Concorde Enters Flight Test Phase

By Donald E. Fink

Toulouse, France— Anglo-French Concorde prototype 001, which made a 28-min. maiden flight here Mar. 2, was to enter the first stage of tests on its second flight late last week with the landing gear retracted aloft and the droop nose nose cycled to the fully raised position.

André Turcat, Sud Aviation flight test director, was chief pilot on the Concorde first flight. His crew included Jacques Guignard, copilot; Michel Retif, flight engineer, and Henri Perrier, flight test observer, all of Sud's Flight Test Div.

The start of flight tests with the 001 prototype, which was built by Sud in a joint program with British Aircraft Corp., came one year and two days after the Feb. 28, 1968, date set early in the program and reaffirmed at the prototype rollout in December 1967. It also followed by slightly more than two months the first flight of the Soviet Union's Tupolev Tu-144 supersonic transport prototype on Dec. 31, 1968 (AWST Jan. 6, p. 33).

Plan for the second Concorde flight, set for last Friday following two days of bad weather, called for evaluation of the aircraft's handling qualities in a variety of configurations including the streamlined climb/cruise configuration with the movable nose visor raised.

The second flight opens a test program which calls for logging more than 4,000 hr. on four prototypes and the first three production models, leading to aircraft certification in mid-1973. The flight test schedule requires a minimum of 15 flight hours per month for the next three months. This will be increased to 23 hr. monthly in June and 30 hr. monthly later this year.

The 002 Concorde prototype, built by British Aircraft Corp., is scheduled to join 001 in flight tests by mid-April. The second prototype will make its maiden flight on a 25-min. transfer hop from BAC's Filton facility to the company's Concorde flight test center at Fairford. It will be flown by Brian Trubshaw, BAC chief test pilot, and John Cochrane, copilot.

The 01 and 02 pre-production prototypes are scheduled to fly by early 1971. These aircraft will start with a flight test schedule of 30 hr. monthly. The first three production aircraft are scheduled to begin flight testing in early 1972.

Turcat said after the 001 flight that the mission had been so well rehearsed on the simulator that he found no surprises in the way the aircraft handled.

High winds forced cancellation of an initial flight attempt on Mar. 1, and the test was set for the following day. Turcat finally taxied the 001 prototype onto the special 11,500-ft. Concorde runway at about 3:30 p.m., after a 3-hr. wait for fog to clear. He brought the four Rolls-Royce Bristol/Snecma Olympus 593 engines to full power and released the brakes as the afterburners were cut in.

The aircraft, which weighed slightly over 250,000 lb., accelerated rapidly, its nose-down attitude accentuated by the drooped visor which was left lowered in the landing position. A three-quarter tailwind was gusting up to 6 kt. Maximum takeoff weight of production Concordes will be 376,000 lb.

Rotation to the 10-deg. takeoff attitude occurred slightly beyond 3,900 ft., and the aircraft became airborne at the 4,900-ft. mark after a 22-sec. takeoff roll. Takeoff speed was 175 kt.

Turcat increased the climb-out angle to 20 deg., and the aircraft accelerated through 200 kt. Rate of climb was 3,500 fpm. A Gloster Meteor engine driving a chase aircraft joined the Concorde on its right rear quarter, and a Sud/Potez Paris photo chase aircraft flew into place on the left. Maximum speed reached during the flight was 250 kt. at an altitude of 10,000 ft.

The Concorde was put through a series of banks during the climb-out to evaluate handling characteristics at various speeds. Maximum roll angles of 30 deg. were reached during the flight.

Turcat kept the aircraft on the 330 deg. runway heading for about 7 min., then made a 90-deg. turn to the left. After 2 min. on the 240-deg. heading, he turned back to a downwind heading of 150-160 deg. which returned him to the Toulouse-Blagnac airport in a wide left-hand pattern.

The two Sagem-Ferranti SF 500-AE 51 inertial navigation systems aboard the 001 prototype were used to maintain the desired flight path. Five navigation points were programmed into the systems, which are built in France under license from Litton Industries. The aircraft was under visual and radar surveillance through the flight to monitor its performance and verify position.

The crew had a tense moment during the flight when the landing drag chute jettison warning light flashed. Flight test control had just informed Turcat that the wind was reinforcing, and that he could expect a 10-knot tailwind with gusts up to 14 kt. on landing. The Concorde is restricted to takeoffs and landings to the northwest because takeoffs on the 150-deg. heading would take the aircraft over the city of Toulouse. The runway also is equipped with an overrun arresting barrier only at the northwest end.

The crew considered switching the landing to the 150-deg. upwind direction as the chase pilot was asked to move in and check the tail chute housing. The chase pilot reported the chute door in normal position, and the jetti-

Sud Aviation Flight Test Director André Turcat, chief pilot on the Concorde 001 first flight, answers questions afterward. Crew members in background are (left to right) Jacques Guignard, co-pilot; Henri Jean-Louis Perrier, flight test observer, and Michel Retif, flight engineer.

Aviation Week & Space Technology, March 10, 1969
son warning was attributed to a faulty circuit. The drag chute functioned normally on the landing, which was made on the 330-deg. heading.

Tucat selected the automatic throttle mode for his approach. The system had been tested during a series of simulated approaches starting at 10,000 ft.

Guignard said the auto throttle system was tested at several different speeds and was found to function smoothly. Guignard followed the movement of the throttle controls with his left hand during the landing and was prepared to override the automatic system if it malfunctioned.

Approach Speed

The aircraft turned onto final approach slightly to the right of the instrument landing system beam and continued the first portion of its approach on that heading. At about 1500 ft., Tucat moved the aircraft through a gentle S-turn which aligned it with the runway centerline. The approach speed was 182 kt.

Touchdown was made at 170 kt., and the aircraft landed evenly on its double-hinge main gear units without bouncing. A cloud of light smoke bellowed from the tires as they hit the runway. The smoke swirled up over the outer wing leading edges, clearly outlining Concorde’s wingtip vortices. The drag chute snapped open as the nose wheel settled onto the runway. The aircraft rolled to a smooth stop in about 8,000 ft. Landing weight was 217,800 lb., well below the maximum landing weight of 240,000 lb.

A simulated approach to an altitude of about 1,000 ft. had been included as an option in the flight plan. This would have involved a low-level flyby and a tighter airport traffic pattern around to the final landing approach.

Wind Conditions

Tucat elected to land on the first approach, however, because of the steadily worsening wind conditions. After the landing rollout, Tucat turned the aircraft onto the runway and taxied back to the airline terminal on the east side of the airport where the crew was met by Sud President Henri Ziegler and Sir George Edwards, BAC managing director.

Ziegler told Aviation Week & Space Technology before the flight that the margin for error in Concorde’s design is very small since its payload is only 3.6% of its overall gross weight. "I do not think many technicians connected with the program in the beginning fully appreciated what this meant," Ziegler said. "In the areas of weight, drag and engine thrust, miscalculations by as little as 1% will mean the program is in trouble."

"As far as Concorde is concerned, our main goal is to produce an aircraft which will cruise economically at sustained Mach 2.2 and carry 25,000 lb. of payload from Paris to New York," he said.

The operational route on which Concorde’s guarantees are based is clearly defined as the Paris-New York run, and the airlines currently holding the 74 options have accepted this, he said. If they want to use it on other routes, such as Copenhagen-New York, they know they will have to operate with less payload, he added.

"As to the aim of the test program, we have questions facing us on the design which can only be answered by advanced flight tests, and specifically the sustained tests at Mach 2 and above," Ziegler said. "The immediate problem is to guarantee the 25,000-lb. payload."

Ziegler said they would not be able to make this guarantee before the first half of 1970, and "therefore we will not be in a position to negotiate final contracts with airlines before mid-1970."

He said the airline customers are not afraid of this delay, and, in fact, are relieved that they will not have to face major expenditures for Concorde at a time when they are making big investments in giant jet aircraft.

Ziegler said that with the completion of the 001 and 002 prototypes, project

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News of the Week

Details of Concorde Flight Tests Outlined

Toulouse, France—Detailed flight test program has been developed for the Concorde supersonic transport, specifying the sequence and objective of each test flight through aircraft certification. The program, covers the two prototypes, two pre-production prototypes and the first three production aircraft.

The two prototypes will be flown in stages up to high subsonic flight, according to Brian Trubshaw, chief test pilot at British Aircraft Corp. Trubshaw is scheduled to make the first flight in the Concorde prototype next month.

During the second half of the subsonic phase, flutter tests will be started with the 001 prototype, which has excitation equipment installed. The possibility of adapting the 002 for this type of testing also is being studied.

While the 001 is doing flutter tests, the 002 prototype will be used to investigate the low-speed performance area, Trubshaw said. This will include exploring the minimum speed at which the Concorde can be controlled.

The 001 prototype is essentially the aircraft that will be used to extend the flight envelope, he said, while 002 will be used to fully explore it.

The prototypes will be scheduled to fly 15 hr per month for the first three months. This will be raised to 23 hr per month and finally to 30 hr per month by the end of the year. The prototypes will be used to extend the flight test program through the end of 1973.

The Concorde test program is more rigidly controlled than any he has ever encountered and that, he said, is a tendency to demand too many formal reports from the flight test section, justifying changes.

This may improve the flight test program of the flexibility required to complete certification in the shortest time possible.

ODD Drops Office For Export Sales

Washington—High-level Defense Dept. office responsible for pushing export sales of U.S. military hardware as a means of easing this country’s balance-of-payments problem is being abolished at the direction of Defense Secretary Melvin R. Laird.

Henry J. Kiss, Jr., his director as deputy assistant secretary for international logistics negotiations and its most aggressive salesman, will retire from the government after 26 years service to establish a marketing consulting office in Washington.

Responsibility for export sales by the Pentagon will be transferred this week from the office of international security affairs to the Defense Dept. office for military assistance.

Lufthansa Buys 747F

New York—Boeing has received its first firm order for the 747F all-cargo transport from Lufthansa German Airlines. The carrier exercised options for the freighter and for a 747B, improved-range passenger model, raising its total of 747s on order to five. Boeing has orders for 196 of the high-capacity transports from 31 airlines, not all of which have been publicly disclosed.

News Digest

Air West’s deteriorating financial condition has prompted the Civil Aeronautics Board to tentatively approve an interline agreement in which Hughes Tool Co. will guarantee up to $4.5 million in indebtedness.

Ling-Temco-Vought last week received definitive Air Force and Navy contracts totaling $238.9 million for production of the USAF A-7D and Navy A-7E through 1970. The contracts, the largest the company has ever received, also cover tasks previously assigned under letter contracts.

USAF ‘Genius Dynamics F-111A crashed Mar. 4 82 mi. north northeast of Nellis AFB, Nev., 50 min. after takeoff

Air Force last week selected TRW, Inc., to design and develop the synchronous satellite for the defense satellite communications system (DSCS) up to the fabrication of flight equipment. The contract totals $23.7 million, of which $14 million was released last week.

Domestic passenger traffic flown by U.S. scheduled airlines rose 14.7% to 7.45 billion revenue passenger miles in January. In January, 1968, the revenue passenger miles total showed a gain of 15.9% over the same month for 1967.

Senate last week confirmed the appointments of four top Defense Dept. officials nominated by the Nixon Administration. Stanley R. Resor was reconfirmed as Secretary of the Army. Other action confirmed the appointments of Dr. John McLucas, former president of The Mitre Corp., as under secretary of the Air Force; G. Warren Nutter as assistant defense secretary for international security affairs, and Grant L. Hansen as assistant USAF secretary for research and development.

Miami-London-Award

Washington—Pan American World Airways was recommended by a Civil Aeronautics Board examiner last week to be the sole U.S. operator of a Miami-London route to be opened next year.

In selecting Pan American for the Atlantic route, examiner William F. Cussick rejected a CAB Bureau of Operating Rights recommendation that National Airlines be granted the route. Cussick also turned down bids by Sea Island World and Air Liquit International airlines to operate all-cargo services on the route.