AERONAUTICS

Decision on Supersonic Airliner

Passenger planes to triple jet speeds to 3,000 miles an hour will be decided by industry and Government. "Go slow" signals are being raised by Congressional spokesmen.

By CHARLES A. BETTS

➤ THE PROGRAM to develop a commercial airliner that can span the country in one and a half hours or less faces a year of decision in 1965.

As the Johnson Administration begins its first full term in office, spokesmen for Government agencies and for aviation subcommittees in the House and Senate are raising "go slow" signals over the American supersonic transport project. Officials are recommending further analysis and study into design, financing and management of the one billion dollar effort.

Najeeb E. Halaby, administrator of the Federal Aviation Agency, summing up the prevalent official U.S. attitude said, "the aim in the United States supersonic transport (SST) program is a safe, practical, efficient and economical vehicle. We should not go forward, and we do not plan to go forward, unless criteria to meet these objectives are met at vital 'decision points' established in the program."

Continue Program

Despite a feeling that sufficient time should be allocated for planning, there is widespread agreement that the United States should continue with an SST for commercial use. Goal is the development of a passenger aircraft that can fly much faster than sound. Sound travels at 760 miles an hour at sea level and 660 miles an hour above 40,000 feet.

One question has been central to United States SST development from the start: is it in the best interests of the nation to maintain world leadership in the field of large transport aircraft?

The answer has been yes, provided a safe, sound, reliable and economical airplane can be built.

Aviation authorities say an SST can and will become a reality. Therefore, they argue, let it be an American SST, since American preeminence in the development of an SST is vital to U.S. superiority in the commercial aviation field.

An airline passenger survey recently indicated that the SST would receive wide traveler acceptance. About nine out of ten coach passengers who answered a survey conducted by Stanford Research Institute, Menlo Park, Calif., in cooperation with three airlines indicated that they would fly in an SST if the price were the same as that of contemporary subsonic jets. About half of these would accept a surcharge of up to 50% over subsonic jet fare levels.

Among design goals for an SST are a speed of Mach 3 or three times the speed of sound, a range of 4,000 miles, ability to operate from existing jet airports, operating costs equivalent to current subsonic jet airliners, and a useful lifetime of 15 years, or 30,000 to 50,000 operating hours.

Cost Factor

Three basic factors underlie the current attitude of proceeding steadily but deliberately with SST.

First—cost and financing. Controversy developed during 1964 over relative percentages to be paid by the taxpayers and by private industry. Aviation spokesmen have held that the Government should contribute up to 90% of costs, with 10% paid by private industry. Government and Congressional leaders have advocated a 75-25% split.

In addition there could well be legislation during 1965 creating a budget for the supersonic transport program. At present it is under the budget of the Federal Aviation Agency.

Permissive legislation could spell out spheres of authority and even create a timetable for progress. Congressional leaders have indicated support for such an approach.

Last spring, cost and financing were interlocked with a major scientific breakthrough. This development came to light with the announcement by President Lyndon B. Johnson of the new A-11 interceptor plane using titanium and capable of flying over 2,000 miles an hour.

Use of Titanium

The secret of using titanium was found in the development of a means to fabricate the heat resistant metal as easily as conventional aluminum. The process was hailed as an aeronautical advance comparable to the invention of the jet engine.

The skin of an SST must withstand extremely high temperatures. The heat is generated by compression and friction of air molecules in contact with the plane.

Aluminum alloys, used in most of today's commercial airliners, lose their strength at high temperatures. By contrast, the titanium alloy has a melting point of about 3,000 degrees Fahrenheit.

The speed and performance of the A-11 shows it to combine and even improve the best features of the renowned U-2 reconnaissance plane, which was the first non-rocket craft to approach 100,000 feet altitude, and the F-104 fighter, which was the first to fly at substantially more than twice the speed of sound—more than 1,400 miles per hour.

Titanium is one of the most common elements on the earth's surface. It comes from rutile or ilmenite ore, sometimes to be found in black grains of sand from Australia. Lower grade deposits are in eastern Ohio, western Pennsylvania and upstate New York.

A reduction in cost of titanium has contributed to its use in aircraft. Titanium sponge, the raw form of the metal, dropped from $5.00 a pound in the early 1950s to about $1.30.

However, its cost still prohibits as wide a use as desirable.

The use of titanium in the SST program has raised further uncertainty as to costs. Typical Congressional reaction was expressed by Sen. A. S. Mike Monroney (D-Okla.), chairman of the aviation subcommittee of the Senate Commerce Committee, when he said, "because of the titanium breakthrough, the cost estimates of our supersonic transport program can be reduced materially." Exact amounts involved will depend on the outcome of cost studies.

Boeing Company

SUPERSONIC FLIGHT—Boeing Company engineers display an array of airframes leading to the present design for an American SST, cutaway model on stand. Featuring a variable sweep wing for both subsonic and supersonic flight, the Boeing proposal is now before the Federal Aviation Agency for evaluation.

Concorde Delayed

Second basic reason for urging deliberation—reduction of priority because of an anticipated indefinite delay in the Anglo-French Concorde program.

The Concorde, nearest known competitor to an American SST, is designed to carry 118 passengers. It is to be powered by a Bristol Siddeley Olympus engine. Overall

length of the Concorde is to be 184 feet 2 inches; wingspan 83 feet 10 inches; maximum takeoff weight 326,000 pounds, and maximum payload 26,000 pounds. The Olympus engine will develop 32,000 pounds thrust.

As long as this competitor was being pushed ahead by Britain and France, U.S. officials operated under a sense of urgency to develop our SST first. Shortly after the new Labor Government took office in Britain, however, the project was left in doubt.

Labor officials announced the beginning of an entire reevaluation of the British supersonic program. Subsequent meetings at cabinet level between British and French officials solidified the American interpretation that Concorde was off for the foreseeable future. Therefore, according to Sen. Monroney, "we are not going to be in a race any more and can give more time for research."

Sen. Warren G. Magnuson (D-Wash.), another key member of the aviation subcommittee, said, "we can't afford to rush. We are developing an airplane to carry America and the world into the turn of the century."

Sen. Norris Cotton (R-N.H.), ranking Republican member of the subcommittee, stated, "the British-induced slowdown in the development of the Concorde will certainly give the United States additional breathing room in developing our own supersonic transport program. It ends the necessity for a money-wasting crash program."

Another less optimistic view cites Russian progress in the supersonic transport field. Last summer, the head of Aeroflot, the Soviet airline, said that the Russians were working on an SST and that they hoped to have one flying before the United States.

Third basic reason—time for consideration of the report by a Presidential study group to Mr. Halaby. This report will offer substantive guidelines to policy makers.

To Select Designs

Following this study, airframe and power plant design are to be selected. Two aircraft companies, Boeing Company and Lockheed Aircraft Corporation, and two power plant companies, General Electric and the Pratt and Whitney Division of United Aircraft, submitted designs Nov. 5, 1964. The four bidders were named by the President to conduct additional research and submit proposals.

For efficient supersonic flight, an airplane should be long and slender with thin short wings that are sharply swept back. But taking off, approaching and landing at low speeds calls ideally for long wings jutting straight out from the plane's body.

Boeing's version of the SST features variable sweep wings. For landing or takeoff, wings are in a fully extended position. For supersonic flight, the wings are in a fully retracted position. During the transition from subsonic to supersonic, the wings are retracted to an intermediate position for transonic flight.

Lockheed's SST has a double delta wing. The forward delta sweeps back at an 80 degree angle from a point just aft of the pilot's compartment to about the mid-point of the fuselage. The aft delta sweeps back at a 60 degree angle. There is a movable nose section which is lowered 15 degrees for landing, 10 degrees for takeoff to improve pilot's visibility.

Recently, the Air Force XB 70 was turned into a research plane and assigned the sole job of gathering data on supersonic flight. It is considered the forerunner of the SST.

This plane is 185 feet long, with a 105-foot wingspan. The twin vertical tail is 30 feet high. Underneath in a 30-foot bay are six General Electric J-93 engines, each in the 30,000 pound thrust class.

The plane weighs more than 450,000 pounds.

In solving the complicated problems of the SST program, Government, industry and the Congress agree that seldom if ever before has there been a Government program involving so many parties of interest.

The program is truly national in scope and demands mutual confidence and cooperation to develop through a businesslike combination of Government and industry resources the finest airliner in the history of aviation.

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Nature Note

Mountain Goat

➤ THE NORTH AMERICAN mountain goat is one of nature's most exciting sights in the cold and snowy ranges of the Rocky Mountains.

Unless pursued, he is a slow moving creature, but his climbing ability enables him to reach high pinnacles of slippery rock. His sure-footedness is due to hooves having sharp, hard rims and soft inner pads.

Both the male and female of this species have heavy white coats contrasting with their black hooves, snouts and horns. The bearded beast appears to be hunch-backed because of a growth of stiff long hair that forms a ridge along the mid-line of its neck and shoulders.

The mountain goat moves in an unhurried fashion over rugged terrain, grazing on a small variety of vegetation, including lichens, grasses and scrub.

When November arrives, the males battle for possession of the females and mating takes place.

In late spring, the female may give birth to one or two kids. Within a matter of minutes after birth, a kid can stand, and within less than an hour he is able to jump.

Though various predators such as cougars, wolves and bears stalk this mountain creature, his ability to scramble along narrow ledges and climb the faces of steep cliffs usually keeps him out of danger. His chief worries are the snowslides and the deep snow of his environent.

The term 'mountain goat' is deceptive in that the animal is more closely related to the antelopes than to the true goats. Its latin name, *Oreamnos americanus,* taken from Oreas, a spirit of the high mountains, seems to be more apropos.

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