Mach 2

Concorde magazine

Concorde50 celebration

G-BOAF returns to life

Concorde watch

News from Orly and Manchester

A transatlantic odyssey

First non-stop Atlantic crossings by F-WTSA

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Introduction

Celebrations are continuing across the Concorde community to mark the 50th anniversary of the prototype's first flight. In this issue we look at the double event held at Filton and Yeovilton on 9 April, the date when the British prototype took to the air. The day ended in spectacular style with a re-born G-BOAF moving her nose; four days later, Alpha Fox repeated the act for the general public.

The next feature revisits a less well known but still momentous occasion in Concorde's history – the transatlantic tour undertaken by Concorde 02 (F-WTSA) in September 1973, in which the aircraft proved beyond doubt that Concorde could fulfil its intended role as a supersonic luxury air service.

The restoration work is still continuing at various Concorde museums, to bring flight deck instruments back to life, improve visitor displays in cabins, and re-activate the famous droop noses. We have news from Sierra Alpha at Orly and from Alpha Charlie at Manchester.

In this issue

Editor: Katie John

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Cover: G-BOAF moves her nose for the first time, Filton, 25 February 2019.

Photo: James Cullingham

Return to Life

This year, the 50th anniversary of Concorde's first flight, has seen some amazing events – most notably, in the UK, the return to life of Concordes G-BOAC and now G-BOAF. In this feature we look at Alpha Fox's first public nose moves since she touched down at Filton on 26 November 2003.

The restoration project for G-BOAF

The project to restore Concorde G-BOAF to life began in November 2017 with a meeting between Lloyd Burnell and other members of the management team at Aerospace Bristol, former British Aircraft Corporation engineers, and Graham Cahill and James Cullingham of restoration group Heritage Concorde. Graham Cahill, head of Heritage Concorde, recalls this first day.

On 27/11/2017 James Cullingham and I met with the managers of Aerospace Bristol to discuss what enhancements could be made to Concorde G-BOAF. The meeting was arranged by a former volunteer team leader for Concorde at Filton, who unfortunately could not attend.

Heritage Concorde offered to help with the work if required but could not take on another full-term project as they were already working on G-AXDN at Duxford and G-BOAC at Manchester. Therefore, they recommended that James be included in the team at Bristol. This was because James has an extremely good track record with restoration on other airframes, including the nose work on G-BBDG at Brooklands Museum.

We have been most impressed with the way James has worked on the restoration of the airframes and it is hats off to him and the guys at Bristol for the great work they have done.

Signs of success

25 February 2019: On the flight deck (below), the nose lever is activated and the "nose down" light comes on. Concorde G-BOAF lowers her nose for the first time since she landed at Filton more than 15 years ago (bottom).
Photos: James Cullingham

The crowning achievement

After more than a year of planning and work, Concorde G-BOAF was ready to take her place as the centrepiece of the commemorative day held at Filton and Yeovilton on 9 April, the 50th anniversary of the first British Concorde flight from Filton.

The day began when more than 150 people gathered at the Aerospace Bristol museum at Filton, from where a cavalcade of Bristol cars and buses took them to the Fleet Air Arm Museum – home of Concorde 002 (G-BSST), who made that first flight exactly 50 years previously.

This event was the highlight of a week-long focus on Concorde at the FAAM, with volunteers giving free talks on the aircraft every day. The guests had lunch at Yeovilton, and a chance to look around 002, before being brought back to Filton.

Royal gala dinner

The day's events culminated with the Concorde50 dinner – a gala dinner at which HRH The Princess Royal (Patron of Aerospace Bristol) was the guest of honour. Captain Les Brodie, who had brought Alpha Fox back to her birthplace 15 years ago, was invited on to the flight deck to lower the nose and activate the landing lights. The process was flawless, with Alpha Fox returning to motion as if she had never been retired.

Professor Iain Gray CBE, former head of Airbus UK and now Chair of Aerospace Bristol, thanked The Princess Royal for attending, and said, "The iconic Concorde was an engineering marvel, developed far ahead of its time by talented engineers working on the cutting-edge of 1960s technology. Through our exhibition, inspiring workshops for schools, and Concorde50 events, it is this spirit of innovation that Aerospace Bristol aims to ignite in the engineers of the next fifty years and beyond, encouraging the young people of today to develop the big ideas of tomorrow."

Katherine Bennett, Senior Vice President Airbus, said: "Concorde has a special place in Airbus's heart and history. Many of its innovations, from electronic flight controls to anti-skid braking systems, helped inform future aircraft designs. We also maintained the aircraft at Filton for more than 10 years after its final flight. To see the aircraft once again at the centre of celebration, helping inspire the next generation of engineers, is fantastic, particularly as we are fast approaching Airbus's own 50-year milestone, which is a celebration of everyone who has the courage to build and improve things."

Further celebrations

Aerospace Bristol will continue its Concorde anniversary celebrations, including talks, tours, and other activities centred on the re-born G-BOAF. The first public nose move took place on 13 April (see following story, page 6), and more recently there was a public nose move conducted by former Concorde captain Colin Morris, on 27 May (Bank Holiday Monday).

For further information on nose moves and other Concorde events at Aerospace Bristol, please visit the museum website: http://aerospacebristol.org

At the Fleet Air Arm Museum at Yeovilton, the "Leading Edge" exhibition is dedicated to the developments that led to the creation of Concorde. For more information on Concorde 002 at the FAAM, please see the museum's web page: https://www.fleetairarm.com/exhibition/leading-edge/4-6.aspx

Bristol cavalcade
Some of the vehicles from the historic Bristol fleet of buses and cars that carried the Concorde50 guests between Filton and Yeovilton.
Photos: Aerospace Bristol

Dazzling performance
The guests at the gala dinner applaud and take photos as Concorde G-BOAF lowers her nose and visor and switches on her landing lights. This perfect display was the outcome of many months of careful work by ordinary men with extraordinary talent and passion for the great white bird. *Photo: Aerospace Bristol*

Support from the Patron
HRH The Princess Royal addresses the guests (above) and speaks to Captain Les Brodie (right), the last pilot to fly Concorde, and the pilot who brought G-BOAF back to life again on this special occasion.
Photos: Aerospace Bristol

A display for the public

Four days after the gala dinner, on 13 April, it was the general public's turn to be delighted by Alpha Fox's return to active life. Mach 2 Contributing Editor Nigel Ferris *was there to witness a sight he thought he would never see again.*

An admirable achievement
G-BOAF performs a nose droop before a gathering of the public - many recording the event for posterity.
Photo: Aerospace Bristol

Let me take you back to a grey, cloudy, rainy, day, November 26th 2003, if you were somewhere in the environs of Bristol or Filton airfield. This was the last day that any Concorde would fly. Ever.

The farewell salute

Thousands of us stood at vantage points around Bristol to witness this poignant event. She was coming home to the place of her birth, and indeed the birthplace of supersonic commercial aviation.

As if pre-ordained, the clouds cleared, blue sky appeared and Concorde came in from the east. She landed – a superb landing by Captain Les Brodie – and slowed, then turned and taxied back down the runway. At various points she turned to the crowds and drooped her nose down and up in salute – including at the eastern end of the runway, where, with hundreds of other fans, I was standing. She made her final powered movement on the turning circle, in front of the waiting dignitaries.

This would be the last time that AF moved her nose in service – a sad day for me. I watched, thinking this could be the last time anything moved on any airframe.

A thrilling rebirth

Within the last few months, Aerospace Bristol revealed that AF was undergoing work to make her nose move again, with volunteers and engineers in the Bristol Aero Collection installing a hydraulic pump, wiring and other modifications. Also in this group was an aerospace engineer, James Cullingham, who has been very much involved with the work to restore nose movement on G-BBGD at Brooklands, G-BOAC at Manchester and G-AXDN at Duxford.

Aerospace Bristol announced that the first public move of the nose would be on 13 April. I attended with some colleagues and friends from Foxies's Filton Fliers. There were to be two moves, at 11.00am and 1.00pm.

At 11.00 am, with a commentary from an Aerospace Bristol employee, a countdown from 10 to 1 was started. James in the cockpit began the operation. The taxi turn lights and marker lights came on, various 'bings' and 'bongs' were heard and lights came on in the cockpit. The visor went down, and the nose went to 5 degrees, and then to 12.5 degrees before returning to supercruise configuration – all of which earned hearty applause!

At 1.00pm, Paul, the only other engineer allowed to operate AF, repeated the operation. When everything was returned to flight position, Paul leaned out of the direct vision window and said "Would you like to see that again?" and to cheers, he did it again.

Overall, it was wonderful to see AF with some life in her. Hopefully, other systems might be moved again – the intake ramps, reverse thrust buckets, elevons, rudder – although these would require a huge amount of work to restore to the correct operating standards.

Congratulations – and concerns

The volunteers, engineers and everybody else concerned with caring for the aircraft around the world are to be highly commended. We must be deeply grateful to them for enabling us once again to see Concorde moving or being lit up and reminding us of her life in service.

At this point, however, I must say what could be called heresy. Apart from the actual nose move, the event was, to my mind, sadly lacking. The presentation included very little history of the aircraft since her birth at Filton. With apologies to all those concerned in doing the work to make the nose move, I felt that Aerospace Bristol treated this event as very similar to a circus, with an animal that has been corralled and trained to perform 'tricks'. I would not want to belittle the achievement, or to see no more happening. My concerns are directed towards the circus owners, not the 'trainers' – who have a deep love and admiration for their charge.

It has been a long journey from Nov 26th 2003. Despite my concerns, it was a very welcome sight after nearly 16 years to at last see AF 'doing her bit'.

Transatlantic Triumph

Mach 2 Editor Katie John *looks back at a milestone for Concorde – the first non-stop transatlantic flights. Forty-six years ago, in 1973, Concorde 02 (F-WTSA) first made the journey that would come to define the Concorde services. In doing so, this aircraft secured a unique place in aviation history.*

Concorde F-WTSA, the fourth Concorde to be built and the second pre-production aircraft, was the first one to be made to the now-familiar Concorde shape and dimensions; as well as the all-glass visor (first seen on his British counterpart, G-AXDN), 02 had the extended tail cone and the secondary nozzles and thrust reverse buckets used on the production aircraft.

Going the distance

F-WTSA made his maiden flight on 10 January 1973 – but the prospect for Concorde was already looking less rosy than it had been when the prototypes appeared. In 1972 British Airways had agreed to take five of the aeroplanes and Air France to take four, but there was little sign of firm orders from other airlines. Worse, in January 1973, the two foremost American airlines, PanAm and TWA, had decided against buying the aircraft.

Nevertheless, Concorde 02 began a series of test flights. On 23 February he made a 6,000-km (3,728-mile) non-stop flight from Toulouse to Iceland and back – slightly longer than the distance between Paris and New York – in just 3 hours 27 minutes. The aircraft, carrying a 28,000-lb payload, landed with

> *"Concorde was perfectly capable of flying the transatlantic routes for which it was intended"*

12 tons of fuel in reserve. On 7 March 02 completed an even longer flight of 6,300 km (3,915 miles) from Toulouse to just beyond Madeira and back; this journey, taking 3 hours 38 minutes, was designed to replicate a flight between Paris and Washington, or between Frankfurt and New York.

These flights showed that Concorde was perfectly capable of flying the transatlantic routes for which the aircraft had been intended from the beginning.

Dual identity
Concorde F-WTSA shows the unique British livery combined with French registration. The aircraft bore Air France livery on the left and British Airways livery on the right-hand side.
Photo: Musée Delta

A VIP appearance

Then, in September 1973, Concorde was given a chance to show its star quality. The new Dallas–Fort Worth Airport was to be inaugurated on 20–23 September, and the former Governor of Texas, John Connally, invited the British and French to send a Concorde to perform a fly-past and landing as part of the celebration. The two nations opted to send their latest model – 02, painted in the livery of Air France on the left-hand side and the new British Airways livery on the right, thus representing both nations at once.

The British and French used this occasion as a sales and promotion exercise to help win orders from Braniff Airlines, based in Texas, and the Venezuelan airline Viasa. Accordingly, they planned a four-stage tour: first from Paris to the Venezuelan capital, Caracas; then from Venezuela to Dallas; then from Dallas to Washington's Dulles International Airport; and finally back across the North Atlantic from Washington to Paris.

Atlantic route
This map shows the route taken by 02 from Paris to Caracas and then to the USA, before returning over the North Atlantic.
Artwork by Katie John

The Atlantic tour

The tour began on 17 September, when 02 left Toulouse for Paris-Orly. The following day he departed from Paris at 09:30 hours, bound for Caracas. The aircraft was carrying passengers including the Chairman of Air France, the Chief Executive of British Airways, and politicians and airline executives from Venezuela.

The journey across the mid-Atlantic took 6 hours 22 minutes in total (including a 44-minute refuelling stop at Las Palmas in the Canary Islands) – about twice the speed of a subsonic airliner. Sierra Alpha carried out a low-altitude pass over Maiquetía Airport before landing at 10:45 hours local time.

The flight from Caracas to Dallas–Fort Worth left on 20 September at 09:00 hours. In addition to his existing passengers, 02 was carrying the president and senior executives of Braniff International, politicians from the USA, Panama, and Peru, and journalists. The flight included a 10-minute farewell pass over Caracas and three low passes over the airfield at Dallas before landing at 11:09 hours.

Awaiting the aircraft were 8,000 invited guests, including 50 ambassadors of various nations. The attendees had the chance to walk through the aircraft at a charity ball that evening. The next day, 02 flew two round trips at Mach 2 over the Gulf of Mexico, carrying US government and Federal Aviation Agency officials, the Mayors of Dallas and Fort Worth, board members and directors of the airport, other notables, and members of the press.

Dallas–Fort Worth held an air show that weekend; Concorde was the centrepiece of the flying displays, which also included a Vulcan and some Harriers. Meanwhile, in Washington, D.C., US President Nixon awarded the Harmon Trophy for achievements in aeronautical science to André Turcat and Brian Trubshaw, the original test pilots for Concorde; awards were also given to Henri Ziegler, head of Aerospatiale, and George Edwards, head of the British Aircraft Corporation.

On the Sunday, after two low-level passes over the air show crowds, 02 left at 14:00 hours for the flight to Washington Dulles. A large, excited crowd welcomed Concorde to the city, with enthusiasts lining the approach roads to the airport to watch 02 arrive. Even

Flight crew

These are the crew members who took 02 on his tour of South and North America.

Captain: Jean Franchi

Co-Pilot: Gilbert Defer

Flight Engineer Officer: Yves Pingret

Chef Steward: Claude Monpoint

Itinerary for the tour

Date	Journey	Distance	Airborne time	Time at supersonic speed
17 Sept	Toulouse to Paris-Orly			
18 Sept	Paris-Orly to Caracas (re-fuelling stop at Las Palmas)	6,615 km (4,110 miles)	5 hr 12 min	3 hr 55 min
20 Sept	Caracas to Dallas–Fort Worth	4,121 km (2,560 miles)	3 hr 09 min	1 hr 48 min
21 Sept	Round trips from Dallas over Gulf of Mexico:			
	Trip 1	2,380 km (1,479 miles)	1 hr 57 min	0 hr 42 min
	Trip 2	2,315 km (1,438 miles)	1 hr 54 min	0 hr 39 min
23 Sept	Dallas–Fort Worth to Washington Dulles	1,885 km (1,171 miles)	2 hr 5 min	N/A
26 Sept	Washington Dulles to Paris-Orly	6,265 km (3,893 miles)	3 hr 33 min	2 hr 42 min
	Paris-Orly to Toulouse			

though this flight was over land and therefore had to be subsonic, Concorde's flight time was still a good 20 minutes faster than the average for subsonic airliners.

The Atlantic tour ended on 26 September with a non-stop flight from Washington to Paris-Orly. This time Sierra Alpha carried 32 passengers with luggage, and 10 crew members (4 on the flight deck, 3 flight test engineers, 3 cabin crew members), in addition to 8 tonnes of test equipment – thus performing the first supersonic passenger flight across the Atlantic. Leaving Washington at 07:46 hours, Concorde Sierra Alpha reached Mach 2 at 08:35 hours, and landed at Orly just 3 hours and 33 minutes after departure.

The next chapter

Sierra Alpha's 13,000-mile transatlantic odyssey had exceeded expectations and proved beyond doubt that the aircraft could perform its intended task perfectly. For the first time Concorde carried passengers at supersonic speed and in an airline-type service, with luxury food and champagne. The aircraft's dazzling performance was the perfect response to its growing number of critics.

Just one month after 02's tour, however, economic catastrophe struck, with the oil crisis triggered by the Arab members of the Organization of Petroleum Exporting Countries (OPEC) in retaliation for US support for Israel in the Arab–Israeli War. This dealt a death knell to any prospect of selling Concorde to other airlines.

However, despite serious misgivings from the politicians, the manufacturers continued with the proving flights. Their persistence finally paid off in spectacular fashion on 21 January 1976, when British Airways Concorde G-BOAA and Air France's F-BVFA simultaneously took off to inaugurate scheduled passenger services (see Mach 2, Jan 2016) – thus opening a unique, and still unparalleled, chapter in civil aviation. It had taken thousands of man-hours and flight hours to reach this point; but it was Concorde 02, F-WTSA, which first showed Concorde as we know the aircraft today.

Visit to Caracas
02 on the ground at Maiquetía Airport, attracting attention from local residents. *Photo: NASA*

Arrival at Dallas
F-WTSA would spend a weekend at Dallas–Fort Worth, participating in the air show held for the inauguration of the airport.
Photo: Arthur Gibson

Eyewitness view
F-WTSA's Air France livery is visible in this photo taken by a spectator at Dallas–Fort Worth, September 1973.
Photo: Zane Adams

A place in history
F-WTSA on display at Musée Delta, at Paris-Orly airport (above). The aircraft was moved there in 1988.
Photo: Musée Delta

Unique paint scheme
F-WTSA has been re-painted in Air France/British Airways colours; the sign on the cabin door (left) indicates his unusual career. More recently, the volunteer team has restored many of the flight deck instruments to working condition.
Photo: Musée Delta

Concorde watch

Concorde F-WTSA

French pre-production aircraft

Location: Musée Delta, near Orly Airport, Paris
Reporter: Athis Aviation-Musée Delta **Date:** 6 May 2019

Since the last update, further improvements have been made to the flight deck and front cabin.

Cockpit

- The Captain's and First Officer's yokes have been re-linked.
- A new hydraulic panel has been made as the original was missing.
- A new air intake panel has been made.
- New instruments have been made, including the cabin pressure, cabin climb, radiameter, and a 3D-printed cabin flow selector.
- All the replica fuel instruments have been upgraded. Ten years ago the original replicas were created with a special paper, but these had become discoloured with age. They have been replaced with replicas made from special PVC to ensure a realistic appearance and a long life.
- 3D-printed surrounds have been created to hold all the engine instruments on the centre panel.

Front cabin

Update of the set-up, with new TVs to replace some old panels, and also Concorde parts on display.

Modern replica instruments

The old replica fuel management instruments have been removed (below left) and replaced (below). The original radiameter (bottom left) has also been replaced (bottom centre). A surround has been made for the hydraulics panel (bottom right).
Photos: Musée Delta

Flight deck
A view of F-WTSA's flight deck, with many of the instruments activated.
Photo: Musée Delta

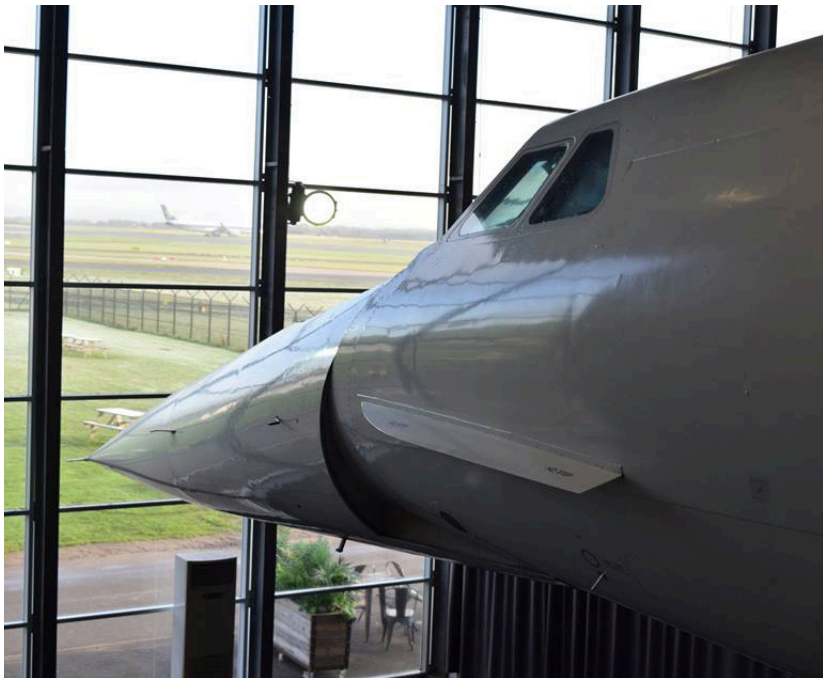
Cabin
The cabin has had a refurbishment, with components put on display and monitors set up.
Photo: Musée Delta

Concorde G-BOAC — British production aircraft

Location: Runway Visitor Park, Manchester, UK
Reporter: Graham Cahill **Date:** 18 May 2019

The team at Heritage Concorde has performed another nose move with G-BOAC. The nose switch has been replaced with a loan unit while the original is being refurbished. Heritage Concorde will now start planning the windscreen replacement and the remainder of the restoration work on this airframe.

As parts fail, Concorde museums will need to repair what they have to maintain the noses in working condition, due to the spares shortage; although we have plenty of oil, we don't have a large stock of spares.



Ready for the next phase
G-BOAC with nose lowered. Now that the mechanism is working, the aircraft will be able to have her broken windshield replaced.
Photo: Heritage Concorde