Mach 2
Concorde magazine

Celebration at Toulouse
Forthcoming French tribute to "le bel oiseau blanc"

Concorde's fuel system
How the fuel provided speed, strength, and stability

Concorde watch
Technical tour of G-BOAC at Manchester

Issue 10
June 2017

Introduction

In this month's issue we focus on Concorde's awe-inspiring technical capabilities. Contributing Editor Nigel Ferris considers the fuel system and the unique way in which it was used to balance as well as power the aircraft. Former BA engineer Pete Comport gives an insight into everyday Concorde operations at Heathrow. We also have an extended "Concorde Watch", courtesy of Filton's Paul Evans, describing his volunteer group's visit to Concorde G-BOAC at Manchester, and giving a view of one of the in-depth technical tours on offer at the museum.

In addition, we have our regular contribution from Captain Christopher Orlebar – this time recalling how he first became involved with flying Concorde.

Finally, we welcome a piece from Cap Avenir Concorde, a French Concorde association based in Toulouse. They kindly invite readers to their forthcoming "Concorde Day" at Toulouse-Blagnac on 25 June.

In this issue

Editor: Katie John

Contributing editor: Nigel Ferris

Cover: French development Concorde F-WTSB being towed to the Aeroscopia museum, Toulouse. Photo: Duch.seb / Wikimedia Commons

Becoming a Concorde pilot

Christopher Orlebar, former Concorde pilot with British Airways

Christopher Orlebar, one of the first Concorde pilots for British Airways, recalls the reasons why he transferred from flying the VC10 and first applied to train as a pilot on this new aircraft – in particular, his curiosity about an airliner that could breach the sound barrier.

Flying in a subsonic airliner such as a Trident or VC10, the danger of even approaching the speed of sound was to be avoided at all costs. Different aerodynamic laws apply as the speed of the aircraft gets close to Mach 1 – the speed of sound. Once the "critical" Mach number has been exceeded, strange things begin to happen.

Stepping up a gear
Concorde G-BOAA waits at a stand at John F. Kennedy airport, with a British Airways 747 and a VC-10. Captain Orlebar transferred from the VC10 to Concorde in 1976.
Photo © The Royal Aeronautical Society (National Aerospace Library) / Mary Evans Picture Library

Exploring the sound barrier

In November 1969 I found myself on a VC10 training flight exploring these phenomena. As the Mach number exceeded 0.94, the nose dropped and the wings rattled as the shock waves killed the lift. Left to its own devices, the VC-10 would have ended up in what the famous test pilot Eric (Winkle) Brown called a "graveyard dive".

How was it that Concorde was not going to suffer from such ills and have a range only just shorter than the VC10? I applied to become a Concorde pilot in to find out. Besides, the subsonics flew at a speed which was too slow to make a seat satisfactory and too fast to make a bunk essential and I did not enjoy long night flights.

Converting to Concorde

I hoped that the chief Concorde training pilot (Captain Norman Todd) would want an instructor of my junior status. I accordingly applied in a letter which I handed to him personally. I feared an immediate rejection. However he glanced at it and then said "We will take you." It was just as easy as that.

At the end of 1975 a great expansion of British Airways was anticipated, so any more senior pilot converting to Concorde would not justify the expense of the course since he would be promoted to captain of a different type (of aircraft) too soon. I could give six years, which was more cost-effective than two. In fact, the expansion was delayed so the more senior pilots could after all have justified the expense of their conversion to Concorde.

So, in May 1976, I watched the Mach meter inch its way into the hitherto prohibited speed range. There was not even a shudder at Mach 1. My career on Concorde went on for ten years – four more than originally envisaged.

In retirement
Concorde and the VC10 are both now retired. Here, Concorde G-BBDG and G-ASIX, a VC10 formerly owned by the Sultan of Oman, are shown on permanent display together at Brooklands Museum in Weybridge, Surrey.
Photo: Katie John

Concorde's fuel system

Contributing Editor Nigel Ferris gives a personal appreciation of another of the marvels of Concorde – the fuel system. He shows the innovative ways in which the fuel was used to regulate the aircraft's temperature and control its centre of gravity as well as to provide power.

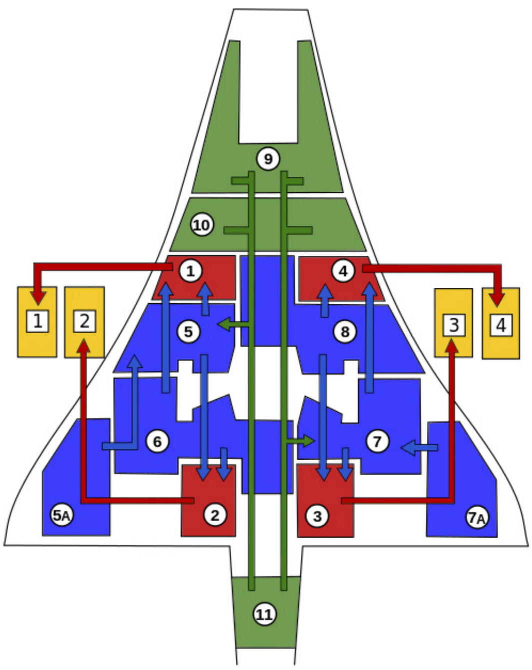
The fuel used for Concorde was normal Jet A1, kerosene (the American word for paraffin), as used in other airliners. Uniquely, though, on Concorde the fuel system served three purposes. As well as supplying the engines, it was used for cooling the airframe and adjusting the centre of gravity during flight.

Cooling the airframe

At supercruise, the compression of the air over the airframe caused kinetic heating, and the length of the aircraft increased by some 8–10 inches. The maximum allowed was 127°C at the pitot tube – temperatures above this figure would require action by the flight crew. The fuel was circulated around the aircraft to act as a heat sink, keeping the airframe temperature within set parameters. (By comparison, the Tu-144 – the Soviet supersonic airliner – had a separate skin cooling system, reportedly very noisy.)

Additionally, the fuel was used to control surplus heat from the air conditioning system, hydraulic systems from the CSDs and the electrical generators on the engines, and from the engine oil – the excess heat was ejected through heat exchangers to the fuel. This warming of the fuel also helped to reduce the possibility of ice forming in the kerosene – certainly at 60,000 feet with the outside air temperature around minus 55°C. It had an added benefit in that the fuel was warmer when injected through the spray nozzles in the engines, thus aiding good combustion. To minimise fuel icing, most modern jet engines use a unit called a fuel oil heat exchanger

Fuel tanks: locations and functions



Fuel storage and flow
The engine supply tanks (shown in red) directly feed the engines (in yellow). The main storage tanks are shown in blue. The trim transfer tanks (in green) have fuel moved between them during flight to adjust the aircraft's centre of gravity.
Artwork: Steal88/Wikimedia Commons

Tank no.	Function
1	Engine supply
2	Engine supply
3	Engine supply
4	Engine supply
5	Main storage
6	Main storage
7	Main storage
8	Main storage
5A	Auxiliary tank
7A	Auxiliary tank
9	Transfer / reserve tank
10	Transfer / reserve tank
11	Transfer / reserve tank

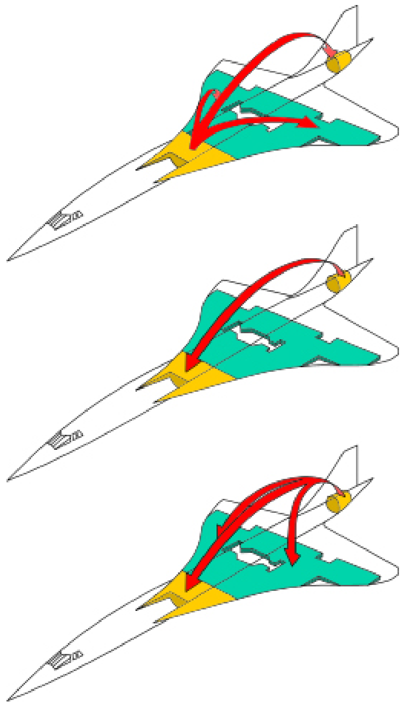
Total fuel capacity:
119,280 litres (26,237 gallons) / 94,470 kg

(FOHE), where the fuel is pumped through the unit, which is heated by the hot engine oil. Concorde, by contrast, needed no FOHEs, which would have added extra weight to the aircraft. This is another instance genius design – use the aircraft's inherent abilities to do the job!

Centre of gravity control

This was probably the most important function apart from powering the aircraft. Other airliners have slats and flaps to increase lift at low speeds, with small movements of the elevators in flight to control trim at cruise. This had not been a realistic option for Concorde, as it would have induced unwanted drag from movement of the flying control surfaces. Concorde had no horizontal stabilisers, being a slender double delta; instead, pitch and roll was controlled by elevons. The inner elevons were very powerful, and were limited to 1 degree of movement up or down, with the outer elevons progressively inhibited as the speed increased. The aircraft also had very sophisticated auto-stabilisation and auto-trim systems, to prevent suicidal control inputs at speed, and to use minimal elevon movements for minor trim control. In addition, though, and uniquely, Concorde was kept in balance by fuel being moved between the fuel tanks in flight, to adjust the centre of gravity (C of G).

Flying at Mach=2.00, a shockwave is propagated at the nose, and dissipates at the tail. (This causes the double 'boom' that is heard on the ground.) This shockwave travels the length of the aircraft, and in doing so affects the centre of pressure (or lift) under the wings, moving it rearwards. This position is now aft of the C of G of the aircraft, which would cause a nose pitch down attitude. So the designers thought – we have an aircraft that would be unbalanced at speed; what can we do to keep it level without using control surface movements? Light bulb moment – let's move the fuel to compensate!



Fuel transfers
These diagrams show how fuel was moved around the aircraft: (top) subsonic flight and transonic acceleration to Mach=2.00; (centre) emergency forward fuel transfer; (bottom) deceleration from Mach=2.00, subsonic flight, taxy, and parking.
Images: Steal88/Wikimedia Commons

Layout of the fuel system

During the design and construction, a large fuel test rig was built at Filton. This replicated the layout of the fuel tanks, and was able to tilt up and down, and sideways, to simulate the effects of attitude, pitch, yaw, roll, acceleration, and deceleration on the transfer of fuel. The use of the rig also influenced the design and positioning of pumps, fuel lines, and valves to facilitate quick and efficient fuel movement. (Further information, and a photograph of the fuel test rig, can be found on page 1969-0427 in the archives of *Flight International* magazine: https://www.flightglobal.com/pdfarchive/1969,pageid_22.html)

On the aircraft, the Flight Engineer's fuel control panel was laid out in roughly the same layout as the tank positions, and enabled him to pump fuel from tank to tank as necessary. The Air Speed Indicator dials on the pilot's panel had 'bugs' around the circumference, which indicated the upper and lower speed limits for any given C of G position (or C of G position for given speed). It was the most vital part of the FE's job to control the C of G position.

Operation

The C of G position on take-off was 53.5% of the length of the wing root chord, and 59% at Mach=2.00. The aircraft had to burn off about two tons of fuel on taxying to the runway – arriving at the take-off point with sufficient fuel for the journey, with a contingency amount for emergencies, or go-around. (This is standard civil aviation practice.)

During flight, the engines were supplied by tanks 1, 2, 3, and 4 (shown in red on our diagram; see opposite page). Tanks 5, 6, 7, and 8, and tanks 5a and 7a, in turn supplied tanks 1 to 4. The fuel in the foremost and rearmost tanks – 9, 10, 11, and 12 – would be moved fore or aft to adjust the C of G.

Fuel from tanks 5a and 7a (the outermost tanks in the wings) was used fairly early on in a flight, as it could become unacceptably hot due to the tanks' large surface area, high skin temperature, and relatively low volume. The fuel would be moved into tanks 5 and 7, respectively, as the aircraft reached M=2. When fuel was being moved from tanks 5a and 7a, aft of the C of G, tanks 1 and 4, forward of the C of G, were run to a low level of about 50%, known as aft trim, to keep the C of G fairly constant. It was possible to move fuel from almost any tank to almost any other during flight (although not into 5a or 7a).

Once the aircraft had landed, again fuel was moved to the forward trim tanks to make sure there was no imbalance during unloading. (A tail-heavy Concorde would be at risk of tipping backwards as a 'tail sitter' –not a good look!)

Concorde engineering operations

Pete Comport, Concorde No 2 shift manager TBB, Heathrow

Former British Airways engineer Pete Comport recalls operations at Concorde's first home, Technical Block B (also the home of Britannia's VC10 and Boeing 707 fleets), from the late 80s up to the mid-90s.

Concorde Engineering was said to be an "airline operating within an airline" because this was no ordinary aircraft. Its maintenance and running required a unique skillset in its teams, not seen before or since. It needed extraordinary knowledge, skills and dedication in the face of complicated cutting edge technology – looking after a thoroughbred was never easy.

How were we organised?

The Licensed engineers, Technician and Maintenance and support personnel were a unique and indispensable team for successful operation of Concorde. This team was organised into small multifunctional units that worked together from the moment an aircraft arrived at its home at LHR, to each and every aircraft's flight maintenance flight testing.

The Concorde engineering structure had 3 rotating double day shifts, each one working 8-hour 'earlies' or 'lates' for 7 days, with a further 3 permanent night shifts.

Each double day shift had 2 shift managers who rotated every 6 months between the heavy maintenance/service check management (every 3 months), and the daily engineering operations control of Concorde's maintenance regime. Every shift manager was a qualified certifying Concorde Engineer.

The shift manager reported in to Manager Concorde, who reported to the Engineering Director. (Note - at one time Concorde engineering reported in to short-haul engineering management, due to the short flight times flown!)

The team required to maintain Concorde's airframe (including the cabin), Olympus engines, and avionics consisted of a team manager (supervisor licensed to certify fit to fly) plus 3 to 5 team members who were qualified to set levels allowing completion of any maintenance task.

A typical shift would comprise 2 Airframe/Engine teams; 2 Avionics teams (consisting of Instrument/Electrical), and one team for cabin, radio, and general maintenance work (towing, servicing, and cleaning the aircraft).

Each of these disciplines needed planning and maintenance task support teams to manage the hundreds, and on regular occasions, thousands, of maintenance tasks completed by the teams prior to the departure of an aircraft.

BAC and Rolls Royce/Snecma supported the fleet with a highly skilled, small group of technical engineers who were in place to help with specific and targeted support.

A shift manager's day

The workload of the manager varied depending on the shift. Early shifts executed the daily operations and set the next day's ops plan. The late shift dealt with receiving and departing ops (BA002/003), maintaining and certifying the aircraft, and re-planning if needed due to flight defect timelines. The night shift's key priority was to execute the plan after all the aircraft returned from the daily operation and review the fleet status for the next day's operation.

The early shift manager's primary duty was to allocate the individual aircraft registration to each of the next day's operations. This decision was based on his assessment of the maintenance requirements, time available to complete the maintenance, and any specific performance requirements. (One of my first jobs was to plan the first round-the-world charter, which required selection of optimal performance for the tour.)

Earlies started at 6.30am, but you arrived at around 6.00am to get a handover from the night shift. You knew you were in good shape if the aircraft was parked nose in to TBB (ready for the ramp collection team to tow to Terminal 4)! Often, you would have the BA 001 (and any early charter – usually UK ops) "in the bag from the night shift".

Your first job would be to allocate the teams to the daily operational departures and complete any outstanding maintenance for the late shift flights (e.g. BA003). Where needed (when the aircraft didn't behave!), the teams followed their allocated aircraft after work had finished in the hangar (you had about 90 minutes back from departure time to get the aircraft serviceable for towing to the terminal).

Occasionally you had a bad day in the office when your supervisor leading the departures had eaten all his stress-busting bananas before the 001 had left – one of our team supervisors had the flight numbers written on each banana!

Such was the challenge of looking after a magnificent icon full of sophisticated engineering that flew 100 people in luxury at 1,450 mph on the edge of space, every day of the year!

Concorde status meetings with the manager/BA ops followed at 8.00am, followed by the process of selecting the aircraft for next day's

operations. These tasks were completed with the help of data provided by planning and the fleet support operative allocated to each shift.

Everyday tasks

The operation was always a very dynamic affair, especially as the shift solely owned all aspects of engineering. A typical day might have:

- Operations across more than one terminal (UK charter operations), which stretched the ability to get support and teams working efficiently.
- The need to turn around the same aircraft from UK charter operations for a later scheduled service, requiring increased logistics support for all.
- Special maintenance requirements for some aircraft, requiring key equipment and tight timelines. (One example was the testing of flying control surfaces following the damaged rudder incident into Sydney in 1989.)
- All these on top of the need to clear the incoming technical and cabin deficiencies reported by the flight and cabin crews. Running /testing the Olympus engines after routine work was often the final task before pick-up by the tow crews.

In the event of any delay, or on the odd occasion IF the aircraft had returned from airborne (when Concorde could make the 6 o'clock news!), managers had to make tactical decisions on staying with the selected operating aircraft or switching to the standby aircraft (if you had one). I once had a delay on the BA001 with the Duke of Westminster on it; Lord King rang to ask me if he should cancel his meeting!

Special jobs

The passenger list was always high-profile, with flights carrying our royal family, government, IMF leaders, and A-list stars being the norm. Concordes in the hangar also often received important visitors. You could be showing the young princes around one day, and a TV and film unit on another – all of them needed hosting to make their special visit just that!

Concorde Engineering managers and their teams would often find that the fruits of their labour were part of the 6 o'clock news – usually for good things! Such examples included the "Phil Collins Live aid flight", a royal traveller, or wrapping Concorde in a giant bow – all in a day's work!

Service check
Concorde G-BOAC undergoing a service check in North Bay, Technical Block B, June 1982.
Photo © Steve Fitzgerald (Wikimedia Commons)

Author's note

I would like to dedicate this article to all those superb engineers whom it was a privilege to work with, especially my fellow BOAC apprentice of 55 years ago, Dave Sutton – an extraordinary engineer with superb Concorde knowledge and commitment, sadly taken from Concorde Engineering during my time running 2 shift.

Concorde watch

Concorde G-BOAC

British production aircraft

Location: Runway Visitor Park, Manchester Airport, UK
Reporter: Paul Evans **Date:** 22 April 2017

Back at our last meeting at Filton on January 21st 2017, I arranged for my group of former Concorde At Filton volunteers to visit G-BOAC at Manchester Airport's Runway Visitor Park, and so the Foxie's Flyers On Tour inaugural event was set for Saturday April 22nd.

Awaiting visitors
Concorde G-BOAC in her hangar, with the Runway Visitor Park restaurant behind.

Aside from my 'A' Team from Filton, three others would also be joining the Filton Posse: Graham Cahill from Heritage Concorde, Ben Lord from SCG, and our good friend Mr Fred Finn.

At 6.00am on April 22nd I set off from Neath to Manchester Airport, where I would be meeting with Fred and Ben at the Marriott for breakfast and a quick catch up. After breakfast I headed to the RVP to meet with Graham, and also James Coombe who had travelled up earlier that morning by train.

We chatted at length about the current situation with Alpha Fox at the new Aerospace Bristol (BACT) facility and the ongoing work at Duxford and Brooklands.

Technical tour of G-BOAC

Our tour of Concorde was booked for 2.00pm. Through John Hepple at the RVP we had arranged a private technical tour, where no part of the aircraft was off limits. At 1.30 we headed into the waiting area to meet our tour guide Geoff. John Hepple would join us on the flight deck.

We all watched the "British Airways Celebrating 27 Years" video, before going in to meet the grand old lady herself, Alpha Charlie. For an aircraft that has been retired nearly 14 years, and that had spent part of that time outside, she really isn't in bad condition at all. Still looking every inch the flagship of the fleet!

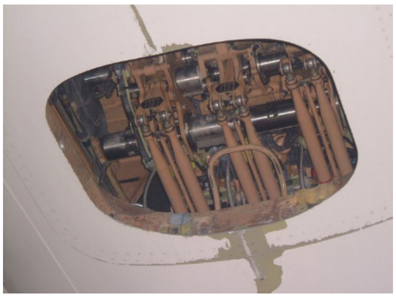
The Technical Tour that Manchester provide is excellent, and goes into enough detail to keep even those who think they know everything about Concorde interested.

Examining the exterior

As with most tours of Concorde, including those we used to conduct at Filton, it started at the front of the aircraft, looking and admiring that beautiful 204ft length from front to back.

The nose and visor mechanism is explained in detail. The visor is lowered into the nose. The nose can be drooped to one of two positions: 5 degrees (for taxying and for take-off), and the fully drooped 12.5 degree position (used during landing, when the nose-high attitude of Concorde requires this lower position so the pilots can see the approaching runway). There is also a standby droop system if the main system fails (operated from the cockpit centre console), and as a last resort if both hydraulic systems fail, a lever can be pulled in the cockpit which releases the mechanical latches, allowing the nose to fall under gravity to the 12.5 degree position.

From the nose and visor, we moved on to the forward fuselage, where a lot of access panels remain open, including those for the forward cargo door, hydraulic resevoir access panels, and the fuel station. The "near zero growth" (NZG) tyres could do with inflating, and although I don't care for the Perspex around the undercarriage it's to stop people damaging the undercarriage when they have events. This keeps the aircraft in A1 condition.



Access panel
One of several access panels in the fuselage that has been left open for visitors to see the interior.

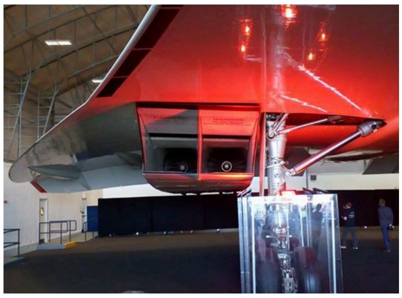
Walking under the beautiful double delta ogival wing we approached the main undercarriage. This area is explained in great detail. The main undercarriage units swing towards each other to be stowed, but due to their great height also need to retract telescopically before swinging to clear each other. The four main wheel tyres on each bogie unit are inflated to 232lb/sq in. The twin-wheel nose undercarriage retracts forwards, and its tyres are inflated to a pressure of 191lb/sq in; the wheel assembly carries a spray deflector to prevent standing water being thrown up into the engine intakes. The tyres are rated to 250 mph.

The starboard nose wheel carries a single disc brake to halt wheel rotation during retraction of the undercarriage. The port nose wheel carries speed generators for the anti-skid braking system, which prevents brake activation until nose and main wheels rotate at the same rate. Additionally, due to the high average take-off speed of 250 miles per hour (400 km/h), Concorde needed upgraded brakes. Like most airliners, Concorde has an anti-skid braking system, a system which prevents the tyres from losing traction when the brakes are applied for greater control during roll-out. The brakes, developed by Dunlop, were the first carbon-based brakes used on an airliner. The use of carbon over equivalent steel brakes provided a weight-saving of 1,200lb (540 kg). Each wheel has multiple discs which are cooled by electric fans. Wheel sensors include brake overload, brake temperature,and tyre deflation. After a typical landing, brake temperatures were around 570–750˚F (300–400˚C). For landing Concorde required a minimum of 6,000 feet (1,800 m) runway length.

From the main undercarriage we moved to Concorde's power plant and air intake system. The Rolls-Royce/Snecma Olympus 593 was an Anglo-French reheated turbojet engine. It was originally a joint project between Bristol Siddeley Engines Ltd (BSEL) (as dear old Clyde would tell everyone at Filton) and Snecma. It was based on the Bristol Siddeley Olympus 22R engine. Rolls Royce acquired BSEL in 1966 during development of the engine, making BSEL the Bristol Engine Division of Rolls-Royce.

As was explained by Geoff, the tour guide, the overall thermal efficiency of the engine in supersonic cruising flight was about 43%, which at the time was the highest figure recorded for any normal thermodynamic machine.

A reheat system was installed to give an additional 20% of thrust for take-off. It was also used for transonic acceleration from just below Mach 1 up to Mach 1.7; the engine "super-cruised" above that speed, and at cruise the thrust through the engine mounts contributed 8% of the thrust from the complete propulsion system.



Intakes and engines
A front view of the starboard wing; the intakes are fully open, with the engines visible inside.

Concorde's intake, designed by Bristol Aircraft Corporation, was a variable geometry and an intake control system that did not compromise the operation of the engine nor the control of the aircraft. Enabling Concorde to cruise supersonically for up to three hours at a time, the intake system really is a marvel of the modern age.

On hitting the front of the variable ramps (Cat Flaps, Mr Ted Talbot!) at 1,350 mph, the air is slowed down by nearly 1,000 mph in just 11 feet inside the intake, before entering the Olympus engine. The unit at super-cruise gave the 63% thrust contribution from the intake part of the propulsion system.

Wing and undercarriage
The sheer beauty of the shape of Concorde' double delta ogival wing, with the dipping twisting camber still gets me every time. The main undercarriage is protected by perspex casing.

Concorde's Air Intake Control System also pioneered the use of digital data highways (multi-plexed data serial buses), which connected the Air Intake Sensor Units that collected aerodynamic data at the nose of the aircraft and sent it to the AICUs. The intake control system had the unique ability to keep the power-plants operating correctly and to aid recovery, whatever the pilots, the aircraft and the atmosphere were doing in combination at the time.

From here we moved to the rear of the aircraft to discuss the propulsion and thrust provided by the variable geometry exhaust nozzle, developed by Snecma. These comprise two "eyelids", which varied their position in the exhaust flow dependent on the flight regime. For example, when fully closed they acted as thrust reversers, aiding deceleration from landing to taxi speed. In the fully open cruise position, together with the engine nozzle, they formed a divergent passage while the engine exhaust ejected or pumped the secondary flow from the intake ramp bleed slot. During cruise at Mach 2.00 each Olympus 593 was producing around 10,000lb of thrust – just "ticking over". In super-cruise this was the most fuel-efficient engine in the skies at the time.

Exhaust nozzles
The rear of the wing, with the exhaust nozzles (centre right of image) set in the "take-off" position.

Cabin machmeter
It was nice to see the Mach displays reproduced in the front cabin on Alpha Charlie, thanks to the efforts of Graham at Heritage Concorde, our own Antoni Basri, and yours truly.

Cabin comforts

At the next stage of the tour we were taken on board Alpha Charlie and given free access to the rear cabin, galleys, wardrobes, etc. Our hosts at the RVP made us feel right at home and very welcome, with no part of the aircraft off limits.

Everyone settled into the £14,000 pairs of Conran seats, fitted as part of the Project Rocket upgrade back in 2001. Due to the premature retirement of the aircraft, only the new seats and carpets were fitted, and just to five of the fleet, the other aircraft being G-BOAD, G-BOAE, G-BOAF and G-BOAG. The other two aircraft, G-BOAA and G-BOAB, were never fitted with the Project Rocket upgrade, although G-BOAB was used to test fit the new washrooms, which would have been installed on the fleet, along with new stainless steel galleys, wardrobes, bulkheads with replacement cabin displays, and a "cool wave" blue lighting system which would have been a wave effect travelling the length of both cabins as the aircraft went through the sound barrier. Personally I feel it's a great shame that the Project Rocket upgrade was not completed, as the end result would have looked amazing (aside from the blue wave lighting).

Luxurious seat
Fred was very much at home in seat 9a (wonder why!) and sharing wonderful stories from his 718 flights.

A fabulous surprise

Now it was time for the big surprise of the day ...

For the past several weeks Heritage Concorde have been working with the RVP to bring the flight deck back to life in a safe, controlled environment WITHOUT using the aircraft's power; I think you'll agree the results are fantastic!

This magnificent work was completed after a process to replace the batteries (which had been removed from Alpha Charlie back in 2003 as part of the decommissioning process) with a 28v supply. This has allowed some of the systems to "come to life". The 28v systems are mainly some warning indicators, along with some lighting, cabin signs, in-flight entertainment and the horn!

A new lease of life
Me on the flight deck. It was a wonderful experience to be on the flight deck of a "live" Concorde, and one that everyone truly appreciated.

The work included removing the panels covering the various electronic systems to reveal Concorde's wiring (Bob White, Antoni Basri and Andy Strange would have loved to have seen this again!) This wiring was all inspected and found to be ok.

To achieve the end result, a full review of all the circuit breakers was undertaken to ensure the correct systems could be activated (ALL circuit breakers were isolated).

It was a wonderful experience to be on the flight deck of a "live" Concorde, it was a fantastic experience and one that everyone truly appreciated and enjoyed.

Thanks and goodbyes

After nearly two hours with Alpha Charlie, it was time to return to the forward cabin, where I also had a small surprise of my own. On behalf of everyone from my team of volunteers, we presented Fred with one of my original photographs I had taken of Alpha Foxtrot at Filton, way back on November 26th 2006, as a thank you for all the help and support he has given to Alpha Foxtrot, the Bristol Aero Collection, and all of us as a team over the years since 2004.

We all gathered on the stairs of Alpha Charlie for a group photo, before John Hepple had one final surprise for us: a tour of the Nimrod. This was a much appreciated addition, and a wonderful insight into yet another unique aircraft.

After we all expressed our thanks for such a wonderful technical tour from our friends at the RVP, especially John Hepple and our guide on the ground Geoff, we headed for The Romper pub, for a few beverages and a good debate about Alpha Foxtrot and what the future holds for the aircraft and each of us, once the new BACT facility opens later this year.

This brought an end to the first and certainly not the last of Foxie's Filton Flyers tours. It was a wonderful day where people from all walks of life, different groups with different views, beliefs and goals were all brought together by Concorde, in much the same way that she was created all those years ago, by having a sense of corporation and ambition to succeed.

Author's note:
Special thanks to John Hepple and Graham Cahill at the RVP for arranging "the surprise" on Alpha Charlie's flight deck and to John for the additional tour of the Nimrod.

All photos by Paul Evans and Graham Cahill.

Runway Visitor Park: *http://book.manchesterairport.co.uk/manweb.nsf/Content/ConcordeViewingPark*

Foxie's Filton Flyers
Andy Strange, Bob White, Nigel Ferris, James Coombe, Antoni Basri, Colin Smith, Graham Cahill, Ben Lord, Fred Finn and myself.

Celebration at Toulouse

We end with a kind invitation from the French association Cap Avenir Concorde, to join them for a special day to commemorate the "Concorde family" at Toulouse/ Blagnac on 25 June.

We at Cap Avenir Concorde, Toulouse, announce that we are organising a small event on Sunday 25th June in the company of all those who wish to share this beautiful day proposed by our association.

We are located near the Aeroscopia Aeronautics Museum, on the site of our friends "Ailes Anciennes" inside the Atelier des Avions, and we present an exceptional, historical, human and industrial heritage.

We aim to evoke one of the most beautiful pages of civil aviation, from November 1962 (with the signing of the Franco-English intergovernmental agreement) to the end of French commercial Concorde flights in May 2003. Our main objective, to maintain the myth that is Concorde, was finally realized more than ten years after an agreement signed with Air France, with the opening of this museum devoted to the "*Bel Oiseau Blanc*" – our "great white bird".

Concorde F-WTSB

Development Concorde F-WTSB is moved into the Aeroscopia museum.
Photo: Duch.seb/Wikimedia Commons

A day for Concorde

After having spent several months working on major works on our "Espace CONCORDE", since February, every Saturday from 2 pm to 6.30 pm we have been welcoming visitors with great success.

Although we are still working on the final layout, the association has decided to honour people who have participated in one way or another in this beautiful supersonic adventure, often in the shadows, so that we can properly represent the "Concorde family". Each area of "Espace CONCORDE" will bear the names of people associated with Concorde, representing each area of Concorde development and operations – from Béatrice Vialle, the only female Concorde pilot in Air France, to Jean-Michel Rougier, Concorde maintenance mechanic from January 1976 to November 2003, Concorde developers André Chaumeton and Camille Combis, and stewardess Nicole Meneveux.

Who are we?

The association "Cap Avenir Concorde" was created in 2004, just after by Air France and British Airways ceased commercial Concorde flights. It continues to maintain the myth of the *Bel Oiseau Blanc*, which will fly from generation to generation.

In 2004, Air France bequeathed to our association a historical heritage of Concorde parts taken from the maintenance stock.

For thirteen years, our association has organized or participated in 37 exhibitions, and scheduled 19 conferences with the test crews of Concorde F-WTSS or pilot crews PNT (pilots) and PNC (hostesses & stewards) of Air France and British Airways. On 1 March 2009, we celebrated the 40th anniversary of the first flight of Concorde F-WTSS; this event took place at the Toulouse-Blagnac business terminal, with Concorde Fox Charlie of Air France on the tarmac outside. In 2012, Concorde maintenance engineers from Cap Avenir Concorde carried out maintenance and restoration work on F-BVFC. Finally, from 28 February–29 May 2016, Cap Avenir Concorde put on an event to commemorate the 40th anniversary of the inaugural Air France Concorde flight on 21 January 1976.

For further information, and to attend the event on 25 June, please contact Monsieur Louis Paulus, President of Cap Avenir Concorde: *contact@capavenirconcorde.com*

Please contact us by June 5 for a reservation in the restaurant and June 12 for transportation. For the meal, there is a charge of 30 euros; please pay by cheque or transfer made out to Cap Avenir Concorde.