

Aérospatiale Concorde Flight Manual



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Pre-Flight Information

Please ensure you have the MICROSOFT FlightSim 2004 installed and Windows XP or Windows 2000. These aircraft are not compatible with earlier versions of FlightSim or earlier version of Windows.

Minimum System Requirements

Pentium 4 1.4Ghz PC

256 Mb Ram

Microsoft Windows 2000/XP (will not work under windows 98/Me)

Microsoft © Flight Simulator 2004, A Century of Flight

120 MB Available Hard Disk space

SVGA Video Card 32 MB

Joystick or Yoke

Recommended System Requirements

Pentium 4 2.5Ghz PC

512 Mb Ram

Microsoft Windows 2000/XP will not work under windows 98/Me

Microsoft © Flight Simulator 2004, A Century of Flight

120 MB Available Hard Disk space

3d Graphics Card 128 MB

Sound Card & Speakers

Joystick or Yoke, Rudder Pedals

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Joystick Setup

The flight models in this product have been designed with the Joystick Sensitivities set to DEFAULT. To achieve the greatest accuracy of your flight model it is highly recommended to set your joystick back to these default sensitivities. Open FS2004 and go to the OPTIONS MENU, scroll down to CUSTOM CONTROLS. Select the Joystick item in the left window and you will see the SLIDERS for the control sensitivity. At the bottom of the window is a RESET DEFAULTS button. Just press the Button to reset your joystick settings. This will not affect any Custom Button Assignments

Flightsimulator Setup

Please set your Flightsim Instruments to read **INDICATED AIRSPEED** and **FULL REALISM** for best results

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The Aircraft

The Aérospatiale Concorde the most famous commercial supersonic aircraft. It has come to be regarded as both a work of art and a triumph of mechanical engineering. Indeed its unprecedented ability to sustain a cruising speed of mach 2 for up to three hours remains unchallenged.

Concorde is also the world's only operational supersonic passenger aircraft, cruising at more than twice the speed of sound at around 1350 mph, and at an altitude of up to 60,000 ft (over 11 miles high). A typical New York crossing takes a little less than three and a half hours. Traveling westwards, the five-hour time difference means Concorde arrives before she has taken off, in local time at least.

Great Britain and France started working separately towards a supersonic aircraft in 1956. They were working along such similar lines that in 1962 they decided to develop one jointly. This partnership, between the British Aircraft Corporation (now British Aerospace) and Aérospatiale, led to 20 Concorde's being built. Each country manufactured one prototype, one pre-production and eight production aircraft. The first flight of the British prototype aircraft took place from Filton, Bristol on April 9 1969. Concorde was subjected to 5,000 hours of testing by the time it was certificated for passenger flight, making it the most tested aircraft in aviation history.

The commercial supersonic era was inaugurated on January 21, 1976, with British Airways flying from London Heathrow to Bahrain and Air France from Paris to Rio. Concorde's fastest yet transatlantic crossing was on February 7, 1996, when it completed the New York to London flight in 2 hours 52 minutes and 59 seconds.

Of the 16 production aircraft, 14 were made available for sale. British Airways was the world's first supersonic airline. They ordered five Concorde's in July 1972, Air France later ordered 4. Due to no other airlines purchasing the Concorde, the remaining unsold planes were given to Air France and British Airways. Prior to the Air France crash shortly after takeoff from a Paris airport on July 25th 2000 Air France operated 5 aircraft while BA operated all 7 of their Concorde's.

Air France retired one plane and sold it to British Airways for spares, previously most of the spares came from the 2 pre-production craft. British Airways stopped using one plane to use as spares. This aircraft was put back into service when they acquired a spare from Air France.

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After the crash in 2000, the Concorde was pulled out of service to redesign several parts that played a part in the damage suffered prior to the crash. Not all of Concorde fleet was put back into service.

The Concorde is unique in that while it measures 204 ft in length, it stretches between six and ten inches in-flight, due to heating of the airframe which also ensures the airframe is effectively corrosion-free. The characteristic droop nose is lowered to improve pilots' visibility for take-off and landing.

The four engines - specially modified Rolls-Royce/Snecma Olympus 593s give more than 38,000 lbs of thrust each, with "reheat". This adds fuel to the final stage of the engine to produce the extra power required for take-off and the transition to supersonic flight. They are the most powerful pure jet engines flying commercially.

Passenger Experience

Compared to other commercial airliners, Concorde provided an unusual passenger experience. Both British Airways and Air France configured the passenger cabin as a single class with around 100 seats — four seats across with a central aisle. Despite being a nominally exclusive luxury class, most passengers were surprised to find how cramped the cabin was. Headroom in the central isle was barely six foot (1.8 m), and the leather seats were unusually narrow with legroom comparable to coach class on other planes. Flights operated by BA were coded 'Speedbird 1' through 'Speedbird 4'.

In the 1990s many features which were common in the first class and business class cabins of a long haul Boeing 747 flight such as video entertainment, rotating or reclining seats, perambulatory areas, were completely absent from Concorde. The only video entertainment was a plasma display at the front of the cabin showing the altitude, the air temperature or current speed in mach number. With no room for overhead storage, even carry on luggage was severely restricted. Meals were served using specially designed compact Wedgwood crockery with short silver cutlery. The ratio of cabin crew and lavatories per passenger was also considerably lower than typical for a first class cabin. These shortcomings were offset by the much shorter flight time.

The unique experience of passing through the sound barrier was less dramatic than would be expected given the turbulent history of supersonic flight. The moment would be announced by one of the pilots, otherwise the slight surge in acceleration could easily be missed.

At twice the normal cruising altitude, turbulence was rare and the view from the windows clearly showed the curvature of the Earth. During the supersonic cruise, although the outside air temperature was typically -60 C, air friction would heat the external skin at the

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front of the plane to around +120 C making the windows warm to the touch and producing a noticeable temperature gradient along the length of the cabin.

Most remarkably Concorde was the only plane able to outrun the sun. On certain early evening transatlantic flights departing from Heathrow or Paris, it was possible to take off at night and catch up with the sun — from the cockpit you could see the sun rise in the west.

Technological features

Many technological features now common in airliners were first used in Concorde.

For speed optimization, Concorde featured:

- ∅ Double-delta (ogive) shaped wings
- ∅ Afterburning Roll-Royce/Snecma Olympus turbojets
- ∅ Thrust-by-wire engines, ancestor of today's FADEC controlled engines
- ∅ Droop nose section for good landing visibility For weight-saving and enhanced performance, Concorde featured:
- ∅ Full-regime autopilot and autothrottle allowing "hands off" control of the aircraft from climb out to landing
- ∅ Fully electrically-controlled analog fly-by-wire flight controls systems
- ∅ Multifunction flight control surfaces
- ∅ High-pressure hydraulic system of 4,000 lb/in² (28 MPa) for lighter hydraulic systems components
- ∅ Fully electrically controlled analog brake-by-wire system
- ∅ Pitch trim by shifting fuel around the fuselage for centre-of-gravity control
- ∅ Parts milled from single alloy billet reducing the part number count Experience in making

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Concorde Timeline

Nov. 29, 1962

The French and British governments sign a pact agreeing to develop prototypes for supersonic transport aircraft. At the same time, France's Aérospatiale and British Aircraft Corporation Ltd. (later known as British Aerospace PLC) sign a similar agreement.

Dec. 11, 1967

Aérospatiale unveils its first test version – Concorde 001

March 2, 1969

Concorde's first test flight from Toulouse to Le Bourget in France.

April 9, 1969

The British prototype, Concorde 002, makes its first test flight from Bristol.

Oct. 1, 1969

Concorde successfully completes its first supersonic flight.

June 3, 1973

The Soviet version of a supersonic commercial jet, the Tu-144, crashes at the Paris Air Show at Le Bourget, killing 13 people. The Soviet project is shelved.

Dec. 3 1973

The first commercial-production Concorde makes its first trip.

June 17 1974

The aircraft completes its first double transatlantic journey in one day.

Jan. 21, 1976

The first Concorde passenger flights begin. A British Airways (BA) Concorde travels from London to Bahrain and an Air France (AF) Concorde travels from Paris to Rio de Janeiro, Brazil.

May 24, 1976

BA and AF launch Concorde travels from London and Paris to Washington.

Oct. 17, 1977

The U.S. Supreme Court overrules a New York Port Authority ban on Concorde flights in the New York area. Regular service to and from New York begins later that year.

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Aug.16, 1995

Concorde sets a record for around-the-world flight, a New York to New York flight, in 31 hours and 27 minutes.

Oct. 8, 1998

A piece of a Concorde rudder falls off during a flight from London to New York. The plane lands safely.

July 23, 2000

BA reports that cracks were found in the wings of its Concorde fleet. The next day AF says it found cracks in four of its six Concorde.

July 25, 2000

An AF Concorde crashes in Paris en route to New York killing all 109 people on board and four people on the ground. AF grounds its Concorde.

Aug. 4, 2000

French investigators find a strip of metal on the runway that does not belong to the departing Concorde. Later, investigators say the metal damaged a tire and the debris punctured the fuel tank of the Concorde, starting a fire.

Aug. 15, 2000

BA suspends Concorde operations after learning that British and French officials intend to revoke the plane's airworthiness certification.

Aug. 16, 2000

British authorities confirm that the burst tire was the primary cause of the disaster.

Nov. 7, 2001

BA and AF resume Concorde service to New York after reinforcing fuel tanks and installing improved tires.

April 10, 2003

BA and AF announce they are putting their Concorde to rest, blaming rising maintenance costs and low demand.

May 31,2003

Air France's last Concorde flight.

October 24, 2003

British Airways Concorde takes off from New York on its last scheduled passenger flight to London.

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Aircraft Histories

Only 20 Concorde were built, six for development and 14 for commercial service.

These were:

- Ø 2 prototypes
- Ø 2 pre-production aircraft
- Ø 16 production aircraft

Two of the production aircraft did not enter commercial service. Of the 14, which flew commercially, 12 were still in service in April 2003 All but two of these aircraft - a remarkably high percentage for any commercial fleet - are preserved.

Prototypes

- Ø F-WTSS (production designation 001) was the first Concorde to fly, on March 2, 1969, and was retired on arrival at the French Air Museum at Le Bourget Airport on October 19, 1973, having made 397 flights covering 812 hours, of which 255 hours were at supersonic speeds.
- Ø G-BSST (002) was retired when it flew to the Fleet Air Arm Museum at the Royal Naval Air Station Yeovilton (England) on March 4, 1976. It had made 438 flights, of which 196 flights were supersonic.

Pre-Production Aircraft

- Ø Concorde G-AXDN (101) was retired to the Duxford Aviation Museum (England), where it landed on August 20, 1977, having made 269 flights, of which 168 flights were supersonic.
- Ø Concorde F-WTSA (102) made 314 flights (189 supersonic) and was then retired to Orly Airport in Paris on May 20, 1976, where it is on display to the public.

Non-commercial Production Aircraft

- Ø F-WTSB (201) retired in 1979, after flying 754 hours. It is still owned by Aérospatiale and is on display outside their headquarters at Toulouse.
- Ø G-BBDG (202) is owned by British Airways and stored in a hangar at Filton, Bristol. It last flew in December 1981 (having accrued 803 hours) and was occasionally considered for refurbishment to flying condition, but this was deemed too costly. Used as a test bed for recent upgrades, and as a source of spare parts, it is incomplete.

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French Production Aircraft

Air France had seven production aircraft in commercial service:

- Ø F-BTSC (203) was lost in the Paris crash (see above). It featured in the film "Airport '79: The Concorde")
- Ø F-BVFA (205) made its final flight to the Smithsonian's new Air and Space Museum at Washington Dulles International Airport on June 12, 2003.
- Ø F-BVFB (207) was sold for 1 to the Sinsheim Auto & Technik Museum in Germany. It flew to Karlsruhe-Baden–Baden Airpark, in South West Germany on June 24, 2003. After removal of its wings and tail fin, it traveled by barge and road, to join a Tupolev Tu-144 already on exhibit at Sinsheim.
- Ø F-BVFC (209) retired to the Airbus plant at Toulouse, where the French aircraft were constructed, on June 27, 2003, joining 201 and ending Air France's relationship with Concorde.
- Ø F-BVFD (211) was retired early, in 1982, having flown only 5,821 hours. Badly corroded after being stored outdoors, and damaged through use as a source of spare parts, it was broken up in 1994.
- Ø F-BTSD (213) retired to the Air and Space museum at Le Bourget (France) on June 14, 2003, joining 001. In 1996, this aircraft carried a promotional paint scheme for Pepsi.
- Ø F-BVFF (215) remains on display at Charles de Gaulle International Airport in Paris, being cosmetically reassembled.

British Production Aircraft

BA had seven production aircraft in commercial service:

- Ø G-BOAA (206) is destined to go to the National Museum of Flight (run by the National Museums of Scotland), East Fortune, near Edinburgh by road or boat. It was mothballed in August 2000 and is unable to fly.
- Ø G-BOAB (208) remains at Heathrow Airport. It was never modified, and so never flew again after returning home following the Paris crash.

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- Ø G-BOAC (204) The flagship of the fleet (because of its BOAC registration) made its final flight to Manchester Airport (England) viewing park, where a special "glass hangar" will be built for its display, on October 31 2003. Its maiden flight was on February 27 1975.
- Ø G-BOAD (210) departed from Heathrow for the final time on November 10, and flew to JFK airport in New York, from where it was then transferred to the Intrepid Sea-Air-Space Museum, New York, down the Hudson River and past the Statue of Liberty.
- Ø G-BOAE (212) flew to Grantley Adams Airport in Bridgetown, Barbados on November 17, with 70 members of BA staff on board. The flight, lasting less than 4 hours, reached the maximum certified height of 60,000 ft (18,300 m). A new exhibition facility will be constructed to house the aircraft, east of the airport at the old Spencers Plantation.
- Ø G-BOAF (216), the last Concorde to be built, made Concorde's final ever flight to on Wednesday November 26 2003. Departing from Heathrow at 11:30 GMT, it made a last, brief, supersonic flight, carrying 100 BA flight crew, over the Bay of Biscay. It then flew a "lap of honour" above Bristol, passing over Portishead, Clevedon Weston Super Mare, Bristol International Airport and Clifton Suspension Bridge, before landing at Filton, soon after 13:00 GMT. It was met by Prince Andrew, who formally accepted its handover. The aircraft will be the star feature of the Bristol Aviation Heritage Museum (to open 2004) in England. Not originally part of BA's order, G-BOAF was bought by them for 1 FFR in the 1980s.
- Ø G-BOAG (214), the aircraft that flew the final Speedbird 2 service from New York on 24 October, left Heathrow for the final time on November 3 2003. It spent a day "resting" and refuelling in New York before making an unusual supersonic flight (which required special permission) over the uninhabited part of northern Canada, to Seattle, where it will be displayed at the Museum of Flight, alongside the very first Boeing 747 and a BOAC Comet. This Concorde was once used as a source of spares, before being restored using parts from Air France's F-BVFD.

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CONCORDE SPECIFICATIONS

Aircraft Dimensions

| | |
|-------------------------|----------------------------|
| Overall Length | 203 ft 9 ins (62.1 m) |
| Cabin Length | 103.4" (2.63m) |
| Fuselage Diameter | 9' 5" (2.88m) |
| Max. Cabin Width | 77" (1.96m) |
| Height | 40' 0" (12.2m) |
| Elevon Area (Each side) | 172.2 sq. ft (16 sq. mtrs) |
| Track | 25' 4" (7.7m) |

Wing Dimensions

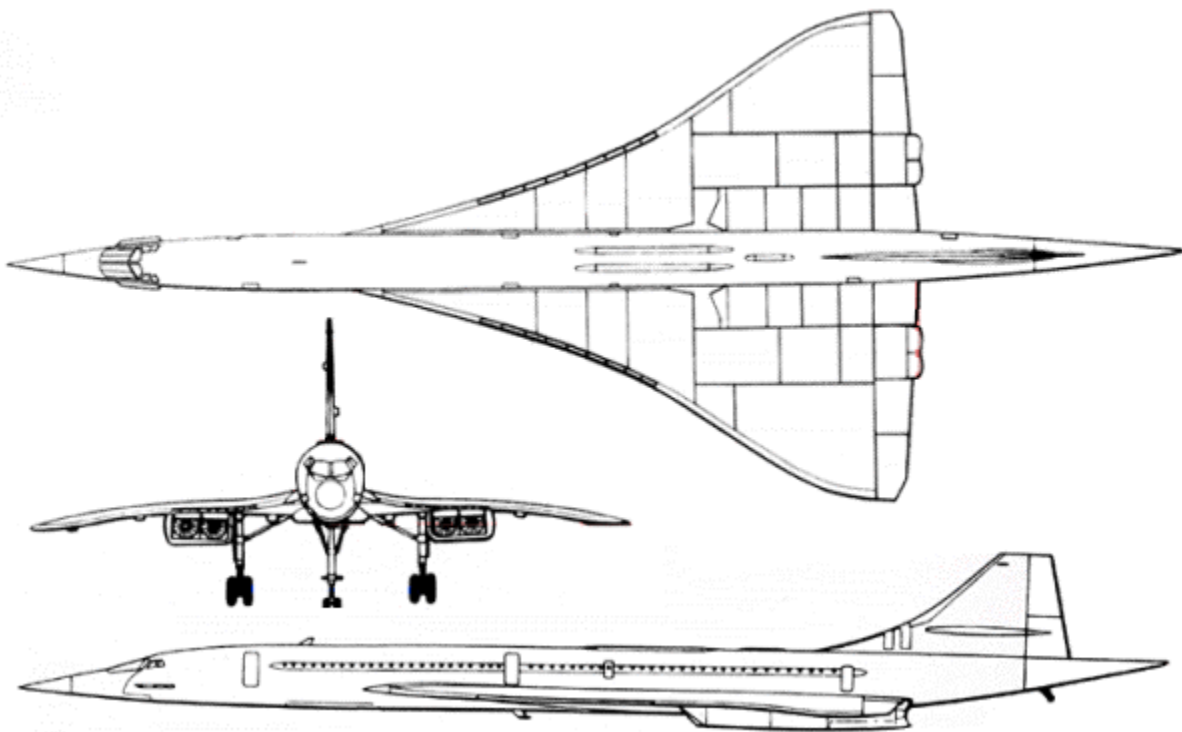
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|--------------------------|--------------------------------|
| Wing Span (geometric) | 83 ft 8 ins (25.5 m) |
| Wing Area (reference) | 3,856 sq. ft (358.25 sq. mtrs) |
| Wing Length (Root Chord) | 90' 9" (27.66m) |

Design weights

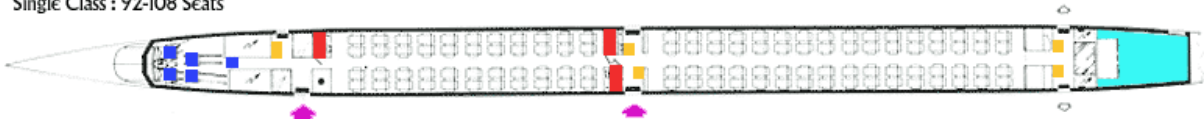
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| Max. Payload Weight | 29,500 lbs (13,380 kgs) |
| Max. Take-off Weight | 408,000 lbs (185 tonnes) |
| Max. Landing Weight | 245,000 lbs (111,130 kgs) |
| Max taxing Weight | 412,000 lbs (186,880 kgs) |
| Max. Zero Fuel Weight | 203,000 lbs (92,080 kgs) |
| Max. Fuel Capacity | 26,286 Imperial gallons (119,500 litres/95,600 kgs) |
| Fuel consumption | 5,638 Imperial gallons (25,629 litres/20,500 kgs) per hour |
| Typical Operating Weight Empty | 173,500 lbs (78,700 kgs) |

Basic Operating Data

| | |
|-----------------------------|---|
| Powerplants | 4 Rolls-Royce/SNECMA Olympus 593s, each producing 38,000 lbs thrust with reheat |
| Thrust Range | 10,000 lbs to 38,050 lbs |
| Typical Seating (one class) | 100 |
| Range | 4500 Miles (3900 NM) |
| Take-off speed | 220 knots (250 mph 400 kph) |
| Cruise Speed | 1,350 mph (2,150 kph/Mach Two), at 60,000 ft (18,181 m) |
| Landing Speed | 187 mph (300 kph) |
| Maximum landing gear speed | 270Kts (Mach 0.7) |
| Maximum visor down speed | 325Kts (Mach 0.8) |



Single Class : 92-108 Seats



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