

# MACH 2

Concorde magazine

Flying into history  
*15 years on from  
Concorde's retirement*

Concorde watch  
*Manchester  
and Duxford*

Touchdown  
*An insight into  
Concorde landings*

Issue 18  
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# INTRODUCTION

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*This extended issue of Mach 2 commemorates a milestone in Concorde's history – the 15th anniversary since Air France and then British Airways retired their Concorde fleets, in 2003. We revisit the end of the French service that May, and remember the final day of service for the British aircraft, on 24 October, ending with the spectacular triple landing at Heathrow.*

*Also in the magazine, Contributing Editor Nigel Ferris looks at Concorde's landing procedure. In addition, we review Supersonic, a new book by LA-based designer Lawrence Azerrad, which gives an unusual view of Concorde as a design icon and a brand ambassador.*

*We end as usual with Concorde Watch, this time from Manchester and Duxford, and featuring a guest article from our fellow enthusiasts at the "Vulcan to the Sky" group.*

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# SWAN SONG

*Fifteen years ago, on 24 October 2003, British Airways retired its Concorde fleet from passenger service. We look back at the farewells to the great white bird here and in France, and revisit the day when three British Concorde landed at Heathrow to bring this era of supersonic air travel to a close.*

**On 10 April 2003, British Airways and Air France both announced that they would be retiring their Concorde fleets by the end of that October.**

Air France gave falling profits and rising maintenance costs as the main reasons for their decision. These issues concerned the British as well, but Lord Marshall, at that time the chairman of British Airways, added that

Airbus was “not willing to support Concorde beyond the end of October”.

Air France retired their fleet first (see below and overleaf), with a final day marked by a send-off from New York and a double landing at Paris Charles de Gaulle. British Airways embarked on an extended “swan song” that lasted for nearly a month, and finished with three Concorde coming in to Heathrow together on 24 October.

## The French fleet retires

*French Concorde services ended on 31 May 2003, with two flights: the last-ever AF001 flight from New York (JFK) back to Charles de Gaulle (CDG), flown by Concorde F-BTSD (Sierra Delta), and a charter flight from CDG around the Bay of Biscay, flown by F-BVFB (Fox Bravo).*

As Sierra Delta prepared to leave JFK, three airport fire trucks sprayed red, white, and blue water in an arch to salute the aircraft. Under the command of Captain Jean-François Michel, Sierra Delta left New York at 08:15 local time. He landed at CDG at 16:30, after a flight of 3 hours 45 minutes. Sierra Delta’s career had spanned almost 25 years, and included setting the world speed records for a commercial airliner flying east-west and west-east; these records still stand today.

Meanwhile, at 16:10 local time, Concorde F-BVFB, commanded by Captain Jean-Louis Châtelain, took off for a 90-minute charter flight around the

Bay of Biscay. The aircraft, carrying 100 Concorde enthusiasts, touched down at 17:35, flying the French tricolor as it taxied to Terminal 2.

The crew and passengers on these aircraft, and the thousands of spectators around the airport, said an emotional farewell to their “*bel oiseau blanc*”. Many had tears in their eyes. The two Concorde dipped their noses in salute to the crowds as they brought the era of Air France Concorde services to an end.

### So long

F-BTSD climbs away from JFK for the last time on 31 May.

Photo: Art Brett/  
[photovation.net](http://photovation.net)



## “Le fin”: the last landing in Paris

Colin Mitchell was one of the founding directors of travel firm Goodwood Travel, which chartered Concorde many times between 1983 and 2003. One of their charter flights turned out to be the last commercial Concorde flight into Paris Charles de Gaulle (CDG). He recalls the excitement of that day.

After the Gonesse tragedy in July 2000 British Airways ceased to operate charter flights, although the aim was to restart them once their whole fleet had been modified towards the end of 2003. Once back in service, Air France was, however, willing to permit charters with one of their modified aircraft on Tuesdays and Saturdays, the two days when their CDG/JFK flights did not operate.

We took advantage of this situation by booking, in cooperation with a French charterer, Air Loisirs, a ‘Channel supersonic’ (known in French as ‘un bouclé’) on available dates until the end of October 2003, bringing our guests to Paris on scheduled flights or Eurostar.

### Last chance to fly

The decision in the spring of 2003 to withdraw the aircraft in October of that year brought a rush of bookings, only to be followed by Air France’s unexpected decision to cease opera-

tions at the end of May. While many people were disappointed as we had to cancel their bookings, we soon realised that we would be fortunate in having an operation on the last day of Air France’s commercial Concorde service: flight AF4332.

Since 31 May was a Saturday, Air France advanced their JFK/CDG flight by a day to bring the last aircraft back to Paris – a little-publicised event, but clearly this was intended to be the last commercial flight; even the president of Air France was on board. We learnt later that the flight had some 20 empty seats – if only we had known!

### The best-made plans?

On the day we received a call from Air France in Paris to inform us that our flight was to depart an hour earlier than planned, with no explanation given. Fortunately we managed to get our guests together and to the airport in time.

As could be expected, there was an even more than normal buzz of excitement in the departure lounge. The Captain, Jean-Louis Châtelain, visited the lounge, while the first officer, Béatrice Vialle (one of only two female Concorde pilots), prepared the aircraft for departure. We learnt at this point that the incoming flight from New York – AF001, operated by F-BTSD – was on the way home and would be landing after us to mark the final operation.

### Telling the tale

Colin Mitchell’s boarding card shows the original departure time for his charter flight; in fact F-BVFB took off an hour late, thus flying into the history books as the last commercial Air France Concorde flight.

Photo: Colin Mitchell

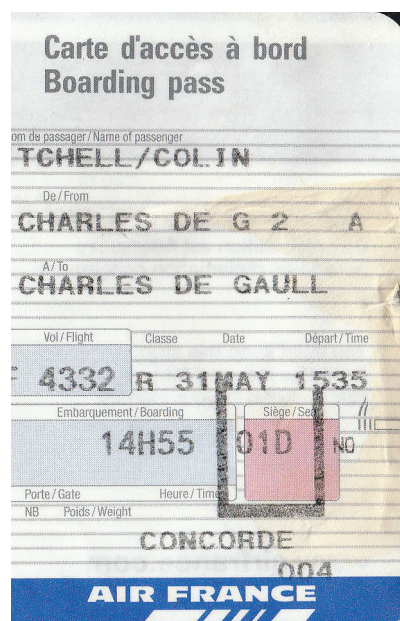
Now we realised why we had been told to depart earlier than normal; that honour was not to be claimed by a mere charter!

F-BVFB was to be our aircraft, and we duly boarded. In spite of the occasion the airport security attempted (mostly in vain) to stop the excited passengers from taking photographs. On board, we could see how much attention our flight was getting from the assembled ground staff. Two engines were started, and we were pushed back.

For what seemed like an age, we waited. Then the dreaded announcement, in French and English, from Captain Châtelain on the flight deck: “There is a problem with our number four engine and we have to return to the ramp.” Surely, of all flights, this would not be cancelled at the last moment?

We all waited, nervous of hearing more bad news. Finally, after about an hour, the announcement came – “The engineers have performed a Formula One maintenance and we are now ready to depart.” We can only suspect that our wily commander, for whom this was his last flight before retirement, had found a way to delay our departure in order to claim the honour of the last commercial landing for himself!

We taxied out. The crowds surrounding the perimeter fence were vast; Tricolours, ‘Concorde Lovers’ and ‘J’aime Concorde’ banners were being waved furiously. The excitement was immense; the flight deck door was open, the Mach meters flickered into life. At the end of the runway the usual pause as final checks were completed – then that incredible surge as the four reheats were lit, the brakes released, and we



raced down the runway and, with a relatively light fuel load and no luggage aboard, made a sensational take-off.

Soon up at over 50,000 feet the usual superb catering and champagne was being offered by the cabin crew, all of whom had bid for this flight; the French Concorde 'brigade' really loved their aircraft and were so proud to be part of this final day. Two by two the guests visited the flight deck and, as usual, were made welcome by the crew. For the benefit of our guests we used to invite retired BA Captain Brian Titchener aboard to provide a commentary in English. Air France were always happy to let him occupy the fourth seat on the flight deck, and the cabin crew delighted in hearing the crisp English accent of 'le Teetch' over the intercom. We cruised at Mach 2, twice the speed of sound.

### Adieu to Paris

The routing out over the Channel approaches was the usual one, but on the return Captain Châtelain had more up his sleeve. Now subsonic, we diverted to fly over Paris, giving the city a last glimpse of the famous 'oiseau blanc', and did a salute to Orly, which had been the original Paris departure airport for Concorde, before heading for Charles de Gaulle and performing a flypast before landing.

Only when the New York aircraft had landed did Captain Châtelain announce that indeed we would be the last flight to land – clearly the New York aircraft would not have had the fuel to stay airborne while Captain Châtelain amused himself and his whole complement of passengers with his sightseeing flight.

By this time I was on the flight deck alongside Michel Thorigny, whose partner we were in the operation of these flights, while those in the cabin were seated and strapped in. There was no call for us to return to our seats, and we stood behind the crew for the landing.

### Flight crew

First Officer Béatrice Vialle and Captain Jean-Louis Châtelain lean out of Fox Bravo's windows to salute the crowd of Concorde admirers. Photo: unknown / alchetrone.com



At the end of the runway we were surrounded by airport vehicles, one hatchback driving in front of us with the rear door up and cameramen filming our progress. As we taxied past the Air France headquarters Captain Châtelain dryly commented that the Air France president was on the balcony watching us taxi in, no doubt with mixed feelings having expected to be on the last flight himself! The flight deck windows were thrown open and the captain and Béatrice leaned out, waving to the crowds. We paused, facing the 'Lovers', and the nose was drooped in a sad salute.

Now the crowds were going crazy, my wife amongst them, many crying openly. Captain Châtelain taxied to the arrival gate and the engines were shut down. The passengers slowly disembarked and then the starboard emergency exit was opened and the crew beckoned us to join them out on the wing for photographs. Everyone waved,

shook hands and wiped back the tears. This was it – LE FIN.

It was not, of course, the last flight of F-BVFB. A few weeks later he (the French Concorde were always referred to as masculine) took off again to fly to Baden-Baden in Germany. There, the wings were removed and he was transported ignominiously down the Rhine by barge, eventually being reassembled and erected on the roof alongside a Russian Tu-144 at Sinsheim Auto & Technik Museum, where he sadly rests to this day.



### On the wing

Top: Colin Mitchell poses for a photograph on Fox Bravo's wing once the passengers have disembarked. Right: Colin (centre) joins the cabin crew for a group photo. Photographs: Colin Mitchell



## The British farewell

*British Airways put together a plan to send Concorde out in style – first with a farewell tour around North America and the UK, then with a final flourish on Friday 24 October. We look back at the staging posts along the way to that last day, and recall the emotion of those final flights.*

### Timeline of the British Airways Concorde tour

*Even at the end of her life in service, Concorde had the ability to surprise and thrill the public. Her farewell tour saw the aircraft set a final speed record and included a send-off from the Queen.*

#### 30 August

The first farewell was to Barbados, with the last scheduled BA Concorde flight leaving Grantley Adams Airport on 30 August. Concorde G-BOAC and her passengers were given a musical send-off from the Royal Barbados Police Band.

#### 1 October

Captain Les Brodie took Concorde G-BOAG to Toronto, Concorde's 50th visit to the city. The journey from Heathrow was 3,800 miles, which Alpha Golf covered in 3 hours 44 minutes. After a reception for the passengers and an overnight stop, Alpha Golf flew subsonically to JFK and then returned to Heathrow.

#### 8 October

Concorde G-BOAD, with Captain Mike Bannister, flew to Boston – setting a record of 3 hours 5 minutes 34 seconds for the east-west transatlantic crossing. (G-BOAD held the record for the fastest west-east Atlantic crossing, with a JFK-LHR flight of 2 hours 52 minutes 59 seconds, set on 7 February 1996, with Captain Leslie Scott.)

#### 14 October

The North American tour ended with a flight to Washington Dulles by G-BOAG. The aircraft was given a water cannon salute, then flew subsonically to JFK to fly the regular BA004 service back to Heathrow.

#### 20 October

The final tour of the UK began with Concorde G-BOAC flying from Heathrow to Birmingham. All of the week's UK flights carried competition winners, who enjoyed a supersonic flight over the Bay of Biscay. Alpha Charlie was also permitted to overfly the airport at 2,500 feet and do a tour over the city centre.

#### 21 October

G-BOAE visited Belfast, taking VIPs and competition winners for flights over the Bay of Biscay.

#### 22 October

Captain Adrian Thompson took G-BOAG to Manchester. On the return to Heathrow, Alpha Golf performed a simultaneous landing with the regular BA002 Concorde flight from New York.

#### 23 October

G-BOAC visited Cardiff (see opposite page). On the same day, G-BOAG left for the last ever BA001 service to New York; HM the Queen had the lights at Windsor Castle switched on to salute the aircraft as Alpha Golf flew overhead.

#### 24 October

G-BOAE visited Edinburgh – the final stop.

### The final BA001

As he prepared G-BOAG for take-off, Captain Adrian Thompson broadcast a farewell to Air Traffic Control and to the crowds of enthusiasts waiting to see Alpha Golf:

"I would like to thank you all, ATC, all the fans at the end of the runway on their airband radios, and to some of the media who have supported this aeroplane over the years, I would like to dedicate this last 001 take-off. But I can say that if this magnificent machine was alive it would be crying supersonic tears tonight."

The tower responded: "Well thanks for that, and we're all sorry up here as well."

Captain Thompson then broadcast the famous countdown as he opened the throttles: "We are rolling ... 3 – 2 – 1 – NOW".

## Concorde visits Cardiff

Paul Evans saw Concorde G-BOAC come to Cardiff Airport on the eve of her retirement. Paul would go on to work as a volunteer leader with G-BOAF at the “Concorde at Filton” exhibit and run the multinational Concorde enthusiasts’ group “Foxye’s Filton Flyers”. He is the author of *The Last Concorde*, about G-BOAF.

The visit to Cardiff by G-BOAC on 23/10/03 was the last leg of the UK farewell tour and marked the final journey of the Flagship of the Flagships – until her flight into retirement on 31/10/03, when she was delivered to Manchester.

### Arrival

I remember the day very well. I arrived at Cardiff Airport around 10.00 am and made my way to the invite-only access to the roof of the airport. Shortly after finding a suitable spot to film the arrival and departure, my attention was drawn to a rumble overhead ... G-BOAC on her way out over the Bristol Channel to the ‘accel point’ and onwards to the Bay of Biscay. She would be arriving back at Cardiff in around 90 minutes.

I vividly remember rechecking that my trusty old Panasonic Camcorder had full battery power and tape and also thinking how quickly I would have to leave Cardiff after she departed and rush to LHR in order to witness the final ever BA001 departure, later that same evening.

### *Still looking like a visitor from the future ...*

The 90 minutes or so passed quickly, and then there she was on final approach – still looking like a visitor from the future (was she REALLY being retired in a little over 24 hours?). Perfect landing, which I managed to film in its entirety, and then she slowly taxied towards the British Airways engineering base at Cardiff, stopping to lower and raise her nose with the flags of the Union



### A tribute to the nation

Concorde G-BOAC, seen from the roof of Cardiff Airport, flies the flags of Wales and the United Kingdom as she taxis around the airport. This would be the aircraft’s final flight in service.

*Photo: Paul Evans*

Jack flying out of one window and my flag, the flag of Wales, out of the other. It all seemed so surreal that this was a sight never to be witnessed again.

### Departure

G-BOAC was on the ground, parked directly outside the British Airways maintenance base, for approximately three hours. As she was parked there, little did I know that in the 15 years following her visit I would meet, become great friends with, and also have as members of Foxye’s Filton Flyers Laurence Keniston – who was cabin crew on the day – and also two chaps on the opposite side of the airport: Richard Chatham and James Coombe. All would become very great friends thanks to this fantastic machine.

All too soon she was taxiing back out to the runway, where Captain Chris Norris would undertake his final Concorde take-off.

I decided to take some photos of her before starting my camcorder to film the take-off. She waited at the end of the runway for several minutes, soaking up the applause and admiration of the crowds – then “3,2,1 now” and she was leaving Wales for the very last time. One final supersonic dash around the Bay of Biscay before returning home to LHR for the last time as a commercial aircraft.

I kept filming until Concorde G-BOAC had disappeared out over the Bristol Channel. Now for the mad dash to Heathrow ... The next day would be filled with excitement and sadness.

## The final day

*Concorde's last day of service began just after 6am in New York. Katie John retraces the events of that day, as the last three flights came home from the USA, the Bay of Biscay, and Edinburgh to Heathrow.*

**In London, the day began at Heathrow with the departure of G-BOAE for Edinburgh at 10:30.**

Alpha Echo, flown by Captain Andy Baillie, went supersonic over the North Sea and came in over Aberdeen, Perth, Stirling, and Captain Baillie's home in Bridge of Allan, arriving at Edinburgh just before mid-day.

### Leaving New York

Meanwhile, Captain Mike Bannister and Senior First Officer Jonathan Napier, with Senior Engineering Officers David Hoyle and Robert Woodcock, were preparing to bring G-BOAG back from New York with a full complement of VIPs.

Their day started just after 06:15 New York time. Captain Bannister gave a statement, saying he was "proud and privileged" to be flying the aircraft, and "thinking of all the people in BA who have kept this plane flying successfully for 27 years". The fire crew at JFK gave Alpha Golf a water cannon salute of red, white, and blue water, and the flight crew waved the US Stars and Stripes and the Union Jack.

The Air Traffic Controller had been the same man who had welcomed the first Concorde to New York in November 1977; he radioed to Concorde, "It's been wonderful working with your aircraft – good luck to all the crews, and we're going to miss you." From Concorde's flight deck came the reply, "It's been great knowing you and we're going to miss you a lot."

The last spectacular take-off, at 07:20 local time, was also watched by American Concorde enthusiasts on the shore of Jamaica Bay. As well as the official news media, the enthusiasts' still and video cameras followed Alpha Golf until she faded into the distance. One enthusiast said, "I was filming it – and I just had to put the camera down and watch it. ... Just beautiful ..." Another admirer said simply, "Just in awe ..."

### Final touchdowns

At 14:20 local time, Alpha Echo, commanded by Captain Chris Norris, departed from Edinburgh to take her passengers on a last supersonic flight. At the same time G-BOAF, with Captain Paul Douglas, left Heathrow to take 100 VIPs and British Airways staff for a supersonic flight around the Bay of Biscay.

As Alpha Golf re-entered UK airspace, Air Traffic Control directed Alpha Echo and Alpha Fox onto their final approach. Alpha Golf made one final loop to overfly Heathrow and London before taking up position as



### Perfect timing

G-BOAE (top), G-BOAF (centre), and G-BOAG (bottom) come in to land just minutes apart.

*Photos: Baz Glenister*





### Close-up view

Airport staff stand by the runway to see Concorde.  
*Photo: Jetinder Sira*

the third aircraft in line. The three aircraft were permitted to fly lower than normal on their final approach to Heathrow, so people in London could have a good view.

At the airport, a stand had been set up opposite the runway, to hold 1,000 spectators – but the airport authority and police had warned ‘unofficial’ spectators to stay away. Nevertheless, they could not stop the crowds that gathered on the roadsides, tops of car parks, and even tops of buildings to see the Concorde come in.

Just after 16:00, G-BOAE touched down. She was followed at 16:03 by G-BOAF, and finally, at 16:05, by G-BOAG. Alpha Golf was taken to the engineering base so that the VIP passengers could disembark. On the way the fire service gave her a water cannon salute; the flight crew, waving flags out of the windows, were rather taken by surprise! Meanwhile, Alpha Echo and Alpha Fox taxied around the airport one last time.



### Back to earth

Crew and passengers disembark for the last time as the sun sets on the Concorde fleet. *Photo: Jetinder Sira*

The day ended with the five in-service Concorde (G-BOAA and G-BOAB had been retired since 2000) positioned for a group photograph, together with the British Airways staff who had worked with the aircraft. So ended 27 years of unparalleled supersonic service.

Further details on the retirement are available at:

<https://www.heritageconcorde.com/concorde-retirement-2003>

<http://www.concordesst.com/retire/diary.html>

<http://www.concorde35mm.co.uk/page47aa.html>

### Lap of honour

Flying the Union Jack, Concorde G-BOAG leads her sister aircraft on a last taxi around the airport for the benefit of their admirers and the world's media.

© Adrian Meredith Photos [www.concordephotos.com](http://www.concordephotos.com)



## Concorde at Edinburgh

*Philip Cairns was one of the British Airways engineers who took care of Concorde G-BOAE on her final trip to Edinburgh, on 24 October. He looks back on a day of combined thrills and emotion.*

I flew to Edinburgh on Thursday 23 October along with Gerry Williams to meet Oscar Alpha Echo coming in from LHR on Friday, on the last day of Concorde commercial services. Gerry and I were there as the engineers assigned to 'turn round' Alpha Echo and to send her back to LHR in time to rendezvous with the other two Concorde coming in to Heathrow from New York and a round the bay charter, respectively.

Everything would need to be ready so we could get the aircraft away on time on Friday, so we arranged for our ramp passes to be ready for us the next morning and checked that we could obtain all that we would require for the 'turnround' – i.e. steps, fuel, tow bar, air starts – and that the ground power was available.

Early on the Friday morning, Gerry and I returned to the airport. At the British Airways desk we found a very helpful ground stewardess who took us through security and down to the engineering office. We re-checked all our arrangements and then waited for the arrival of Concorde Alpha Echo, which was due about 12.00 noon.

### Excitement builds

Tension began to mount as visitors started to arrive to get a glimpse of our wonderful aircraft; people even came into work on their days off just to be involved with the turnaround.

We could see on a computer screen, which showed the flights arriving and departing, that Concorde OAE was nearing her landing time, so Gerry and I made our way to the aircraft stand where our Concorde would eventually arrive.

As we walked past the terminal we were struck by the noise of the



people waiting to see Concorde – there seemed to be thousands on top of the terminal roof. When Concorde Alpha Echo came into view on the landing circuit, a huge cheer went up, increasing the atmosphere and the excitement of this occasion.

I did final checks on ground power and on my tools, while Gerry checked the ground power access steps and ensured that we had some keen helpers to give us a hand. By this time Alpha Echo had disappeared into the distance, to turn onto the flight path for landing.

### Concorde arrives

Concorde Alpha Echo's distinctive profile came onto the flight path for her landing at Edinburgh Airport. All eyes were on her as she would be landing here for the last time; all kinds of cameras were being focused for this unique occasion, and you could hear the crowd's excitement beginning to rise.

The noise of those Olympus engines began to drown out the general hubbub of an airport at work as Alpha Echo made a beautiful land-

### The focus of attention

Crowds of cameras capture Alpha Echo touching down at Edinburgh. Photo: Sandy Young / Alamy

ing and engaged the reverse thrust and her brakes as she decelerated. She then did a tour of the airfield so all who had come to see this mighty machine could feast their eyes on her sleek lines. As always, Concorde did not disappoint; she lowered her famous droop nose several times to salute the public. Eventually Concorde made her way round to the terminal building. As she came to turn onto the stand a huge roar could be heard above the noise of the two engines still running, such was the wonderful support Concorde received in Scotland.

### Work to be done

Alpha Echo came to a halt on the stand, and I plugged my headset in and talked to the flight crew. I said all the usual things: "Chocks in position on the nose wheels, ground power will be with you soon, 4 tonnes of fuel in tank 9, checked, and passenger steps are now in posi-

tion". It was then that Trevor Norcott, the Flight Engineer, said, "As usual, Phil, there is nothing wrong with this aircraft – can you find something wrong that will keep us in Edinburgh a bit longer?". He was only joking, of course, but you could sense the heartfelt passion that all of us had for 'our' Concorde – anything that would keep us in touch with her for just a while longer would be greatly appreciated.

In the meantime, we had work to do. The mighty engines were shut down as the ground power came on. Gerry and I started our checks, the fuel tanker came, and the passengers started to disembark. Loads of people seemed to come from everywhere just to get close to Alpha Echo. We managed to get all the routine checks done whilst the aircraft was being refuelled. Captain Andy Baillie just wanted to stay on the flight deck as it was the last time he would fly Concorde; Andy is a proud Scotsman, and it was fitting that he should bring Concorde into Edinburgh for the last time.

All our inspections on Alpha Echo had proved fruitless; we couldn't find anything out of place or in need of our attention. The fuelling was now finished, so all the paper work needed to be completed. I went up to the flight deck to do this; Andy was still sitting in the Captain's seat as the Flight Engineer checked the fuel load, and I went through the cabin to check for cleanliness and to see if there was anything out of place. All seemed fine, so it was back to the flight deck to tidy up the paper work and prepare for an on-time departure.

Gerry and I found time to have our photographs taken and have a bite to eat. I had another quick walk round and found lots of others doing the same – people who were

### Engineering checks

Gerry Williams (left) and Philip Cairns (right) pause for a photograph while they prepare Alpha Echo for departure. *Photo: Philip Cairns*

really keen to spend as much time with the aircraft as possible.

### Preparing for departure

I went and had a little chat to the push-back crew about the tow bar attachment and how we could get it back on board Alpha Echo after the push-back. The tow bar we were using was not for a Concorde, but with the help of the tow bar attachment you could use a Boeing 707 tow bar.

All the final details were in place. The air start trucks were in position, all panels and doors were closed except for the forward passenger door, the last passengers were boarding, and we would soon be ready for the last commercial push-back.

I put my headset on and called the flight deck. All on the flight deck seemed to be ready for the departure, except that Captain Les Brodie had been signing autographs for lots of people, not many of them passengers – but such was the impact of this occasion that all kinds of enthusiasts wanted a bit of history.

At last, permission was granted to start the engines for the return leg to Heathrow. We already had the air starts running, so within a few moments the inboard engines were running and their noise deafening all conversations. Ground power was disconnected and the push-back team were ready to go.

I asked the flight deck to release the brakes and we were off. We

pushed back to the taxiway. The outboard engines were being started by cross-feeding air from the inboard engines. The push-back team had disconnected the tow bar and were already getting the tow bar attachment back on board the aircraft.

With the attachment stowed, Alpha Echo was ready to taxi away. Captain Les Brodie asked me to remove the nose wheel steering pin and to signal on the left-hand side of the aircraft. This I did, feeling really sad at the same time.

### An emotional moment

I waved the magnificent Alpha Echo on her way and she moved off under the power of those mighty Rolls-Royce Olympus engines. I took my headset off and was amazed to hear a huge cheer from the crowd.

As Gerry and I returned to the terminal, a ground stewardess came over and said that I looked very sad. She gave me a big hug. When we parted we were both crying our eyes out – it was truly very emotional.

By this time Concorde was at the end of the runway. After a few minutes the engines roared at full power, and with the reheat visible she sped down the runway to take off and disappear into the sky.

Our stay in Edinburgh was over. All that remained to do was to say our goodbyes and get on the shuttle back to Heathrow. The memories of this day will stay with me forever.



# Landing Concorde

Nigel Ferris, Contributing Editor, Mach 2

**T**HE UNMISTAKEABLE wing shape of Concorde was designed primarily to be efficient at Mach 2, although there was some compromise to be able to fly at low speeds.

This goal was achieved after many design changes, facilitated by over 5,000 hours of wing tunnel testing, and designers flying paper aeroplanes in their lunchtime (yes, really!) to test which one flew best.

Development work to find the best wing and body shape for a supersonic airliner was carried out at the Royal Aircraft Establishment at Farnborough in the early 1950s. It became clear that a slender delta would have sufficiently low drag for high-speed cruise, and still have good handling characteristics at low speed and on landing. This shape encompassed what is known as the 'finesse ratio' – the ratio of length to width. Therefore, the longer and thinner the aircraft, the better.

## Lift and drag

This wing shape was a complex mix of curves, cambers, angles, and droop. It was described as an 'ogival' shape – that is, like an 'S', curving in and then curving out. In effect, it was a double delta. The ideal angle for a supersonic wing is around 25 degrees. Indeed, the front 'half' of the double delta was at this angle from the aircraft centre line; had this angle been continued down the entire length of the wing chord, she may have been 2 or 3 times longer.

A delta wing will produce good lift, known as vortex lift – with spirals of air passing down the wing. Even at Mach 2, she flew at an angle of attack of 1½ degrees. But this does come at a cost: needing to adopt a fairly high angle of attack on landing, which creates a lot of drag. Not recommended on safety grounds, but put your hand out of

## Landing configuration

Concorde seen with the characteristic drooped nose and angled attitude as she comes in to land.

Photo: Jetinder Sira

a car window when moving, hand level, tilt up slightly, and you will feel the lift and the backward pressure of drag. Therefore, the landing configuration for Concorde was markedly different from that of 'normal' aircraft.

## Powered landing

Concorde employed what is known as a 'powered landing'. Conventional aircraft will adopt a landing attitude with power setting sufficient to maintain at least a minimum safe landing speed (with contingency speed added), dictated by load, runway length, and ambient conditions. They utilise the leading edge slats and trailing flaps to generate a large amount of extra lift by effectively increasing the wing area, allowing a low landing speed. The powered landing on Concorde simply means a higher level of power setting coupled with the angle of attack maintaining the lift.

The aircraft would use the normal systems at the airport, establishing onto the instrument landing system (ILS) under radar control for the final approach and landing. On the landing approach, a high level of power was required to maintain speed, in order for the wings to produce enough lift at low speed. The landing speed was 160 knots indicated air speed (KIAS), 184 mph – take-off speed for a conventional aircraft. Once established on final approach, and with the aircraft correctly trimmed, the elevons would take up a position about 3 degrees down from the horizontal, giving the added bonus of a small amount of 'flap' effect. (Concorde had no high lift devices, slats or flaps, but



the model 'B' would have had three-position leading edge slats.)

The decision height would be set on the radio altimeter. Should there be no visual contact with the runway at decision height (DH), then a go-around was initiated. At DH, if the decision was to land, the aircraft was flown down to a landing. If there was a runway obstruction, or other reason not to land, the handling pilot would commence the go-around.

The engine rating mode was set at 'take off' during approach, and the engine control schedule was set at 'approach'. The positioning of the aircraft created the familiar yet unique view of a graceful swan coming into land. The angle of incidence was about 14 degrees. Factor in the 3-degree glide slope, and the pitch attitude was about 11 degrees.

With the nose drooped to 12½ degrees, the pilots had a good view of the runway. In cross-winds, the technique was to come in with the aircraft crabbing to maintain the centreline. Then, in the flare, rudder input would be used to straighten the aircraft whilst keeping the wings level. The pilots would not want to subject the landing gear to side loads, hence the importance of decrabbing the aircraft in the flare.

Another factor was that at the high angle of attack on landing, the cockpit was well over 20 feet above the runway, which could make the pilot think the aircraft was much further down the runway than it actually was. It was not recommend-

ed to do a coupled approach and then disconnect for a manual landing. In fact the crew would do a reduced-noise approach whenever possible: that is, maintaining 190 knots to 800 feet radar altimeter, then reducing to threshold speed between 800 and 500 feet, progressively raising the nose up to about 11 degrees to stay on the glideslope. The aircraft would then be stable at final approach speed of around 160 knots from 500 feet down to the threshold. A coupled approach (autothrottle [AT] and autopilot [AP] engaged) did not cope with that procedure very well. So, when doing a manual landing, the AP was already disconnected and it was just the AT to disconnect at 40 feet.

### Positive touchdown

As the approach continued to landing, the Flight Engineer would call out the height – measured by radio altimeters under the front fuselage – “50, 40, 30, 20, 15”. When doing a manual landing, the autothrottles should be disengaged at 40 feet and the power at disengagement maintained until reaching 15 feet.

At 15 feet, power was smoothly decreased to idle. As the throttles were closed it was necessary to apply increasing back pressure on the control column to maintain the aircraft attitude prior to touchdown as both ground effect and throttle closure caused a marked nose-down tendency in the aircraft.

Once the main wheels had achieved a positive touchdown (that is, with no bouncing) the nose would be lowered smoothly to touchdown, and then keep straight on the runway centreline. The pilots would initiate braking. Full reverse thrust would be selected; as the reverse thrust buckets were aft of the main wheels, this would cause a nose-up attitude, so full forward stick was selected to counteract this effect. Main wheel braking would be controlled from the toe brakes on the rudder pedals, decelerating the aircraft to taxiing speed to vacate the runway. Watching film of a landing, the elevons can often be seen to be flapping as the pilot kept to the landing parameters.

There was an autoland system fitted, which would control the entire approach and landing and could probably land the aircraft more smoothly. However, I believe the pilots would consider it a point of honour not to use this system, and instead to perform the landing themselves, and still achieve a smooth landing. With the ground effect air cushion, Concorde was a naturally soft-landing aircraft when the pilots got it right – overall, the vast majority of times! The tyre smoke swirling up and around the outer edges of the wings was a good indication of this ground cushion effect in action.

The Captains, First Officers, and Flight Engineers in the Concorde fleet were the elite of British Airways, highly trained and professional, so the landing (and take-off and flying) was second nature.

## Flight crew checklists

### Approach checklist

Cabin crew call – 15 Min.  
 Landing briefing – Updated.  
 Taxi turn lights – On.  
 RAD/INS sws – RAD.  
 Flight deck door sw – Open.  
 Seat belt signs – On.  
 Engine rating mode – Take off.  
 Brake fans – On.  
 Engine recirculating valves – Shut.  
 Engine control schedule – Approach.  
 Engine feed pumps – All on.  
 Cross feed valves – Shut.  
 SSB – As required.  
 Batteries/d.c. split sw – As required.  
 Fuel/weight/CG – Checked.  
 ASI bugs – Update.  
 Seats & harness – Locked, pwr off & sec.  
 Autopilot changeover – Checked.  
 Visor/nose – 5 degrees.  
 Altimeters – QNH set/update.  
 10,000 feet – Landing lights on.  
 Nav 1 – Set ILS frequency.  
 AFCS – Set ILS course in AP1 and AP2.  
 9,000 feet – Alt hold on – set final App Alt/Alt AQC on.  
 Speed – 210 KIAS.  
 AFCS – When ILS active press VOR loc.  
 Visor/nose – down 12 ½ degrees.  
 At Loc intercept – Press land at AF.  
 Speed – 190 KIAS.  
 Approach checklist – Complete.

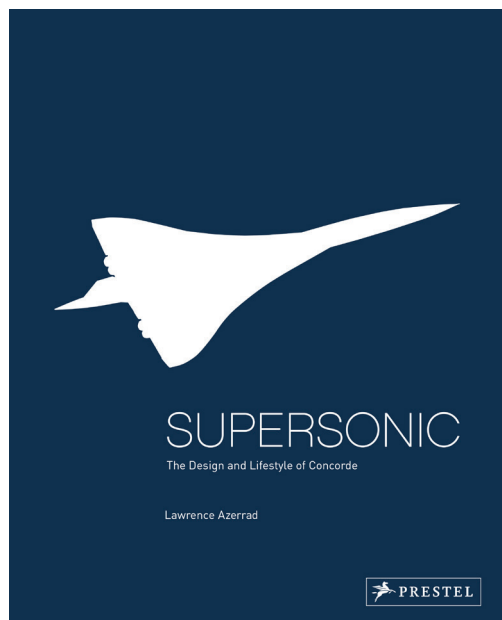
### Landing checklist

At glide slope capture – Gear down – 4 Green.  
 Speed – 170 KIAS.  
 AFCS – When land 2 light is on, AP2 for Auto-land/Land 3 light on.  
 Speed – 160 KIAS.

I finish this piece with my very grateful thanks to Captain John Huthcinson (in that elite group, one of the best Concorde pilots) for verifying and amending this piece where necessary. (A lot!) I have used this quote many times before, but I end with John’s words about Concorde – “In the hands of professionals, the safest aircraft ever to fly.”

## THE FINE ART OF FLYING

*At Mach 2 we are used to seeing Concorde as a masterpiece of aeronautical technology, speed, and beauty. In Supersonic, Grammy-winning graphic designer Lawrence Azerrad, head of Los Angeles-based firm LADesign, considers the aircraft from a different angle – as an icon of industrial aesthetics.*



### SUPERSONIC THE DESIGN AND LIFESTYLE OF CONCORDE

Lawrence Azerrad  
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[www.prestel.com](http://www.prestel.com)

ONCE UPON A TIME, we dreamed of the future. War would end, and humanity would become one people. Poverty and disease would be conquered. Technology would make our lives easier and more exciting than ever before, and perhaps propel us from Earth to visit the stars. Supersonic airliners were one part of this breathtaking vision – situated between the glamour of jet travel and the awesome challenge of spaceflight.

As Lawrence Azerrad shows, Concorde took its place in this dazzling dream, the sweeping curves of its wings forming part of a pattern with the flowing lines of Eero Saarinen's TWA terminal at JFK airport, the UFO-like Theme Building at Los Angeles airport, and Disney's Experimental Prototype Community of Tomorrow (EPCOT), to embody the spirit of curiosity and hope. In his view of the era, "the overall design aesthetic explicitly promised a better world to come".

### Form ever follows function

Azerrad has been smitten by Concorde since childhood, and recalls the thrill of the one flight that he managed to have before the aircraft finally retired. He gives an overview of the airliner's history and operation, from early development to retirement, and touches on Concorde's short-lived supersonic rivals: the Soviet Tu-144 and the various American concepts. He includes contributions from Sir Terence Conran and supermodel Christie Brinkley. The meat of the book, however, is in his aesthetic response to Concorde, and his examination of the aircraft's design legacy.

Azerrad sees Concorde as the ultimate exemplar of the principle set out by the 19th-century American architect Louis Sullivan: "form ever follows function". He has a fellow professional's admiration for what the Concorde designers achieved: "The miracle of Concorde is that its revolutionary, iconic design is purely functional. The physics of the craft informs its shape."

As he notes, however, "The interior design ... was ... at best a secondary concern.

Aeronautically speaking, physics came before pleasure.” Yet those who designed the fittings and accessories to be used on board the aircraft rose to the challenge of matching Concorde’s allure. Everything from the cabin crew uniforms to the seats and bathrooms, dinner services, and luggage tags echoed Concorde’s clean lines, understated luxury, and intriguing shape. The accessories became so widely admired that some passengers, most famously Andy Warhol, stole pieces as keepsakes.

## Shaping an identity

The author describes how the promoters of Concorde pioneered the art of creating a visual identity for a brand. The task was made all the more satisfying as the aircraft lent itself to graphic elegance and cutting-edge design. He sets Concorde in a context of visual signifiers of optimism for the future – the acute-angled glyphs and clean, sans-serif typography, and everywhere the ogival curves of that sinuous double-delta. His photographs of the changing cabin layouts and souvenirs show how advertisers and designers played on the creative tension between sober national tradition and cutting-edge technology.

Airlines expressed the Concorde experience in various ways, from the muted chic of Air France’s grey-and-beige decor to the sumptuous yet ingenious cabin created for BA by Sir Terence Conran. The themes were continued in the Concorde lounges at Heathrow, Charles de Gaulle, and JFK, which radiated that unique ambience of prestige. Azerrad also touches on the range of Concorde-themed gifts that the airlines gave departing passengers, as mementos of their flight and reminders of this iconic brand.

Azerrad sets Concorde in a 1970s context of jet-set progress. The picture created by airlines and advertising agencies was of a world in which suave businessmen and glamorous women rubbed shoulders with supermodels and screen icons, rock stars and royalty.

Not only the airlines but their host nations, Britain and France, adopted Concorde as an icon. They recognised the supersonic aircraft as a global ambassador. It enabled them to present themselves to the world to stunning effect – conveying an aura of timeless British style with French panache, as Azerrad illustrates with the smart simplicity of Landor Associates’ “speedwing” and Roger Escoffon’s typeface for Air France.



### Royal Mail stamps

A sheet of British Royal Mail 4d (4 old pence) stamps, 1960s.

© Collection of Lawrence Azerrad

More surprisingly, given the aircraft’s elitist aura, the British and French people took Concorde to their hearts: “Concorde’s signature form aroused the sort of fandom unimaginable for a typical (i.e. economical) subsonic commercial airliner.” The legions of fans are still in evidence today, at aviation museums and air shows, and on the internet, and Concorde memorabilia still attract enthusiastic bidders and buyers.

There are one or two slips that I noticed as a Concorde obsessive – for example, the French Concorde F-WTSC, pictured on p.64, was part of the Air France fleet, not a “preproduction Concorde” as stated in the caption, and this particular aircraft had not yet been built in 1969 – but overall, this is an absorbing and visually enjoyable book. The elegant square format, high-quality paper, clean sans-serif type, and crisp images neatly echo Concorde’s dual character – retro and futuristic at the same time. Sir Terence Conran, in the foreword, defines Concorde as “the single most important piece of design in my long lifetime”, and in Lawrence Azerrad’s book, this aircraft is presented in a way that befits its lasting charisma.



## CONCORDE WATCH

### Concorde G-BOAC

### British production aircraft

**Location:** Runway Visitor Park, Manchester, UK

**Reporter:** Richard Clarke **Date:** 3 August 2018

Grey skies and rain greeted the visitors from Vulcan to the Sky as we arrived at the Runway Visitor Park at Manchester Airport - a phenomenon we had not seen in the south of the country for many weeks!

The visit bought back some nostalgic memories for me because I was lucky enough to be at the airport in November 2003 when Concorde G-BOAC arrived, having completed her final flight in the colours and employ of British Airways. The objective then was that she would become a major attraction in an expanded visitor centre - a goal that has now certainly come to fruition.

One of the big attractions to visitors is the raised viewing area, which is adjacent to the main taxiway and therefore provides a panoramic view of the airport, affording an excellent view of aircraft departing and arriving - of which there were many, with a huge variety of different airlines from around the world. The highlight was the chance to see the incredible Emirates A380 arriving and departing. When this huge aircraft took off, she seemed to hang in the sky before disappearing through the low cloud.

#### Tour of the Park

The Visitor Park has changed and expanded considerably in the ensuing years and makes for a very impressive sight, with the Concorde

#### A breathtaking sight

Members of the "Vulcan to the Sky" group admire Concorde G-BOAC before touring the cabin and flight deck. *Photo: Richard Clarke*

Exhibition Hall being the centre-piece of the attraction. The Park houses a striking collection of aircraft and we were to be given a VIP tour of each one of them, with the culmination being the opportunity to board Concorde.

The tour started with the British Airways Trident, which included a tour of the flight deck; as this had not been visited by members of the public before, it was a real honour for us to be the first party to do so. The aircraft was used extensively by British European Airways on a variety of routes to the European mainland before BEA was merged with BOAC to form British Airways.

The next aircraft was a complete contrast: the ex-RAF Nimrod XV231, which had been flown in from RAF Lossiemouth and had served as a Maritime Reconnaissance aircraft during her years of military service. The aircraft had a remarkable record of hunting down Soviet submarines to the north of the UK and for its ability to carry

out missions that required long endurance. The aircraft has been impressively maintained in exactly the same way that she would have appeared in RAF service, with a wide array of radar and other electronic devices in place, which had enabled her to carry out her vital role.

The external tour of the Park concluded with a visit to the cockpit and forward section of the DC10, which had been converted into a classroom setting with presentation facilities and now attracts regular visits from schools as a part of the Science, Technology, Engineering and Maths (STEM) programme that the Park operates.

#### Concorde

The highlight of the tour then arrived with the chance to see Concorde at close quarters in her highly impressive Exhibition Hall. As we entered the facility it was breathtaking to see the aircraft standing in splendid isolation high above us, still looking futuristic and as though she





had just arrived from the production line, with the beautiful clean lines of the fuselage and wings a fitting tribute to her design.

It was a real privilege to be able to sit in the plush leather seats in the main passenger cabin and to see the live 'Mach meter' depicting the height of the aircraft and her acceleration to twice the speed of sound.

Then came the opportunity to visit the flight deck, and the chance to sit in the left-hand seat usually occupied by the Captain of the aircraft, which must have been an ambition shared by many people and now available to visitors to the Park. As you would expect it was quite compact by comparison with the other aircraft in the collection, but this of course is the consequence of the design requirements for a sleek fuselage to enable supersonic flight.

This was a highly enjoyable and informative visit with the time pass-

### Flight deck

Group members enjoyed an in-depth personal tour of the flight deck.

*Photo: Richard Clarke*

ing by extremely quickly. John Hepple and the team of visitor guides were highly knowledgeable, with many interesting and humorous anecdotes and an obvious pride in the aircraft that they were presenting to us. Many thanks to all of them for the hospitality that was extended to us, and we certainly intend to visit the Park again in the future.



For further information about the Runway Visitor Park and G-BOAC, see the RVP website: <http://book.manchesterairport.co.uk/manweb.nsf/Content/ConcordeAircraft>

## Vulcan to the Sky

Mach 2 magazine thanks Vulcan to the Sky for allowing us to reproduce this article from their news feed. This special access tour was just one of many aviation and engineering-related events organised by the Vulcan to the Sky Trust. For updates on their work with aviation heritage and to sign up for free newsletters, visit the website: <http://www.vulcantothesky.org/home.html>

## Concorde G-AXDN

### British pre-production aircraft

**Location:** Imperial War Museum, Duxford, UK

**Reporter:** Katie John

**Date:** 18 August 2018

On 18 August the Duxford Aviation Society (DAS) hosted an inter-group meeting that included former British Airways Concorde engineers (BA); volunteers from the Concorde exhibits at Brooklands Museum (BM) and from the Runway Visitors' Park (RVP), Manchester; former volunteers from the Concorde at Filton (CAF) centre; and representatives of Heritage Concorde (HC) and Mach 2 magazine. The aim was to gather ideas for a new technical tour of Concorde 101 (G-AXDN).

### Planning

Chrissie Eaves-Walton, DAS Director of Marketing and Communications, presented a plan that DAS had created, with information boards on Concorde's shape,

structure, flight deck, droop nose, undercarriage, and power plant. She invited further suggestions from those present.

A sample tour was planned for that afternoon. The tour was divided into three areas: outside of the aircraft, underside, and interior – with visitors divided into groups for each area. The meeting went through the details that would be covered in each tour – from the development pitot tube on the nose to the 'bonkers' on the aircraft's tail.

Graham Cahill, head of HC, mentioned the decorations on G-AXDN's side, commemorating the tests: 'Miss Moses Lake', for the icing tests in Maine, USA, and the 'clockwork tangerine' for the flight tests at Tangiers. Further fascinating

facts were included – for example, that this aircraft achieved the fastest speed of any Concorde, but production aircraft 208 (G-BOAB) reached the highest altitude (68,000 ft) and made the longest continuous flight (New York to Nice, France).

Paul Evans (team leader, CAF) explained to the DAS team that CAF would tailor their talks to suit different kinds of visitors (technically curious people, schoolchildren, general public). For example, for children, the volunteers would say that Concorde had been designed on paper, with no calculators. Peter (volunteer from RVP) said that one of Manchester's young visitors had observed to him, "If you stand Concorde on its tail, it would look like the Space Shuttle".

More technical points were raised as well. One DAS volunteer asked about fuel burn; he was told that Concorde would carry 95 tonnes, but had to land with at least 20 tonnes still on board. In supercruise, Concorde burned 18 tonnes of fuel per hour, compared to the Airbus A380, which burns 14.5 tonnes per hour. Fuel use in supercruise was highly efficient – the action of the air intakes in slowing and compressing the air meant that there was no need to use the reheats. John Dunlevy said that Concorde never flew level as this would overheat the skin; instead, the aircraft would ascend and then descend in a giant parabola during the flight.

For the interior, the most obvious topic to cover was the equipment and procedures for the test flights, including the ‘ice desk’ with its monitors and the stations with their computers, as well as the escape hatch under the fuselage in case the crew ever needed to ‘abandon ship’. Another notable feature, raised by Graham, is that G-AXDN has no baggage areas or galleys. (She also has no toilets!)

DAS asked for details about the icing trials conducted with the aircraft. John Dunlevy said that the trials were done to identify any circumstances in which ice might build up on Concorde’s wings. Flying through ice-bearing clouds – even in places such as Singapore – would generate ice, but the ice build-up could be prevented or dispelled by heater maps/strips in the wings. He said that the underside of the wings was more vulnerable to ice build-up than the top – hence the numbered black panels, so observers on board could identify the areas of build-up during the flight.

Further planning issues were covered, such as safety, advice for allowing visitors to take photographs, letting people on to the flight deck, and keeping to schedule.

### The inter-group tour

There were more than 20 visitors for the afternoon’s tour. We were joined by former British Airways Concorde pilot John Hutchinson, former BA Concorde engineer Pete Comport, and an engineer who had worked on G-AXDN during the testing in Tangiers. The technical information that these guests recalled was a welcome addition to the detailed presentation from the guides.

The DAS volunteers were assisted for this occasion by the Heritage Concorde team, which included former BA Concorde engineers, and by the volunteers and former volunteers from the Concorde exhibits at Brooklands, Manchester, and Filton – some of whom relished the chance to get back ‘in harness’ again!

Between the regular guides, the guest volunteers, and our visiting experts, we were treated to a thorough examination of G-AXDN, from the tip of her pitot tube to the end of her tail. The mixture of technical detail and first-hand recollections made for a fascinating experience, and having the aircraft to ourselves to explore added to the enjoyment.

The tour ended with John Dunlevy carrying out a nose move,

accompanied by commentary from DAS volunteer David Norman. G-AXDN is currently the only Concorde that does regular nose moves; F-BTSD at Le Bourget and G-BBDG at Brooklands can also have the noses moved, but this is not regularly done (although Brooklands is planning nose-move events in the near future).

Inter-group meetings such as this one are becoming an increasingly important element of Concorde restoration and maintenance work. It was an invaluable chance for Concorde experts and guides to share details and experiences about working with Concorde itself, and on presenting the aircraft to visitors. While this collaboration continues, the reservoir of knowledge about the aircraft – an intangible but unique national asset – is being conserved and enlarged, so Concorde lives on.

For more information on the restoration work at Duxford, see the following websites:

- <http://das.org.uk/aerospatiale-british-aerospace-concorde-101-g-axdn/>
- <https://www.heritageconcorde.com/latestnews>

### G-AXDN 360° tour

The Duxford Aviation Society has created an app enabling users to enjoy a virtual tour of their Concorde’s exterior, cabin, and flight deck. The app also includes in-depth information on the systems, plus videos of G-AXDN’s arrival at Duxford and of a nose move. For further information, and to purchase the app, visit the web page:

<http://das.org.uk/das-launches-concorde-360-pano-tour/>