FACT SHEET - XB-70

Specifications.

Wing Span ....105 Ft
Wing Area ....6,300 Sq. Ft.
Length ....189 Ft
Canard Span..........28.8 Ft
Height...............30 Ft
Engines..............6 General Electric YJ-93 (30,000 pounds class)

Performance.

Speed...............Mach 3 (2000 MPH)
Range...............Intercontinental
Altitude............Over 70,000 Ft
Gross Weight........500,000 Lb Approx.

Compression Lift. The XB-70 is designed to take advantage of the effect of highly compressed air below the wing and lower pressure above it, which increases the lift-over-drag ratio. Literally riding on its own sonic wave, with the drag reduced, and the compression lift buoying up the aircraft, considerable fuel economy is realized.

The XB-70's delta wing and elongated fuselage were especially designed to take advantage of the shock wave pressure created when the nose rams into an air mass at over 2,000 miles per hour. Wingtips fold downward to provide directional stability and in addition acts to contain the spreading shock wave.

Differences. The principal difference between the two aircraft is the wing dihedral; air vehicle #1 has 0°, air vehicle #2 has 5°. In other respects they are basically the same.

Management Team. The management team conducting the XB-70 flight test program is composed of Air Force and contractor personnel. The Air Force team members are from the Systems Command's Aeronautical Systems Division (B-70 SPO) and the Air Force Flight Test Center (XB-70 Joint Test Force). The contractors participating in this test program are the Los Angeles Division of North American Aviation and the General Electric Company's Evendale, Ohio, jet engine division.

Technological Contributions.

Hydraulic System

The requirement for a total of approximately 2000 horse power operating at temperatures as high as 630°F far exceeded the present state-of-the-art. In addition, due to weight and size considerations a 4000 psi system was selected. New fluids to meet these requirements were developed.

Metallic seals to satisfy the temperature environment were developed and perfected.

Previous history had indicated tubing connections to be a major contributor to operational difficulties. To overcome these problems, welded and brazed fittings were perfected.

Some 10,000# of weight was eliminated by the use of this high pressure, high temperature unitized design.

High Voltage Electrical System

Due to weight considerations involved in the long power transmission cables, the 240/416 volt AC power system was developed. The generator was required to operate at high temperatures and altitudes. An oil cooled rotating rectifier type generator of high capacity was developed with a weight to power ratio of 1.6 pounds per KVA compared to previous ratios of 2.3 pounds per KVA.

Structure

The materials of the structure had to be designed to carry a load while subjected to temperatures of 475°F. While certain of these areas such as inlet ducts and leading edges reached 630°F. Structures in the engine compartment reached temperatures as high as 1000°F. Material environment and load requirements dictated the use of corrosion resistant steel (BH15-7-MO) and it is used in about 70% of the airframe. Titanium was used where advantageous. To permit the thin gages of steel to be utilized to the strength level that was potentially available and to obtain as much insulation value as possible, honeycomb construction was selected.

Processes

Chem milling on an extensive basis was introduced to facilitate attachment of structural members and to provide local strength without excessive welding and damage to the brazed honeycomb. Chem milling was also used for final dimensioning of H-11 tool steel where standard machining is impractical. Metal to metal fuel and nitrogen containment was achieved by extensive use of welded joints and nickel plate sealing.

Extensive use of glass bead shot peening was necessary to provide stress relief over very large structural panels as well as to increase corrosion resistance.

Extensive use of welding where possible, nickel plating in areas of low heat tolerance and plasma (Metallic) spray were all developed or refined in their application to the B-70 because of peculiar requirements of the high strength to weight honeycomb structure. Extensive development was required to obtain an organic sealant that can be applied readily and yet be heat resistant. Viton is available as a result to provide positive seal up to 500°F.

Equipments

Tires have been developed for the B-70 capable of withstanding temperatures on the order of 360°F. This significantly reduces the wheel well cooling requirements.

A central air data system concept was adopted to provide basic flight parameters in a usable form to the many equipments that require similar inputs. This approach resulted in substantial weight reduction and reduced complexity of tubing and wiring.

Cooling of the cabin and equipment is accomplished primarily by using the large quantity of fuel on board as a heat sink. A heat transfer problem of considerable complexity had to be solved plus insuring safe separation of electrical, hydraulic and air ducts from the fuel itself.

Engines

The B-70 required a significant advance in power plant design to achieve its design goals. High thrust for take off, low specific fuel consumption at high speed and minimum weight per pound of thrust for range and the capability to operate efficiently in an environment ranging from - 35°F to 630°F inlet air at M3.0 and 70,000 feet altitude. The requirement was met by an advanced design variable nozzle and compressor, special cooling and continuous afterburner operation. The concepts and designs incorporated in the J-93 engine are now being used in other similar applications.

PROGRAM COSTS. Cost of the XB-70A program through the end of the currently authorized flight test program is approximately $1.4 billion. About $888.4 million has been for design, development and flight test of the two XB-70 aircraft now being flown; $275.8 for development, design and test of the General Electric YJ-93 engines; and $297.3 for construction of the third XB-70(cancelled after construction began), bomb-navigation equipment, high energy fuel research, and other work in support of the XB-70 when it was being considered as a weapon system.

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