whereby the target and ceiling would be adjusted both retrospectively and forward at the completion of between 30% and 40%

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[illegible]

C. [illegible]

[illegible]

D. Engineering

The Contractor's proposal was based on a deviation being received with regard to AN-E-11 whereby ENG drawings would be unnecessary in the production contract. This was not satisfactory to the Air Materiel Command and, as a consequence, an additional 13,600 hours was negotiated for complying in full with Specification [illegible]. The overall engineering hours appeared reasonable to the negotiators as well as the rates provided therein which compared favorably to present levels.

E. Tooling

The proposed tooling hours appeared reasonable to the negotiators, as well as the projected labor and overhead rates. The Contractor's proposal was based on the utilization to the maximum extent possible of the tooling left over from the experimental Navy contract for the ENG. It was agreed that the Air Force would receive such tooling from the Navy by a transfer of accountability and would, in turn, sell such tooling to the Contractor for $1.00. The Contractor would charge such amount to the production contract which, would, in effect, transfer the residual interest to the Government upon completion of the contract.

F. Direct Production Labor

This element was projected by the Contractor on the basis of a starting point of approximately 17 hours per pound for the first article and a continuation on a 76% curve. It was felt by the negotiators that such a starting point and curve required a very high level of efficiency by the Contractor. The labor rate employed by the Contractor represented only merit increases over the existing labor rate in effect at the Contractor's plant.

Subject: Model T-31 Airplane
Result of Contract Negotiations

25 July 1949

G. Production Overhead

The Contractor projected an overhead rate of 130%, which is substantially below current levels. It was agreed that the Contractor would have to maintain an efficient operation with regard to its indirect personnel in order to attain such a projected rate.

H. Production Material

Such material costs appeared somewhat high to the negotiators. However, it was explained that, in many instances, vendors and subcontractors amortized their initial tooling costs over the first production order, which therefore increased the initial cost of such materials.

I. Contractor Furnished Material Which Was Formerly Government Furnished Property

Figures of the Air Material Command negotiators indicated that the prices provided by the Contractor for this classification of equipment ran approximately 10% to 12% higher than the cost to the Air Material Command. It was pointed out that the Contractor would be procuring in much smaller lots than the quantities procured by the Air Material Command and that there had probably been some price increases since the Government had purchased some of the items on the list. It was agreed that the overall price for such items appeared reasonable in view of the outlined conditions.

J. Pre-Production Costs

This item represents the necessary rearrangements and alterations to the Contractor's production line and departmental areas necessary to undertake the T-31 program. Such costs are considered unusual and distinct from normal rearrangement costs in accordance with the Contractor's established policy.

K. Flight Test Expense

The Contractor's proposal for flight test (exclusive of Phase II Flight Testing) contemplates approximately 20 hours of flight on the first production unit and an average of one hour of flight thereafter. Costs in this category also include all [illegible] necessary to obtain acceptance of the airplanes after they leave the factory door. Such costs were considered reasonable and [illegible]. The Contractor furnished a separate proposal for the additional cost of performing Phase II Flight Test which was also accepted as presented.

L. General and Administrative Expense

The rate projected by the Contractor was substantially less than its current experience and appeared reasonable to the negotiators.

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(1) An agreement was being established with regard to future negotiations, and

(2) An immediate authority to proceed with the work would be received.

4. General

Although some specific items of cost were questioned by the negotiators, it was agreed that the overall proposal submitted by the Contractor was fair and reasonable. The bulk of the Contractor's proposal was established in negotiations and it was felt that no contingencies were included in the overall structure of the proposal.

5. The delivery for the one hundred (100) F-51H airplanes will be as [illegible] listed below, providing contractual coverage is received by 1 August 1950:

1	October 1950	7 additional	January 1951	20 additional	April 19[illegible]
3 additional	November 1950	10 additional	February 1951	22 additional	May 1951
5 additional	December 1950	15 additional	March 1951	17 remaining	June 19[illegible]

6. [illegible] on the following [illegible] proposal all the terms and conditions contained in Paragraph 7 of Contractor's Letter [illegible] AC-J-800, dated 16 May 1949, with the exception of sub-paragraph f and h.

Subject: Model K-17A Airplane
Result of Contract Negotiations

Very truly yours,

FAIRCHILD AIRCRAFT
Division of
FAIRCHILD ENGINE & AIRPLANE CORPORATION

F. S. Bennett, Jr.
Division Comptroller

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	[illegible]	[illegible]	[illegible]	[illegible]
	9 [illegible]	7 [illegible]	10 [illegible]	20 [illegible]
Labor Hours	64,664.0	69,160.0	69,730.0	215,750.0
Labor Dollars @ $1.37	88,537.	94,749.	95,520.	295,500.
Overhead @ 130%	115,163.	123,173.	124,176.	384,150.
Material	20,022.	54,600.	70,000.	156,000.
Material (Formerly G.F.P.)	34,276.	77,100.	99,000.	220,000.
Flight Test	7,160.	2,240.	3,200.	6,400.
Sub-Total	274,599.	352,463.	392,446.	772,050.
Engineering & Experimental	335,955.	60,218.	34,668	20,806.
Tooling	493,980.	72,109.	15,052.	19,805.
Pre-production Expense	35,800.			
Sub-Total	1,140,234.	484,790.	461,166.	766,325.
General & Administrative @ 4.5%	51,311.	21,815.	20,750.	34,485.
Total Cost	1,191,555.	506,605.	481,851.	800,810.
Profit	81,946.	32,214.	29,090.	46,777.
Selling Price - 100 Airplanes	1,273,501.	538,819.	510,941.	847,587.
Selling Price Unit	424,500.	76,974.	51,094.	42,379.

Suggested Step-down Prices.

First 3 Units	@ $424,500.00	1,273.
Next 37 Units	@ 51,280.00	1,897.
Next 60 Units	@ 35,254.00	2,115.
		5,286.

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Block 1 ...irplanes	Block 2 7 Airplanes	Block 3 10 Airplanes	Block 4 20 Airplanes	Block 5 30 Airplanes	Block 6 30 Airplanes	Total 100 Airplanes
4,662.0	69,160.0	69,578.0	105,768.0	124,152.0	104,130.0	537,750.0
38,587.	[illegible]	95,322.	144,902.	170,088.	143,015.	736,663.
5,163.	[illegible]	123,919.	188,372.	221,114.	185,989.	[illegible]
28,082.	54,600.	78,000.	156,000.	234,000.	234,000.	[illegible]
4,977.	77,700.	111,000.	222,000.	333,000.	333,000.	1,1[illegible],677.
7,760.	2,240.	3,200.	6,400.	9,600.	9,600.	38,800.
4,509.	352,463.	411,441.	717,674.	967,802.	905,604.	3,629,493.
5,955.	60,218.	34,608.	20,846.	18,033.	12,306.	409,966.
3,980.	72,109.	15,052.	19,805.	7,922.	5,005.	613,673.
5,800.						35,800.
0,244.	404,790.	461,101.	766,325.	993,757.	922,915.	4,769,132.
1,311.	21,815.	20,750.	34,485.	44,719.	41,574.	214,654.
1,555.	506,605.	481,851.	800,810.	1,038,476.	964,489.	4,983,786.
1,946.	32,214.	29,090.	46,777.	58,773.	53,537.	302,337.
3,501.	538,819.	510,941.	847,587.	1,097,249.	1,018,026.	5,286,123.
4,500.	76,974.	51,094.	42,379.	36,575.	33,934.	52,861.

Suggested Step-down Prices.

First 3 Units	@	$424,500.00	1,273,500.
Next 37 Units	@	51,280.00	1,897,360.
Next 60 Units	@	35,254.00	2,115,240.
			5,286,100.

FAIRCHILD AIRCRAFT DIVISION
100 T-31 AIRPLANES

Exhibit A-1

	To Specification R129-100 (Exhibit A)	Full Compliance With AMD-12-B	Evaluation Changes (Exhibit B)	Formerly G.F.P. (Exhibit C)	Delete A.M.C. Provisions (Exhibit D)
Labor Hours	531,500.0		6,600.0		750.0
Labor Dollars @ $1.37	728,100.		9,042.		1,027.
Overhead @ 130%	946,600.		11,755.		1,336.
Material	740,700.		44,225.	1,111,677.	425.
Flight Test	38,800.				
Sub-Total	2,454,200.		65,022.	1,111,677.	2,788.
Engineering & Experimental	434,800.	44,030.	11,331.		648.
Tooling	609,800.		4,395.		509.
Pre-production	35,800.				
Sub-Total	3,534,600.	44,030.	80,748.	1,111,677.	3,945.
General & Administrative @ 4.5%	159,100.	1,981.	3,634.	50,025.	177.
Total Cost	3,693,700.	46,011.	84,382.	1,161,702.	4,122.
Profit @ 7%	258,500.	3,221.	5,906.	(3%) 34,851.	289.
Selling Price	3,952,200.	49,232.	90,288.	1,196,553.	4,411.

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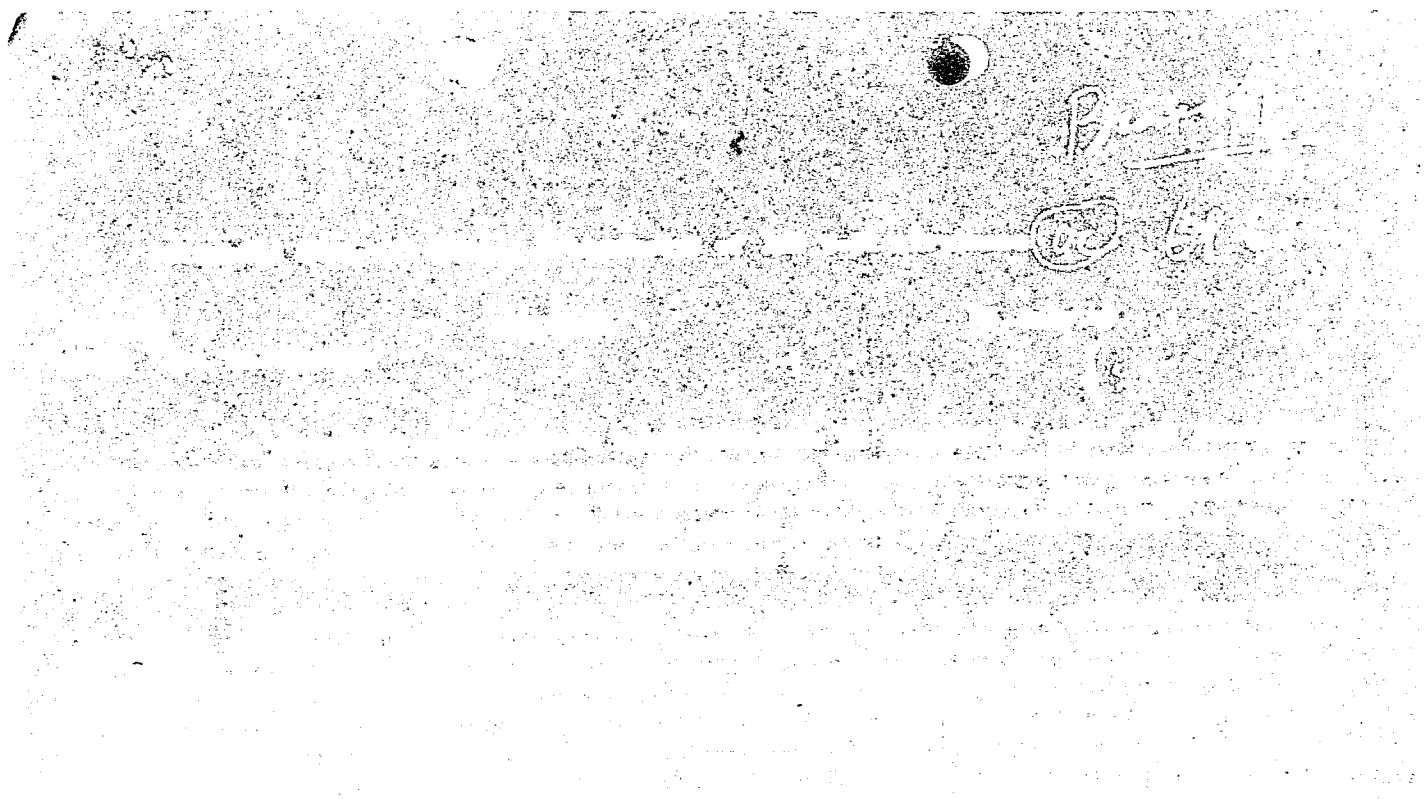
HILD AIRCRAFT DIVISION
00 T-31 AIRPLANES

Exhibit A-1

	To Specification N129-100 (Exhibit A)	Full Compliance with AND-12-8	Evaluation Changes (Exhibit B)	Formerly G.F.E. (Exhibit C)	Delete A.B.C.-14 Provisions (Exhibit D)	Retaining Ings & Joint Point (Exhibit E)	Total
	531,500.0		6,600.0		750.0	400.0	537,750.0
	728,100.		9,042.		1,027.	548.	736,663.
	946,600.		11,755.		1,336.	712.	957,731.
	740,700.		44,225.	1,111,677.	425.	122.	1,896,299.
	38,800.						38,800.
	2,454,200.		65,022.	1,111,677.	2,788.	1,362.	3,629,498.
ental	434,800.	44,030.	11,331.		648.	453.	489,966.
	609,800.		4,395.		509.	187.	613,873.
	35,800.						35,800.
	3,534,600.	44,030.	80,748.	1,111,677.	3,945.	2,022.	4,769,132.
ive @ 4.5%	159,100.	1,981.	3,634.	50,025.	177.	91.	214,654.
	3,693,700.	46,011.	84,382.	1,161,702.	4,122.	2,113.	4,983,786.
	258,500.	3,221.	5,906.	(3%)34,851.	289.	148.	302,337.
	3,952,200.	49,232.	90,288.	1,196,553.	4,411.	2,261.	5,286,123.

1,196,553
408,570



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MCPPXA66

MCPPXA66/WS/rd

26 July 1949

Lt. General H. A. Craig,
Deputy Chief of Staff, Materiel,
United States Air Force,
Pentagon Building,
Washington 25, D. C.

Dear General Craig,

In compliance with recommendations of your letter dated 7 June 1949, negotiations were re-opened with Fairchild personnel with Mr. Art Flood, Director and Vice-President, in attendance.

The prices shown below for the T-31 aircraft are the lowest that could be obtained.

	Unit Price	Total Price
100 T-31 Airplanes	$40,895.70	$4,089,570.00
Spare Parts - 20%	8,179.14	817,914.00
Special Tools and Ground Handling Equipment	408.95	40,895.70
Handbooks and Technical Data	959.00	95,899.19
5,000 Cycle Test	173.55	17,355.59
Phase II Flight Test	166.09	16,609.07
Airframe Cost	$50,782.43	$5,078,243.55

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Government Furnished GFP			
GFP Items (Estimated Cost)	$9,692.00		
Spares GFP 30%	2,907.60		
		12,599.60	1,259,960.00
Total Cost Airplane		$63,382.03	$6,338,203.55

This price conforms to our usual procurement practice as set forth under a. The above figures include 7% for profit and 4.5% for G&A. Maintenance spares will be handled as recommended in paragraph 3.

The following prices were negotiated in conformance with paragraph c. All items normally furnished as GFP will be furnished by the contractor.

	Unit Price	Total Price
Airframe Cost (See above breakdown)	$50,782.43	$5,078,243.00
Contractor Furnishing Equipment Normally Furnished by the Government (GFP)		
GFP Items	$11,965.53	
30% Spares	3,589.66	
	15,555.19	1,555,519.00
Total Cost	$66,337.62	$6,633,762.00

The contractor's price for GFP includes G&A at 4.5% and profit at 3% instead of 7% as originally requested.

Having done this, there appear to be two avenues of action that can be taken.

(1) Circularize the industry for construction of 100 T-31 aircraft on the basis of the procurement directive.

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(2) Throw out all previous negotiations relative to the XRQ Trainer and circularize the industry for quotations on a design based on military characteristics.

Waiting further advice, I am

Sincerely yours,

A. S. BARROWS
Under Secretary of the Air Force

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SECRET

DEPARTMENT OF THE AIR FORCE
DEPUTY CHIEF OF STAFF, MATÉRIEL
WASHINGTON

29 July 1949

MEMORANDUM FOR THE RECORD

SUBJECT: Training Aircraft and Changes to all Aircraft

1. Generals Craig, Kelly, Cook, Smith, Brandt, Burns, McNaughton, Boutner, Carroll and Griswold met at 0900 this date to consider the above problems.

2. The following decisions will be submitted for approval:

a. The T-31 Fairchild trainer will not be purchased.

b. The present T-6 aircraft will be adequate numberwise to carry out the present pilot training program until approximately 1955.

c. T-6's aircraft will be overhauled for a cost of approximately $16,000 each which will result in an airplane essentially equal to new and with considerably improved handling characteristics.

3. No cancellations will be required since no T-31's are on order.

4. No re-certification of funds will be necessary.

5. The foregoing decisions are based on the reduction from 6,100 pilot program to 5,000, the reduction in National Guard units and in the Reserve program and fully meet the needs of the Training Command.

6. The matter of aircraft changes is now under study and a satisfactory solution is anticipated by the end of the day.

FRANCIS H. GRISWOLD
Major General, USAF
Asst Deputy Chief of Staff, Materiel

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[redacted]

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DEPARTMENT OF THE AIR FORCE
OFFICE OF THE VICE CHIEF OF STAFF
UNITED STATES AIR FORCE
WASHINGTON, D. C.

5 August 19[illegible]

MEMORANDUM FOR THE DEPUTY CHIEF OF STAFF, MATERIEL

SUBJECT: Training Aircraft and Changes to all Aircraft

1. The proposals outlined in the attached memorandum signed by General Griswold are approved by the Vice Chief of Staff. They have been cleared with the Secretary of the Air Force and the Under Secretary, both of whom concur.

2. Please notify the Commanding General, Air Materiel Command, that it is not now intended to procure the T-31 Fairchild Trainer, except as noted below.

3. The Vice Chief of Staff feels that, subject to review by the Senior Officers Board, we should procure three each service test models of the (a) Temco Trainer, (b) Beech Trainer, (c) Fairchild Trainer. These are the only known currently available new trainers that promise any suitability for mass production in event of emergency. The Vice Chief of Staff feels that these types should be thoroughly evaluated in actual service test training, as a result of which, determination should be made of the type to be placed in mass production in event of emergency and any changes found essential as a result of such service test should be incorporated in the production drawings so that immediate production of a certainly satisfactory war-time trainer could be undertaken. If this is not done, in the event of war we would be faced with the necessity of placing in mass production either the old T-6 designed back in the 1930's or a new trainer which might require changes which, under mass production conditions, would not only be extremely costly but would result in completely unacceptable delay. In arriving at the above determination, every effort should be made to concert standardization with the Navy.

4. The Commanding General, Air Materiel Command, should be instructed to plan on the overhaul of the necessary T-6's now in storage to meet the requirements of the Training Command. 325 - T-6

5. Please have the necessary certifications prepared to accomplish the overhaul of the required T-6's.

WILLIAM F. McKEE
Major General, U. S. Air Force
Assistant Vice Chief of Staff

1 incl:
memo ltd 27 Jul
frm Gen Griswold.

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1-884

RESTRICTED 3

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D.C.

AFMPD

8 August 1949

SUBJECT: Procurement Directive 49-65 - (T-31 Aircraft)

TO: Commanding General
Air Materiel Command
Wright-Patterson AFB
Dayton, Ohio

1. Reference is made to letter from this headquarters dated 24 March 1949, subject: Procurement Directive 49-55 - (T-31 Aircraft), wherein authority was granted to procure one hundred (100) T-31 Fairchild trainers.

2. It is directed that immediate action be taken to terminate subject procurement.

BY COMMAND OF THE CHIEF OF STAFF:

ALFRED A. KESSLER, JR.
Brigadier General, USAF
Director, Procurement & Industrial Planning
Deputy Chief of Staff, Materiel

Action To MCM
MCP

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

AFMPD

8 August 1949

SUBJECT: Procurement and Modernization of Training Aircraft

TO: Commanding General
Air Materiel Command
Wright-Patterson AFB
Dayton, Ohio

1. The authority granted to AMC to procure 100 T-31 Fairchild Trainers, contained in Procurement Directive 49-55 dated 24 March 1949, is being rescinded.

2. It is desired to consider thorough evaluation and service testing of the following trainers:

a. T-31 - Fairchild Trainer

b. T-34 - Beech Trainer

c. T-35 - Temco Trainer

It is therefore directed that cost quotations and delivery dates be submitted on three (3) articles of each of the above models.

3. It is further directed that cost information and delivery schedules be forwarded for the modernization of T-6 trainers in conformance with the attached characteristics by the Air Training Command. This information is desired for quantities of aircraft ranging from 350 to 750 in increments of 50.

4. It is requested that the above information be furnished at the earliest possible date in order that it can be presented for consideration of the Senior Officers Board.

BY COMMAND OF THE CHIEF OF STAFF:

ALFRED A. KESSLER, JR.
Brigadier General, USAF
Director, Procurement & Industrial Planning
Office, Deputy Chief of Staff, Materiel

1 Incl.
Cy ltr fr ATC dtd 4 Aug 49
w/specifications

[redacted]

S-70392

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ROUTING AND RECORD SHEET SECRET

AIR MATERIEL COMMAND

Use this sheet for inter-office correspondence within headquarters.
Number all comments consecutively.
Use entire width of sheet, both sides.
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Note warning signal at lower left of form. Remaining space is sufficient only for proper spacing of typewritten signature.
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Separate comments by horizontal lines across page.

SUBJECT: Procurement and Modernization of Training Aircraft

TO: MCPPXA | FROM: MCP4 | DATE: 11 Aug 49 | COMMENT NO. 1.

1. In accordance with verbal instructions of General K. B. Wolfe, letter, 8 August 1949, from the Directorate, Procurement & Industrial Planning, Office, DC/S-Materiel, USAF, Subject: Procurement and Modernization of Training Aircraft, is sent you for compliance.

2. It will be noted that this information is desired at the earliest possible date in order that it can be presented for consideration of the Senior Officers Board. The date of the meeting of the Senior Officers Board is not known at this time. It is understood, however, that the Board plans to convene just as soon as the FY-1950 appropriation is passed, which it is anticipated will be not later than 31 August 1949.

3. With respect to paragraph 1, you are informed that a Procurement Directive cancelling Procurement Directive No. 49-55, dated 24 March 1949, has been received by MCO and that a TI covering the cancellation of the T-31 airplanes previously authorized on TI-2249-12, will be issued in the next few days.

W. E. Donnelly

W. E. DONNELLY
Assistant to Director,
Procurement & Industrial Planning

WED:haw
2-2215

Incl:
Ltr, 8 Aug 49

cc:
MCP
MCPP
MCPZ

To: MCPPXA-6 | From: MCPPXA-1 | 12 Aug 49 | Comment No. 2.
Attn: Col. Bishop

1. It is requested that your Branch implement the details outlined in Comment 1 above and attachments thereto.

2. The following comments are offered for your consideration in complying with the subject Directive:

a. T-31 Airplane.

(1) It would appear a definite decision should be obtained as to which type T-31 airplane is desired; i.e., should the final version including flat engine and tricycle gear be procured, or should the airplane, as evaluated at Wright Field, be procured?

S-70392-A 148

(CONTINUE ON OTHER SIDE)

WF-L-15 FEB 49 4 MM 3660M
AMC Form No. 5 (Rev 29 Jul 47)
This form replaces AMC Form No. 10-3, which will be used until stocks on hand are exhausted.

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ROUTING AND RECORD SHEET — AIR MATERIEL COMMAND

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Separate comments by horizontal lines across page.

SUBJECT Procurement and Modernization of Training Aircraft

TO MCPPXA-6 FROM MCPPXA-1 DATE 12 Aug 49 COMMENT NO. 2. (Cont'd.)

(2) Should we incorporate the major 689 Board changes, or do we procure the Navy airplane originally offered by Fairchild?

b. T-34 Airplane.

It is understood the Beech Company has a new 240 hp Continental engine and redesigned propeller available for installation on this aircraft. The installation of these two items will correspondingly allow for a redistribution of equipments, particularly electrical and radio, into a more desirable location within the fuselage to improve maintenance. It would appear desirable to make these changes, as the Evaluation Board spot-lighted them as being the most undesirable features of the T-34 airplane at the time of its evaluation.

3. It is felt that the most advanced types of the above models should be obtained if they are to be used as Service Test aircraft for a possible future procurement in production. There is a campaign on at the present time, however, to reduce changes in aircraft to the absolute minimum in order to lower the present high level of Change Order type costs; therefore, some of the costs should be borne by the contractor.

4. Examination of the changes recommended for inclusion of the overhaul of T-6 type aircraft indicates that several of these items, although desirable, may be deleted from the proposed list at a savings in cost. Item 16, particularly, falls under this category in that new propellers are a high cost item, of questionable necessity. Tests were conducted during the war in which 6" was removed from the diameter of subject propellers and it was found a loss of performance resulted. The reduction in fatigue effect on students and instructors does not appear pertinent, as the noise is tangent to the propeller disc and therefore does not affect the occupants of the aircraft.

cc: MCPPXA
1 Incl
ltr, 8 Aug 49

BEN I. FUNK
Colonel, USAF
Chief, Aircraft & Missiles Section

RMK:et
2-9105
Rm 232

[redacted]

8-70392-4

(CONTINUE ON OTHER SIDE)

AMC Form No. 5 (Rev 29 Jul 47)

This form replaces AMC Form No. 10-2, which will be used until stocks are [illegible]

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DC1A Col Sessums/hml/c128-3 Aug 49
DC2A Col Teed/hml/c128-8 Aug 49
DC1B Gen Griswold/hml--mn/c128/
10Aug49

12 Aug 1949

Mr. William P. Rogers
Chief Counsel, Senate Investigations Subcommittee
Committee on Expenditures in the Executive Departments
United States Senate

Dear Mr. Rogers:

This refers to your letter of 17 June 1949 (S-10).

Recent changes in planned Air Force Group strength have resulted in a substantial reduction in pilot training requirements. This decrease has eliminated the need for additional basic trainer type aircraft, since those already in the Air Force inventory are adequate for the task after minor modernizing. Based upon the foregoing, it has been decided that only special test quantities of Beech, Temco and Fairchild trainers will be currently procured, specifically, three of each.

In view of the fact that no contract has been finalized for any of these three aircraft and that any immediate future contract will be for the small quantity noted, it is assumed that the information requested in paragraph two of your letter is no longer required. If this is not in accordance with your desires, please let us know.

Sincerely yours,

/Signed/

THOMAS D. WHITE
Major General, USAF
Director, Legislation and Liaison

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R E S T R I C T E D

HCGOXT/5-5277
Wright-Patterson AFB
Dayton, Ohio
12 August 1949

MEMORANDUM FOR: Directorate, Procurement and Industrial Planning
Directorate, Supply and Maintenance

SUBJECT: TI 2249-12, Procurement Directive No. 49-33 (T-31 Aircraft) and TI 2249-12 Amendment 1, Procurement Directive No. 49-55 (T-31 Aircraft)

1. Technical Instruction No. 2249-12 dated 13 April 1949, subject: "Procurement Directive No. 49-33 (T-31 Aircraft) and Amendment No. 1 dated 29 June 1949, subject: "Procurement Directive No. 49-55 (T-31 Aircraft)" are cancelled by authority Hq USAF letter from AFLPD dated 8 August 1949, subject: "Procurement Directive 49-65 - (T-31 Aircraft)."

BY COMMAND OF GENERAL McNARNEY:

OFFICIAL:

BRYAN L. DAVIS
Colonel, USAF
Adjutant General

BRYAN L. DAVIS
Colonel, USAF
Adjutant General

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Routine

15 August 1949

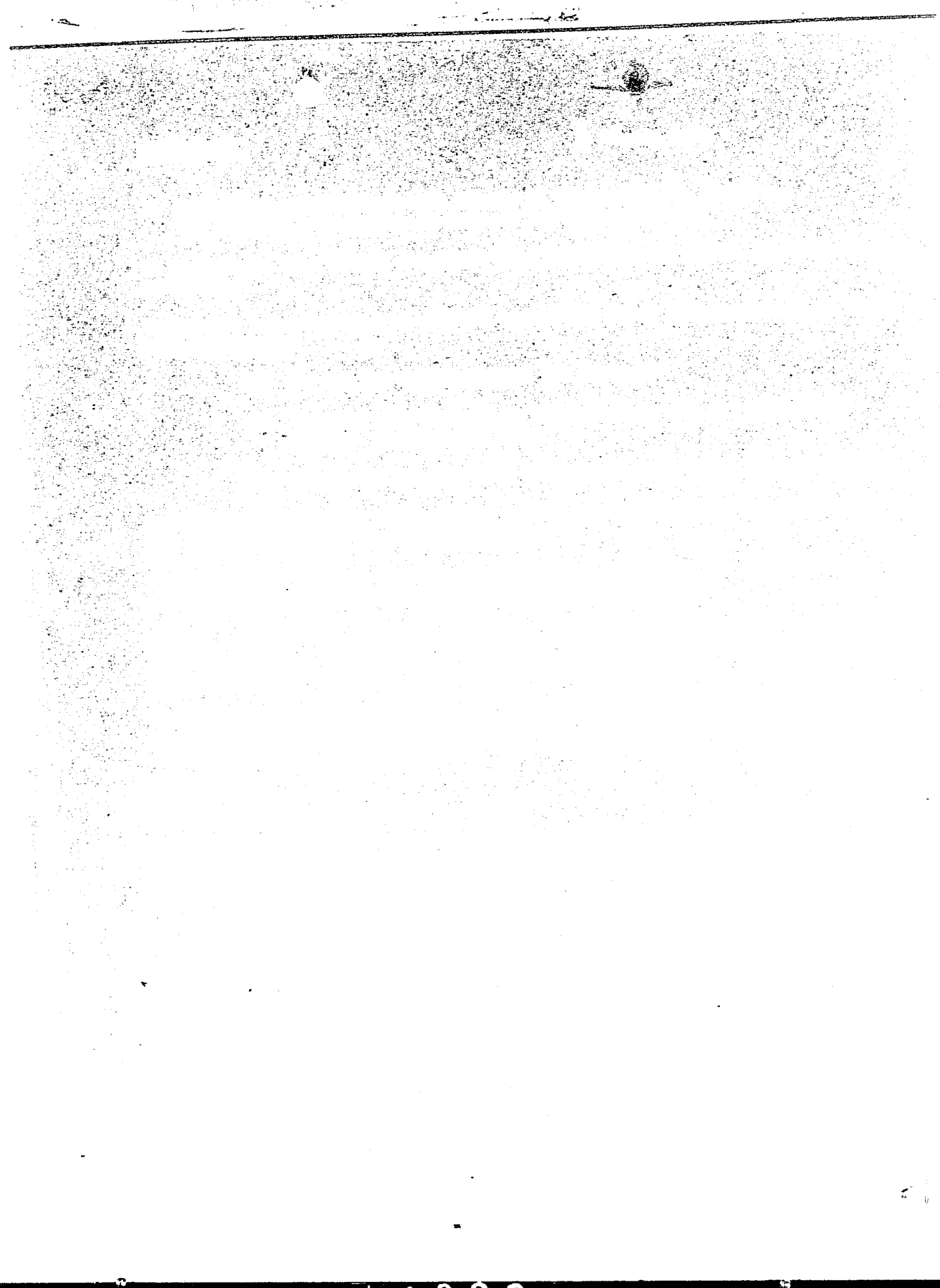
AMC

Texas Engineering and Manufacturing Co., Inc.
Dallas 2, Texas

BEN I. FUNK
Colonel, USAF
Chief, Aircraft & Missiles Section
Procurement Division

MCPPA66-6-17. Confirming conversation with Mr. Maxwell, this date, contractor is requested to furnish quotation on three trainers designated TT-35, contractor's Model TE-1A, Spec. E-2NB, or the configuration of the trainer as it was presented to this Headquarters in recent Technical Evaluation. No GFP will be furnished. Quote to include satisfactory operational data. Indicate best delivery schedule.

SIGNED: Procurement Division



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PERSONNEL & ADM.

RESEARCH & DEV.*

INTELLIGENCE

SUPPLY AND MAINT.

PROC. & IND. MOB. PLNG.*

OTHER

[redacted]

[redacted]

[redacted]

FOR THE COMMANDING GENERAL:

[redacted], Lt. Col., USAF
[redacted]
Colonel, USAF
Chief, Aircraft and Munitions Section
Procurement Division

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PUBLIC INF. OFFICE

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INTELLIGENCE

SUPPLY AND MAINT.

PROC. & IND. MOB. PLNG.*
[signature] MCPPIA-6
Funk

OTHER

CONFIDENTIAL

SIA:rd

24 August 1949

SUBJECT: Procurement and Modernization of Training Aircraft

TO: Deputy Chief of Staff, Materiel
Headquarters, USAF
Washington 25, D. C.
Attention: Director, Procurement and Industrial Planning

Ind Planning Files

1. Reference is made to AFMPD letter dated 8 August 1949, subject, "Procurement and Modernization of Training Aircraft".

2. In compliance with paragraph 2 of referenced letter, cost quotations and delivery dates for T-31, T-34 and T-35 aircraft in quantities of three each are shown on the attached chart.

3. Cost information and delivery schedules for the modernization of T-6 trainers, reference paragraph 3 of referenced letter, are shown below as presented by North American Aviation, Inc. These figures represent the only available cost and delivery estimates at this time. However, should the program be undertaken and be placed with several companies on the basis of low bids, the cost and delivery estimates are expected to be slightly less favorable.

COST

Aircraft Quantities	Unit Price
350	$13,200.00
400	13,045.00
450	12,800.00
500	12,700.00
550	12,600.00
600	12,400.00
650	12,300.00
700	12,200.00
750	12,150.00

452.1 - Training Aircraft

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(Rev 1 Apr 48)
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[illegible] letter to DCS,M Hqs USAF Wash DC dated 24 Aug 49 subj Procurement and Modernization of Training Aircraft

CG, CO OR DEPUTY

AIR INSPECTOR

PUBLIC INF. OFFICE

COMPTROLLER

PERSONNEL & ADM.

RESEARCH & DEV.*

INTELLIGENCE

SUPPLY AND MAINT.

PROC. & IND. MOB. PLNG.*

OTHER

DELIVERY SCHEDULE

Aircraft Quantity	Time of Delivery After Date of Definitive Contract
1	4th month
5	5th month
9	6th month
20	7th month
35	8th month
40	9th month
50	10th month
60	11th month
80	12th month
*100	13th month

*The figure of 100 airplanes per month reached in the thirteenth month after date of definitive contract is the contractor's peak capacity.

NOTE: All figures are based on a three month's lead time on processing.

FOR THE COMMANDING GENERAL:

Bradley

Incl
Chart dtd 24 Aug 49
as noted above

K. B. WOLFE
Major General, USAF
Director, Procurement and Industrial Planning

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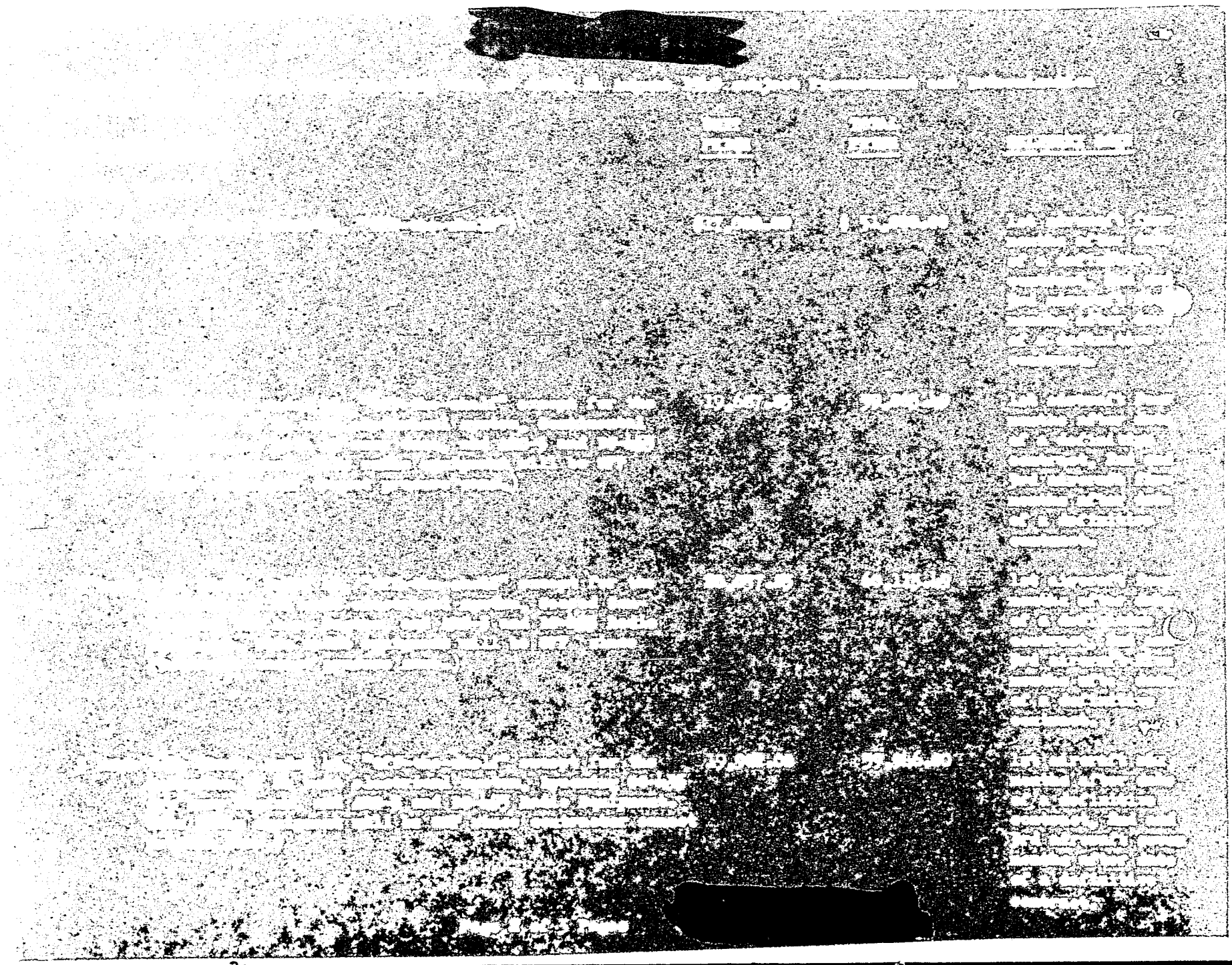
[illegible] by [illegible] dated [illegible] August 19[illegible] and [illegible] procurement and [illegible]

[illegible]	UNIT PRICE	TOTAL PRICE	DELIVERY DATE
[illegible]			
3 each T-3[illegible] (XT[illegible] Configuration with no changes)	$1[illegible]0,000.00	[illegible]50,000.00	1st aircraft [illegible] months after date of a definitive contract, 2nd and 3rd aircraft nine months after date of a definitive contract.
3 each T-3[illegible] (XT[illegible] Configuration with changes as determined by 6[illegible] and Evaluation Board. Conventional landing gear. "Off-the-shelf" except for ARC-3 and BC-453 Radio Equipment which contractor cannot procure.)	205,000.00	615,000.00	1st aircraft [illegible] months after date of a definitive contract, 2nd and 3rd aircraft [illegible] months after date of a definitive contract.
3 each T-31 (XT[illegible] Configuration with changes as determined by 6[illegible] and Evaluation Board, except for the substitution of a tricycle landing gear and a [illegible] 580 Engine. "Off-the-shelf" except for ARC-3 and BC-453 Radio Equipment which contractor cannot procure.)	250,000.00	750,000.00	1st aircraft twelve months after date of a definitive contract, 2nd and 3rd aircraft thirteen months after date of a definitive contract.

1898



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[redacted]

Attachment to AMC letter to DCS/M Hqs USAF Subj [illegible] dated [illegible] August [illegible]
Modernization of Training Aircraft

TRAINER CONFIGURATION [illegible]

T-35 Temco Trainer

3 each T-35 (Model TE-1B) No GFE. [illegible] [illegible]

NOTE: The prices on the T-31, T-34 and T-35 aircraft do not include Technical Data or Spare Parts. A limited quantity of initial spares should be procured. However, as major overhaul would be accomplished by the contractor, it should not be necessary to stock Maintenance Spares.

 [redacted]

1900

3. Attached as Tab A is the [illegible] Board of Senior Officers.

4. Attached as Tab B is the list of [illegible] the Board meeting.

SECRET

AGENDA ITEM I

5. Lt Colonel W. E. Carter, Office of the Comptroller, USAF, appeared before the Board and presented the Comptroller's estimate of aircraft procurement and research and development funds likely to be made available for Fiscal Year 1950.

After presentation and discussion by members of the Board, it was concluded by the Board that $1,100,497,706 is the minimum likely to be made available for Fiscal Year 1950 and further consideration of additional Agenda items was based on this assumption.

AGENDA ITEM II

6. Major General Frederic H. Smith, Jr., Assistant for Programming, DCS/O, appeared before the Board, reviewed the composition of the 48 Group Program, and presented the program proposed by the staff to implement this 48 Group Program for Fiscal Year 1950. (Attached as Tab C are photostatic copies of charts presented by General Smith.)

The Board accepted, in general, this program as a basis for reviewing procurement and research and development for Fiscal Year 1950.

AGENDA ITEM III

7. Brigadier General Alfred A. Kessler, Director of Procurement and Industrial Planning, DCS/M, appeared before the Board and presented the $1,100,497,706 procurement program for Fiscal Year 1950. Attached as Tab D are the items contained in the program, which set forth the estimated unit cost and total cost of each type of aircraft and related items proposed to implement the 48 Group Program within the estimated funds.

8. It was noted by the Board that no provision was made in the 1950 program for procurement of C-97's. This raised the question of the comparative value of this aircraft with other heavy transports and, also the decrease in industrial mobilization potential which would result from closing down the production line of the C-97. In view of these considerations, Major General Lawrence A. Kuter was called before

1902

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1903

(a) [illegible] production line of C-97-A [illegible] type, and further [illegible] source of supply of Navy [illegible] should be maintained for [illegible] mobilization.

(b) The Board is convinced that postponement of additional procurement of C-122/123 aircraft is desirable because completion of service tests will not be accomplished until late in Fiscal Year 1950, and determination whether these aircraft meet requirements cannot be made until that time.

b. That the procurement of three T-31 (Fairchild) aircraft at a high cost is unwarranted because of the availability of two prototypes Navy XNQ aircraft.

c. That the types of aircraft required for primary training in both the Air Force and the Navy are essentially the same. Joint determination of a common prototype to meet this requirement would result in increased economy and should provide the best primary trainer type selected, engineered and readied for mass production in the event of emergency.

d. That the 1950 R&D program reviewed by General Putt is the best program possible within funds allocated.

e. That the proposal of the Under Secretary of the Air Force to procure 12 C-121's in Fiscal Year 1950 in order to maintain three transport production lines is not feasible within fund limitations.

<u>Reasons</u>:

(1) It is difficult to maintain even two production lines; i.e., the Douglas C-124 and the Boeing C-97, within available funds.

b. That the Navy be advised to participate in the procurement of the T-31, T-34, and T-35 aircraft with a view to standardization of trainer aircraft.

c. That the MAP program as presented to the Joint Chiefs of Staff for Fiscal Year 1950 be approved.

d. That the recommendation of the Secretary of the Air Force to maintain three transport (C-124, C-97, and C-54) squadrons not be favorably considered and that in no event should more than C-124's and C-97's be procured.

SECRET

1f. A complete transcript of the record of the meeting of the Board with exhibits included will be kept on file in the Office of the Deputy Chief of Staff, Materiel for reference purposes.

WILL S. FAIRCHILD
General, U. S. Air Force
Chairman

7 Incls
1. Tab A - Agenda
2. Tab B - List of Personnel
3. Tab C - Composition of 48 Group Program
4. Tab D - Aircraft Procurement for FY 150
5. Tab E - Airlift Study for SAC
6. Tab F - Trainer Proposals
7. Tab G - Ltr fr Under Secretary of Air Force

EDWARD A. CRAIG
Lt General, U. S. Air Force

for BENJAMIN W. CHIDLAW
Lt General, U. S. Air Force

THOMAS MORGAN
Lt General, U. S. Air Force

EDWIN W. RAWLINGS
Lt General, U. S. Air Force

O. P. WEYLAND
Major General, U. S. Air Force
(Recorder without vote)

WILLIAM T. THERMAN
Brigadier General, U. S. Air Force
Associate General Counsel
(Asst Recorder without vote)

Approved:

HOYT S. VANDENBERG
Chief of Staff
United States Air Force

Approved as corr for C 97
as corr -

(See [illegible] attached)

[redacted]

1906

SECRET

FOURTH MEETING
BOARD OF SENIOR OFFICERS APPOINTED
BY THE SECRETARY OF THE AIR FORCE

29 AUGUST 1949

GENERAL MUIR S. FAIRCHILD, CHAIRMAN,
PRESIDED

(Conference Convened 29 August at 11 A.M.)

THOSE ATTENDING:

General Muir S. Fairchild

Lt. General Laurie Norstad
Lt. General H. A. Craig
Lt. General E. W. Rawlings
Major General O. R. Cook
Major General Carl A. Brandt
Brigadier General W. F. Tunner
Lt. General [illegible] C. Whitehead
Major General L. S. Kuter
Major General H. M. Lee
Major General J. H. Smith, Jr.
Major General K. B. Wolfe
Brigadier General W. D. Eckert
Brigadier General A. J. Kissner
Brigadier General D. L. Pratt
Brigadier General H. P. Swofford, Jr.
Colonel R. S. Carman
Colonel J. R. Chidlaw
Colonel W. M. Gross
Colonel R. C. [illegible]
Colonel J. C. [illegible]
Colonel R. J. [illegible], Jr.
Colonel J. S. [illegible]
Lt. Colonel O. T. [illegible]
Lt. Colonel L. L. [illegible]
Lt. Colonel S. A. [illegible]
Lt. Colonel J. T. [illegible]
Lt. Colonel W. L. [illegible], Jr.
[illegible]

[redacted]

9

1907

				-11
				-21
				-1
				0
				-80
				-100
				0
				-139
				-10
				-4
TOTAL	1,020		$1,017,914,430	-585

Special Tools, Test & Ground Handling Equipment	10,794,934
Transportation, Prior Years	18,866,814
O&M Program	27,693,000
Weapons, Prior Years	10,008,540
R-4360 "C" Engine	20,000,000
Engineering Changes - FY 49 & Prior Years	0
TOTAL 1,020	$1,100,497,708

26 August 1949
AMCPD

12 Hs.

[redacted]

Office of the Under Secretary

[redacted]

[redacted]

The subject [redacted] ity in its present [redacted] exceptions are taken, however, [redacted] graphs:

a. Comment on the Research and Development [redacted] reveals that review was not possible based on [redacted] Report.

b. The decision to procure [redacted] seems. The first being to [redacted] this particular aircraft and [redacted] current under the proposed [redacted] intended. The second reason being, that it is highly [redacted] Republic can be given Air Force business beyond [redacted] In view of the latter, therefore, would it be more desirable to [redacted] at this time rather than a year from now?

c. It is agreed that procurement of C-97's must be continued [redacted] the minimum economical rate (2 per month). It would be preferable [redacted] to procure C-97's in a quantity ranging somewhere between 24 and 36 [redacted] This increase in C-97 procurement would be made possible by a reduction of C-124 purchases from 36 to approximately 24.

Mr. Barrows' main contention regarding the Report centers around the C-97 aircraft. It is felt here that insufficient consideration was given to the desirability of maintaining production at Boeing, Seattle, in the face of moving the B-47 and B-52 procurement to other parts of the country for manufacture. Further, the cost of the C-124 over the C-97, in comparison with performance data, does not appear justifiable. In this connection a review of the role to be played by each of these aircraft is in order.

It should be noted that Mr. Barrows agrees to the omission of the C-121 from the program. The basis for this change in thinking lies only in the fact that Lockheed, because of large commercial orders, will continue to manufacture the aircraft so maintaining the mobilization potential of a good airplane for us.

J. S. [redacted]
Special Assistant

Incl:
Report of 4th Meeting of
Board of Senior Officers

27 3

1909

[redacted]

[redacted]

[redacted]

2. Directives implementing the action recommended by the senior board of officers will be mailed in the near future.

BY COMMAND OF THE CHIEF OF STAFF:

K. B. WOLFE
Lieutenant General, USAF
Deputy Chief of Staff, Material

2 Incls,
as listed abv

S-55095

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AFMFD/[redacted].E.G.Barber/hia/4860
Written 3 October 1949

4 OCT 1949

MEMORANDUM FOR SECRETARY JOHNSON

SUBJECT: Modernization of T-6 Trainers

After the termination of World War II, a study was made of the Air Force pilot training program with a view toward economy, increased efficiency and modernization of training methods. In the initial flight training program, it was recommended that two phases be established. The T-31 (Fairchild XNQ) was selected for the first phase and the T-28 (North American) for the second phase with procurement of each type to be made annually until the wartime built T-6 was phased out. This would have required 1690 T-31's and 1903 T-28's to support the 70 group program of 6160 pilots per year. Initial procurement of 266 T-28's and 100 T-31's were certified for procurement from Fiscal Year 1948 Supplemental funds.

Limitations of the Fiscal Year 1950 and proposed level of Fiscal Year 1951 for aircraft procurement have necessitated lowering the Air Force pilot training program to a level of 3000 pilots per year which requires an active inventory of 1234 trainers (822 T-31 type and 412 T-28 type) exclusive of attrition and modernization requirements. (See Item 9 of Tab "A") Corresponding reduction to the Air Reserve and other programs have made available an increased quantity of T-6 trainers applicable to the training program.

The present T-6 configuration is not considered the most suitable or economical for the early stages of Air Force pilot training. However, a modernized version is capable of satisfactorily performing the mission. The average age of the T-6's on hand is in excess of five years. A proposed remanufacturing program will produce a modernized version at very moderate cost and will extend the useful life 4 to 6 years. Substantial quantities of T-6's are in Air Force inventory. It is considered in the best interests to forego the introduction of the T-31 at this time and to modernize 700 T-6's.

The initial increment of 100 T-31's from Fiscal Year 1948 supplemental funds has not been procured, thus no termination costs are involved. It is now requested that $7,630,000 of the $8,201,500 originally certified for the procurement of 100 T-31 trainers be recertified for the modernization of 700 T-6 trainers plus such additional spares as may be required that are peculiar to the modernized version of the T-6.

C O P Y fr Copy in
Office of the Under
Sec of the Air Force [redacted]

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Memo for Secretary Johnson

We hereby certify that the contracts to be let are necessary in the interests of National Defense, and the contract specifications will insure the maximum utilization of improvements in aircraft and equipment consistent with the needs of the United States, and that placing of the contracts would not result in commitments or development of a structure requiring future obligational authority in excess of the President's stated fiscal program.

/Signed/
WILLIAM F. McKEE
Major General, U.S. Air Force
Assistant Vice Chief of Staff

For and in the absence of

HOYT S. VANDENBERG
Chief of Staff, United States Air Force

SIGNED

W. STUART SYMINGTON

C C P Y fr
copy in Office of the
Under Secretary of the
Air Force

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1. Project: Modernization of North American T-6 aircraft for continued use in pilot training program.

2. Period during which contracts will be placed:

   Second quarter of Fiscal Year 1950.

3. Brief description of item:

   The North American Texan trainer (T-6) is presently planned to be used in the basic phase of the pilot training program, and as an interim trainer in the early stage of the advanced training phase until replaced by the T-28. It is a thoroughly proven airplane, with years of successful utilization in pilot training.

4. Reasons why the general nature of specifications will insure maximum utilization of improvements in aircraft and equipment, consistent with the defense needs of the United States:

   The maximum utilization of present aircraft is realized by modernization of the present T-6. It is necessary to improve the safety and utility of the aircraft for training purposes by modification so that more effective instructor supervision of student flying and more satisfactory equipment for instrument flight training can be obtained. Other changes, considered necessary for safety, have been included in the modernization. For example, the canopy will be improved for better visibility and the tail wheel assembly will be replaced by a steerable unit to gain better handling of the aircraft on the ground. To be cleared for continued use, in the interest of safety, each plane will be torn down, inspected, and defective parts replaced. The T-6 will then continue to be employed in the basic and early advanced phases of the pilot training program. The interval of time gained by this plan affords a period in which the type of trainer for ultimate replacement of the T-6 may be selected or developed.

5. Estimated Cost:

   The cost estimated by the contractor for the modernization of 700 T-6 aircraft follows:

700 aircraft @ $12,200	$8,540,000
Less allowance 700 sets of G.F.P. currently in stock @ $2,400	1,680,000
	$6,860,000
700 sets of initial spares peculiar to the modernized AT-6 @ $1,100 each	770,000
	$7,630,000

6. Basis of computing the estimated cost:

   The costs quoted above have been submitted by the contractor, and are in line with the number of aircraft to be modernized.

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7. Source of supply and how work will be accomplished:

The T-6 aircraft will probably be modernized at the North American, Inc. Plant at Inglewood, California.

8. Delivery Schedule:

	(Months after Date of Definitive Contract)												
	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th
	1	5	9	20	35	40	60	80	100	100	100	100	100
Cum.	1	6	15	35	70	110	160	240	300	400	500	600	700

9. Basis of computation of the quantities of items proposed:

Primary-Basic Phase - 3000 Pilot Rate

	Required Active Inventory	New Production On Order	Proposed T-6 Modernized	Annual Production Required for Modern Active Inventory
1st Phase (T-31 Type)	822	0 (276 FY 49	700	159
2nd Phase (T-28 Type)	412	391 (125 FY 50	0	80

1234 aircraft are required for the active inventory in the primary-basic phase. Procurement of the T-28 and proposed modernization of the T-6 are both below the required active inventory.

10. Reasons why it is considered to be necessary in the interest of National Defense:

The reduction of the Air Force from 70 to 48 Groups, together with fiscal limitations, has resulted in a consequent lowering of the training program and has made available a quantity of T-6 trainers to provide for the basic portion of the training requirements. To obtain maximum utilization of the present T-6 aircraft, it is necessary to modernize them to improve their safety and operation.

* Per copy - Note that cumulative does not agree mathematically from ninth month forward. Total of 700 listed in monthly line.

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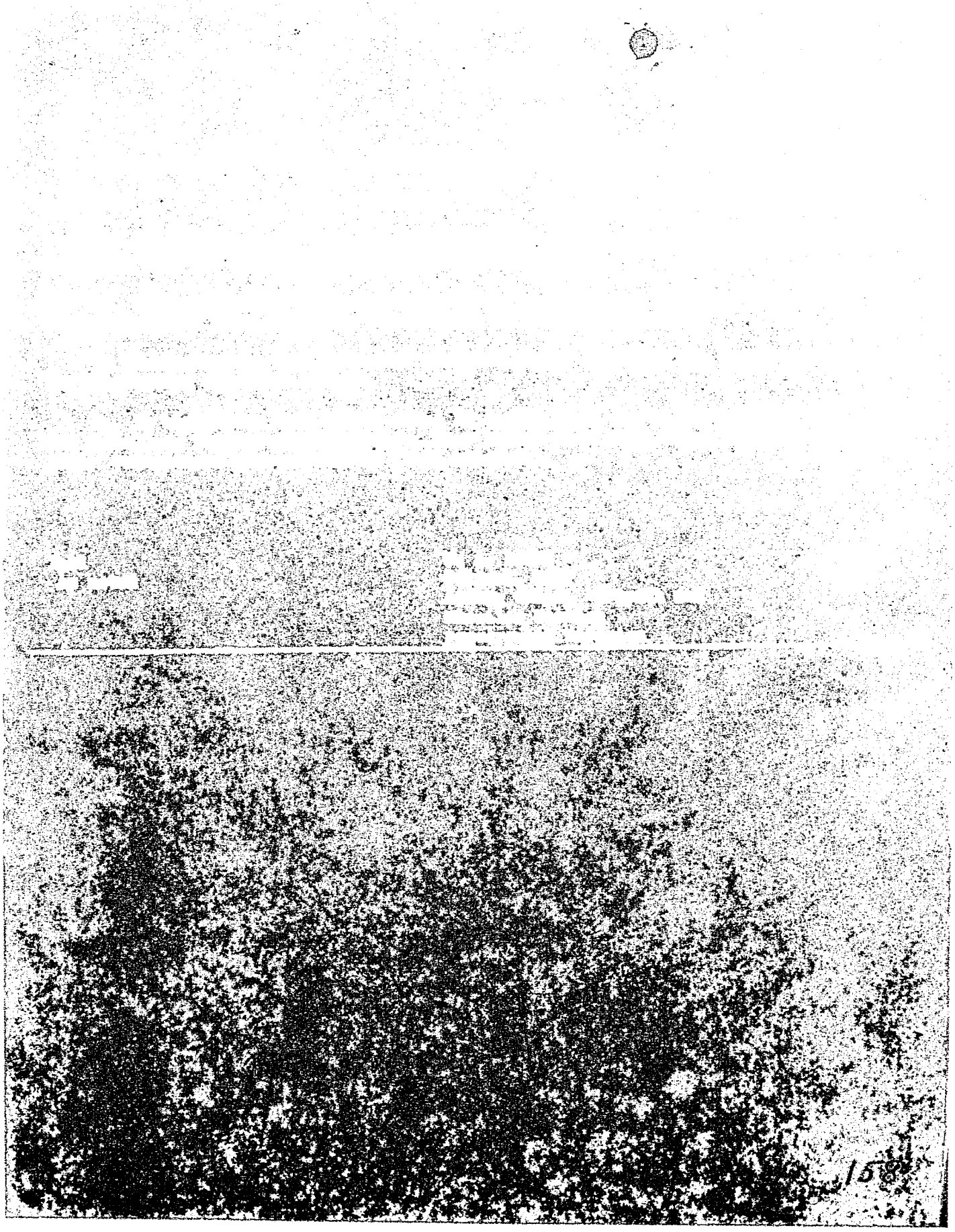

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4 MCPPXA66/SLA:rd/28138

November 20002

TO: Director, Procurement and
Industrial Planning
DCS/M
Washington 25, D. C.

S. W. BISHOP
Lt. Colonel, USAF
Chief, Training, Transport,
and Special Aircraft Branch

ATTN: AFMPD

MCPPXA66-11-3. Re our letter SLA:rd MCPPXA66 dated 24 August 1949 Procurement and Modernization of Training Aircraft. Desire information relative to configuration and procurement status of T-34 (Beech) and T-35 (Temco) Trainers. Contractors of the two above aircraft have each indicated willingness to incorporate in 3 service test aircraft considerable AMC desired changes with no effect on Basic Model (off the shelf) costs. Re Service Test of the T-31 (XNQ), T-34 and T-35. It is understood informally that three (3) each of the T-34 (Beech) and T-35 (Temco) trainer aircraft will be procured and placed on service test together with the existing two (2) T-31 (XNQ) (Fairchild) aircraft. However, no action is being taken by AMC pending receipt of a directive from Hqs USAF. In the event no further procurement action is contemplated on the T-31 (XNQ) aircraft, disposition action is requested relative to the two XNQ Navy Trainers which were loaned to the USAF and bailed by Hqs AMC to Fairchild Aircraft Corp.

SIGNED: Procurement Division

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Frame Number	Classification Number	Date Period	Vol.	Pt.	Title	Security Classification	Remarks
4	202.1-43	Aug/49	1		XB-52 Airplanes.	U	
58	202.1-43	Aug/49	2		XB-52 Airplanes.	U	
409	202.1-44	Mar/45-Jun/49	1		XF-87.Airplanes.	U	
529	↓	Mar/45-Jun/49	2		↓	U	
949	202.1-44	Mar/45-Jun/49	3		XF-87 Airplanes	U	
1409	202.1-45	Mar/50	1		T-31 Trainer.	U	
1514	202.1-45	Mar/50	2		T-31 Trainer.	U	
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