

MACH 2

Concorde magazine

Concorde watch
*Spectacular news from
Manchester*

Winter sun
*The Barbados
Concorde service*

The American
experience
Concorde and Braniff

Issue 20
February 2019

INTRODUCTION

In this issue we feature two of the less well-known chapters in Concorde's history. First, we recall British Airways' winter service to Barbados – pleasure for the passengers, but a feat of endurance for the aircraft, which had to cover almost 4,200 miles (6,750 km). We look at the clever "hack" that flight engineer Ian Kirby devised to make the non-stop journey possible.

Next we look back at a short but unique episode – the three-way alliance between BA, Air France, and US airline Braniff in 1979–80. This period saw Concorde operated by American flight crews! We have pleasure in hearing from one of the original Braniff crew members who flew our great white bird.

Nigel Ferris poses a question to ground engineer Philip Cairns on the procedure for engine changes, and Philip describes the process in detail.

Finally, in Concorde Watch, we have amazing news from the Runway Visitors Park, Manchester, home of Concorde G-BOAC. Graham Cahill of Heritage Concorde describes how his team has brought Alpha Charlie's nose back to working order.

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Concorde and the Yellow Wagtail

George Blundell-Pound, former Commercial Manager Concorde for British Airways

Guest contributor George Blundell-Pound looks back on the notable success of British Airways' service to Barbados – which grew from an occasional charter flight to a scheduled service that lasted from 1987 to 2003.



A life with Concorde

The author, former Concorde Commercial Manager for BA, now works as a volunteer with Concorde G-BBDG at Brooklands Museum.

Photo: George Blundell-Pound

not long after it had entered scheduled service on 21 January 1976. Towards the end of 1977, Her Majesty Queen Elizabeth was coming to the end of her Silver Jubilee Tour of the Caribbean, which had mainly been aboard the Royal Yacht *Britannia* and was due to end in Barbados. She then flew on BA Concorde G-BOAE back to London on 2 November 1977 with Captain Brian Walpole in command. So any subsequent Concorde flights to Barbados

'The Osprey, the Swift and the Yellow Wagtail are not the only birds flying south this Winter.'

THESE words appeared on advertisements in some fine UK magazines announcing the launch of BA's Concorde scheduled services to Barbados, to begin on Saturday 12 December 1987.

The combination of the supersonic aircraft and arguably a matching destination in the Caribbean seemed likely to be a success, and so of course it was. Incidentally, the advertisement prompted a call from the office of the BA Chairman (Lord King of Wartnaby). Evidently his wife had seen the advertisement and wondered whether the Yellow Wagtail did indeed migrate in the winter. A number of hasty phone calls to the advertising agency established that it did – and that small panic was over!

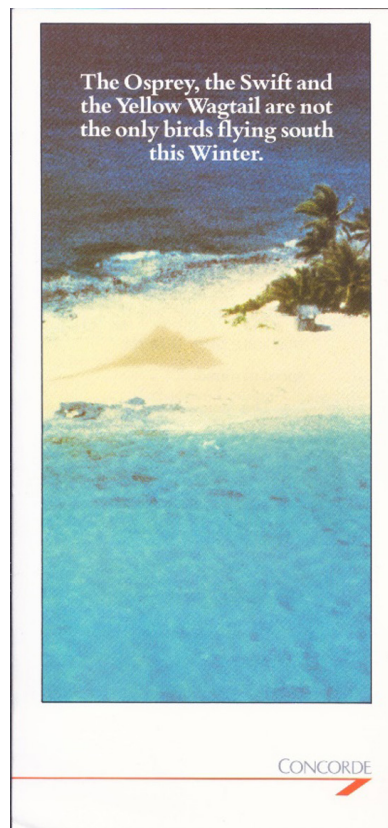
Royal approval

However, it wasn't the first time Concorde had been to Barbados. The airliner's first visit took place

A tempting advertisement

The original advertisement promoting Concorde and Barbados, marking the start of the scheduled services.

Source: George Blundell-Pound



From one Queen to another

November 1977: the Queen and the Duke of Edinburgh, on the deck of *Britannia*, wave to Concorde G-BOAE on her way into Barbados.

Photo supplied by David Macdonald

could be said to have enjoyed an implied Royal seal of approval.

Concorde spreads her wings

There was then a little gap in Concorde's love affair with Barbados until 1984. In the early 1980s the growth of demand for Concorde charters led to the creation of a new role within BA, Concorde Marketing Executive, for which I was successfully interviewed and which I started in November 1982.

I was lucky to enjoy a magical personal involvement with the aeroplane in various subsequent roles, which lasted for eight years. At the time the growth in charters was being driven by Cunard and Goodwood Travel. In the main in Cunard's case, this was focussed on New York and combining the opportunities to cross the Atlantic on both Concorde and the *QE2*. Cunard also chartered Concorde in connection with the Round the World cruise of the *QE2* every year, which led to the aircraft going to Hong Kong, Mombasa, Cape Town, and Rio de Janeiro amongst many

other places. Alongside Cunard, Goodwood Travel had developed their Flights of Fantasy programme, which took the aircraft to a huge number of destinations on imaginative packages to places like Rovaniemi (Santa Claus), Moscow (Bolshoi Ballet), Vienna (New Year's Eve Imperial Ball), and even round the world.

During this period, when it seemed that any travel organisation was thinking of how to include Concorde in their programmes, we were asked by Caribbean Connection and subsequently Elegant Resorts and Kuoni to consider Barbados. In those days the fact that the aircraft would have to make a technical refuelling stop en route, in the Azores, seemed to marginalise Concorde's primary selling points: speed and saving time. However, that first charter flight took place on 25 February 1984 and was a success. The desire to fly on Concorde to Barbados clearly compensated for the stop. Indeed, some passengers said that you got two take-offs instead of just the one!

The following year the competition between the travel organisations mentioned led to something of an auction as they were all bidding for the prime dates either side of

"You got two take-offs instead of just the one!"

Christmas and then again through February and early March. So it continued until during 1987 we received a call in the Concorde office from Jim Harris (then BA's Marketing Director). BA customers were complaining to him that, if they wanted to get to Barbados on Concorde, they couldn't do that with BA and had to do so using an independent travel company. The word was that we should investigate the possibility of a scheduled service to Barbados. Such encouragement

from on high tends to concentrate the minds of everyone – not least a junior cog such as myself.

Scheduled flights begin

It didn't take too long to put the business case together, and it was accepted. The first scheduled flight was to be on 12 December 1987.

After some investigation it appeared that if the fuel stop was in Shannon, Ireland, BA would be able to sell seats from Ireland to Barbados, and so the initial routing was via Shannon, although the flights back to the UK continued to come back direct. A useful few passengers took up the chance to fly from Shannon. The schedule involved leaving Heathrow at 09:05, departing Shannon at 11:15, and arriving in Barbados at 11:10. On the return, the schedule was leaving Barbados at 13:15 and arriving at Heathrow at 21:30. The fact that the return was the only "daylight" flight to London was another sales bonus.

The inaugural flight went well, the only blot being that there was a very high no-show rate on what was expected to be a full aircraft. There was another phone call from the Marketing Director's office to concentrate our minds again.

I recall shortly afterwards getting a call from the General Manager of Sandy Lane, one of the very special hotels on Barbados' west coast. He was less than impressed. The Concorde passengers were arriving much earlier than they did on either BA's Boeing B747s or British West Indian Airways' Tristars! More importantly, a large group had been anticipated to arrive on Concorde and had reserved suites at the hotel, and why hadn't we made sure they had come? He had assumed that, as they were coming on Concorde, they would. I had to explain that Concorde tickets had no cancellation fees and so we were as disappointed as he was. Worse still, he told me that a fellow hotel General Manager in Switzerland had been happy to



Commemorative stamp

This stamp, featuring two Concorde at Grantley Adams airport, commemorates the 50th anniversary of the start of aviation in Barbados, and illustrates Concorde's importance to the island. Source: George Blundell-Pound

share with him that the party had decided at short notice to go skiing and were staying at *his* hotel!

Fine-tuning the route

The following year the service operated every Saturday from 3 December 1988 through to 25 March 1989, with extra flights on Sundays and Wednesdays either side of Christmas. The combination of Concorde and Barbados was proving to be a substantial success, almost eclipsing the revenues from charters.

Considerable efforts were made to improve the efficiencies of flight-planning the services to Barbados: especially, seeking to eliminate the refuelling stop outbound. Lisbon had been tried in place of Shannon. In the end, a Concorde Flight Engineer, Ian Kirby, developed an outstanding piece of software (see p.7) which made the decision of whether to go direct or not easier and if going direct, to safely manage fuel consumption and the decision (if required) to divert.

These diversions became less and less as experience was gained and so the schedules were further revised, to depart Heathrow at 09:30 with a direct planned arrival time in Barbados of 09:45; with helpful winds, the aircraft often arrived in Barbados before it had left London. There were even more grumbles from hoteliers about passengers and crews arriving too early at their hotels.

A unique sight

Late 1990s: Grantley Adams airport plays host to three Concorde at once – two British Airways services (from London and New York), plus one Air France aircraft.

Photo: source unknown

The crews often carried their swimming gear in their hand luggage in order not to delay time on the beach. Occasionally a small stop was made at a ramshackle bar for coffee or on rare occasions something a bit stronger. On one of these stops a Bajan wandered over and asked one crew, “were they the Concorde ‘boys?’” After they replied, he grilled them with a few questions. How far was Concorde from Barbados when it went supersonic? The co-pilot diligently answered. The supplementary was: did they route north or south of the Azores? The crew expressed some surprise at the level of the questions, but answered correctly. On receiving the answers, the Bajan thanked them and wandered back to his group of friends, who also seemed to be eager to hear the answers. Shortly afterwards once on the beach there were other Bajans with similar questions. It transpired that the local rum distillery was running a competition with the top prize being two return tickets to London on Concorde...

On occasion there would be a Concorde charter from New York on the Saturday and so there would be two Concorde on the ground – and, as the photo above shows, exceptionally three, including Air France. I am not sure of the timing of this photo, but as it shows the earlier BA Landor livery and its successor it had to be sometime between 1997 and 1999 when the first and last aircraft were re-painted.

Attracting attention

Some gentle if a little noisy marketing was achieved by the crew requesting a specific arrival route from air traffic control, which enabled them to fly along Barbados’



west coast – reminding hoteliers and their customers that there was a supersonic way back to the UK! One exception to this was when Captain Mike Reilly was in command. Mike was an unashamedly competitive windsurfer who always wanted to check out the sea conditions to the south of Barbados before planning his next action after arriving. Mike was an extraordinarily gifted soul who played a cello, and competed for Britain as an aerobatic pilot, in addition to being a Concorde pilot, and a very nice person as well.

Subsequently I had the chance to watch a scheduled Concorde departure from Barbados while I was there on holiday; you may like the following impressions of that day.

I am sure it wasn't my imagination but the whole ambience of the airport at Grantley Adams that day seemed to have taken on a more urgent feeling. Before Concorde arrived, the taxi drivers were busy cleaning their cars ahead of what they hoped would be their generous customers for the 30-minute journey to the west coast. Larger cars, including Sandy Lane's Rolls-Royce, were already dropping off passengers for the return flight.

I had already met up with Elvin Sealy, then BA's Manager in Barbados, who later went on to be responsible for the whole Caribbean. He

was a little reproachful as it appeared the return flight was overbooked at 102 people (passenger capacity 100). He had made enquiries of some of the hotels and he thought most passengers were due to arrive. All the arriving passengers had left for the coast by now and so one was able to more closely observe the check-in queue. They were obviously all wealthy, the return fare was over £6000, but wealth doesn't mean uniformity. Sandy Lane's Rolls-Royce deposited a well-known hotelier and his wife, who looked as though they were dressed for London. A young man arrived driving a brightly coloured Mini Moke (a small jeep). His elegant companion moved off to join the queue whilst he dropped the vehicle keys into the hand of a car agency representative and headed to join her. Elvin muttered “dress code” as he was wearing shorts, a polo shirt and flip flops. No sooner had the young man joined his lady friend, though, than he opened his suitcase, whipped out a pair of slacks, and put those on, replacing his polo shirt with a sleeved shirt followed by a blazer. Elvin relaxed and wandered away.

Slowly the queue diminished in size until finally there was a family of four: father, mother, and two teenage sons. Judging by the body language, the father was pretty upset



Regular service

A British Airways Concorde on the tarmac at Grantley Adams Airport, during the years of scheduled service.

Photo: *concordesst.com*

and the family looked glum, too. Sadly they were the last to check in, and the mathematics had caught up with them.

Elvin had already said that, unlike other services, Concorde passengers were always special, and most claimed personal knowledge of some senior BA executive. Elvin briefly stopped by. He had already been to the Concorde lounge and offered a full refund, plus first-class travel the following night and of course all meals and a hotel. No takers. The only people who hesitated were the hoteliers, until she remembered they had a prior engagement in London. The call to board the aircraft came, and all the passengers started down through the terminal heading towards the departure gate. Elvin headed to the check-in desk.

His reception, not surprisingly, was less than friendly, but after a while the two boys looked very excited, their mother ditto. The father looked resigned, and they all headed to the gate. Elvin told me afterwards that he had spoken to the flight deck crew and they had volunteered the two cockpit jump seats, but had stipulated it had to be the two boys as they would prefer not to listen to the father's grumbles all the way to London. No doubt compensation was paid by BA and two boys had the supersonic ride of their lifetime.

Concluding memories

The departures from Barbados were different from those leaving London or New York. The departure route is straight out over the sea. Thus, instead of the crews having to throttle

back in order to tiptoe across a local community with gentle increases in power thereafter, a rather more exhilarating plan was used. With full power of course and reheats as usual, after take-off it would be gear up, visor and nose up, cancel reheats at 500 feet. Maximum climb power set at 1000 feet, accelerating to max speed, and keep going until Mach 2 (twice the speed of sound) arrived. Say 9 minutes to the sound barrier (Mach 1) and 22 minutes to Mach 2. Quite sporting, as some passengers were heard to say. Not bad for an aircraft carrying 100 passengers and vintage champagne to match!

The Barbados service was expanded to include a few flights in the summer and continued to contribute to BA's Concorde revenues. However, after the Air France Concorde crash in Paris on 25 July 2000, all Concorde services were halted. BA did not resume the service to Barbados until 1 December 2001, after many modifications to the aircraft.

After Air France had decided to cease Concorde operations in April 2003, the last BA scheduled operation to Barbados was on 30 August that year. At the end of all operational flights BA flew G-BOAE to Barbados on 17 November 2003.

The aeroplane went on display at a museum, the Barbados Concorde Experience. Regrettably this has now

Farewell to Concorde

30 August 2003: Concorde G-BOAC, about to leave Barbados for the final time on the last scheduled service, is given a water cannon salute.

Photo: *concordesst.com*



closed, but at least the aircraft is in a purpose-built hangar. It is perhaps appropriate that G-BOAE was the

aircraft that first flew to Barbados and after 26 years has returned perhaps to her spiritual home.

Final salute

G-BOAE, arriving for the last time in Barbados, displays the UK and Barbados flags. *Photo: Christian Eggers*



An ingenious solution

Former Senior Engineering Officer Ian Kirby recounts how he devised a program to manage Concorde's fuel use – using just a standard 1990s palm-top computer.

I had been unhappy with the accuracy of the computer-generated fuel flight plans since I joined the Concorde fleet. BA introduced the route from London to Barbados with an expensive technical stop en-route to refuel. I knew from much earlier research, when working for the British Aircraft Corporation, that a non-stop flight was well within the range of Concorde if reliable and accurate fuel planning was done.

The system used by BA to plan fuel had been provided by the manufacturer, but reflected an earlier standard of engine intake. Then small, hand-held computers came along, and I saw the opportunity to improve fuel use

predictions. I completed a period of statistical analysis, acquired a HP200LX computer, and provided a far more accurate fuel flight plan that worked on any route but was particularly useful for the route to Barbados, as I was also able to provide information about en-route diversions in the unlikely event of a single or double engine failure.

The management of BA accepted the system, and it was issued to all crew. Other programs were added to provide load-sheet calculations, in-flight centre of gravity calculations, and refuel schedules, and Captain Chris Norris provided a program for take-off calculations for scheduled airfields. However, the management were a little unhappy about the tactical three- and two-engine diversions on the computer. So I produced them as a graph with wind and other corrections. That satisfied management. When asked how I produced the graphs, I told them that I had just used the computer program. There were a few other minor changes I introduced to the operation that saved fuel, but the accuracy of the little HP200LX computer program was the real advantage.



Palmtop system

The HP200LX, introduced by Hewlett-Packard in 1994, and only 16 × 8.64 × 2.54 cm (6.3" × 3.4" × 1"), proved invaluable for helping Concorde crews with in-flight calculations. *Photo: Sysy / Wikimedia Commons*

A brief for the CAA

The following text, defining the intended uses of the HP200LX palm-top computer, is taken from a memo that Ian Kirby sent to the UK Civil Aviation Authority, on behalf of British Airways, requesting permission to use the HP200LX on board Concorde.

The functions, numbered as on the computer index, are:-

0) To calculate the in flight EGT trend as an alternative to the existing Sharp PC1246 or PC1248 and other approved programmable calculators.

* Rolls-Royce have already approved the HP200LX and the program.

1) To calculate a loadsheet as an alternative to a draw down chart or other computer loadsheet and aid the completion of the existing manual loadsheet. To provide a print out similar to current computer generated loadsheets if a suitable printer is available.

* The Load and Balance Manual has been changed to reflect use of the computer. All the examples in the manual have been worked and the results are accurate. Many DCS, main frame, loadsheets have been compared with the HP200LX producing accurate results. The program can be used for a load plan.

2) To calculate a fuel flight plan as an alternative to a manual, a pre-computed or other computer generated plan. To calculate fuel checks as an alternative to corrected other computer generated fuel plans or the Cruise Control Manual. To provide a print out if a suitable printer is available.

* The computer results have been compared with the BA computer fuel flight planning system and pre-computed fuel flight plans, similar results are obtained. The computer results have been compared with the aircraft performance and usually reflect the actual aircraft fuel consumption more accurately than the BA computer system. The program accuracy has been checked over many years. I have the records.

3) To calculate the fuel uplift and distribution as an alternative to the tables in the Fluid Replenishment Manual. This is to assist in completing the existing fuel sheet.

* The results from the computer are accurate for the range of fuel densities covered by the program. Minor errors have been discovered in the fluid replenishment book tables. These errors are being corrected.

4) To calculate the position of the centre of gravity of the aircraft as an alternative to the draw down chart following loss of aircraft on board CG computers.

* The computer results have been compared with the aircraft CG computers and found accurate. BAe have indicated acceptance of this use.

5) To calculate the values required to complete the take-off pro-forma as an alternative to the tables in the performance manual.

* Many examples have been compared with the computer results and the computer has proved accurate. Where differences have been checked very carefully the computer has proved more accurate than the example take-off data forms.

- The computer is intended as a useful tool issued to every flight crew member. It is not intended to be a vital part of aircraft equipment required for flight.


- The computer has similar electro-magnetic characteristics to other small computers with no back light, such as the Sharp PC1246 and PC1248. It has not and should not cause disturbance to any aircraft equipment whenever or wherever it is used. As a good example to passengers it will not be used during take-off or landing.

- Extensive exposure to heavy electro-magnetic fields and to X-ray radiation and on board cosmic radiation has produced no faults within the computer or the programs.

- The program language used is Microsoft Quick Basic 4.5. The user has no access to the source code and all the programs are in .EXE form and require BRUN45.EXE to enable them to run. If any character of the .EXE program is changed the program will not run.

- The source codes are held on a dedicated lap-top PC that is kept in a locked cabinet and in a pass protected directory on the BA Local Area Network in the Compass Centre.

Planning the route

NAVIGATION SERVICES	P. 6	BARBADOS OPERATION	
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FLIGHT PROGRESS CHARTS .

Two Flight Progress Charts are provided for the Concorde Barbados flights . An outbound chart with the normal route to BARBADOS plus routes from SHANNON , LISBON and SANTA MARIA , and a return chart with just the BARBADOS - LONDON route . Note this is the only flight into LONDON permitted to route up the English Channel .

On each chart GREEN circles give the ONE HOUR still air range for three engines from certain airfields . The two engine range will be 50 nms less . For a tailwind increase the radius by the tailwind component and for a headwind decrease the radius by the headwind component . Use the latitude scale to measure distance .

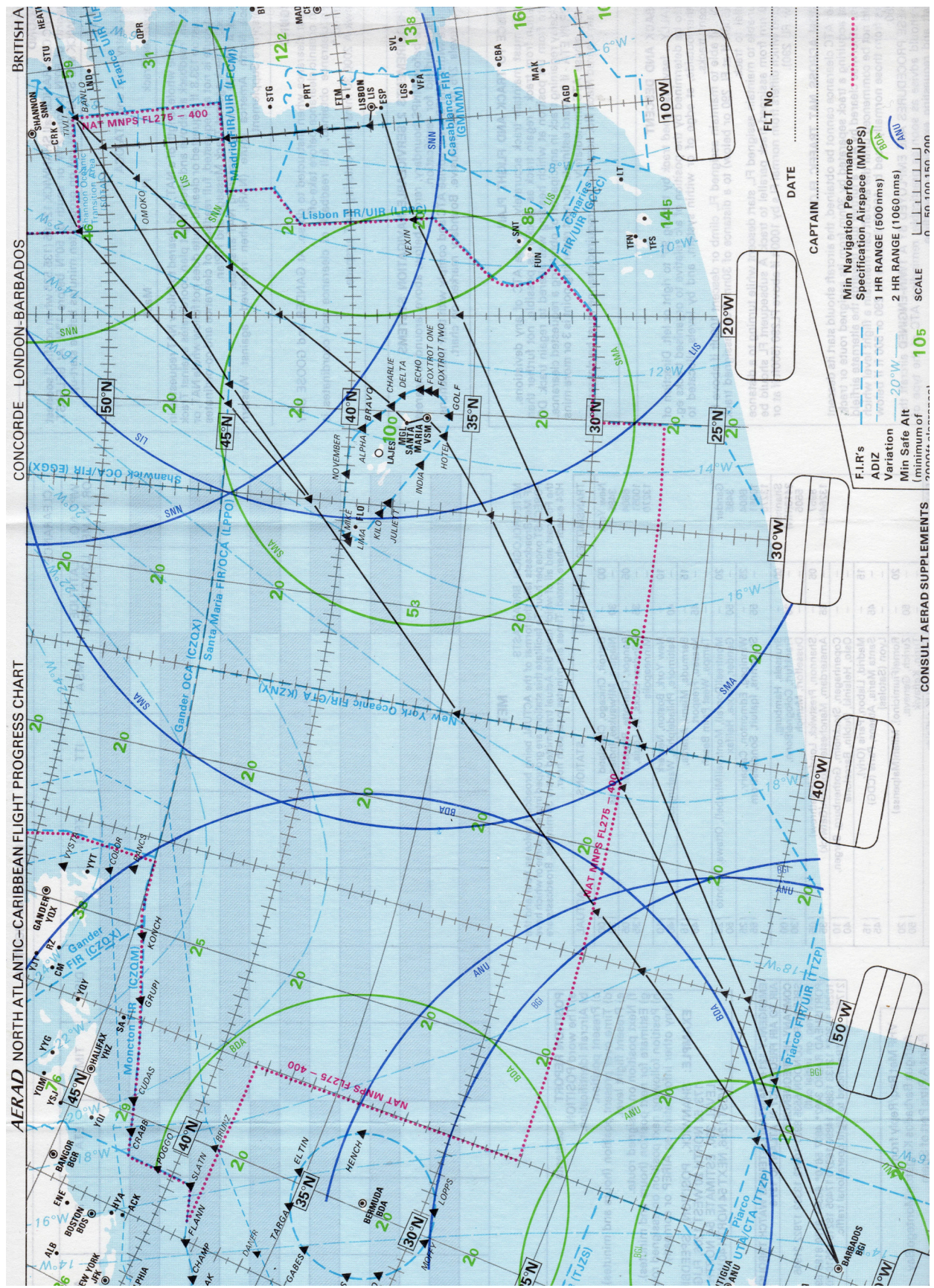
NOTE : Each graduation on the latitude scale is 30nms .

BLUE circles round certain airfields provide TWO HOUR still air range for three engine flight . The two engine range will be 110 nms less . For a tailwind increase the radius by DOUBLE the tailwind component . For a headwind decrease the radius by DOUBLE the headwind component .

Date:- Nov 93. Page:- 1

▲▼ Above and overleaf: London to Barbados

Above is a document from British Airways' Navigation Service, dated November 1993, briefing flight crews on flying non-stop from London to Barbados. The direct flights were offered from September 1993 onwards. On the following page (turned sideways for clarity) is a map of the route from LHR to BGI. *Images courtesy of David Rowlands*



A TRANS-ATLANTIC VENTURE

Forty years ago, on 12 January 1979, one of the most unusual services in civil aviation began. British Concorde G-BOAE and French Concorde F-BVFC touched down together at Dallas International Airport to inaugurate a joint service between the two national airlines and US airline Braniff International.

Many people imagine Concorde as the embodiment of British class or French panache. Yet, for a short time, Concorde also had an American identity.

In this feature we recount the story of the three-way partnership between British Airways, Air France, and Texas-based US airline Braniff International, which allowed the Americans to offer their own – albeit limited – Concorde service.

British Airways Flight Engineer David Macdonald outlines the history of this unique relationship. Richard Ben Cass, head of the Braniff Foundation, tells the story from the American side, and finally we have an interview with one of the actual flight crew members – Norwood Band, former Braniff flight engineer and then First Officer on Concorde.



Training flight

Concorde G-BOAE arrives at Washington Dulles Airport for Braniff International pilot training.

Photo: Braniff Airways Foundation

FAA certification

David Macdonald, British Airways Flight Engineer

Yes, I know I'm biased, but I believe it's fair to say that, along with Joanna Lumley, Judy Dench and your esteemed editor [*blushing – Ed*], Concorde has achieved 'National Treasure' status. It wasn't always so.

AFTER the euphoria of Entry-into-Service, after the rush to be the first to fly at Mach 2, there followed a fairly lean period. Singapore came and went – twice! And, in between, the Americans called.

It was Braniff International (BI) who first rang the bell. It was 1978 and at that stage there were five unsold aircraft, two at Filton and three at Toulouse. However, any operations by a US operator would require Concorde to be certificated as an airliner by the American Federal Aviation Administration (FAA). That organisation had maintained a watching brief during Concorde's design and development phase and had undertaken specific evaluation

flights from Toulouse in 1975. But, with all American option-holders having withdrawn their interest, there was no incentive to proceed with certification. (In a spirit of completeness, those US airlines were: Pan Am, American, United, Continental, TWA, Eastern, and . . . Braniff International.)

The FAA opened negotiations with British Aerospace and Aérospatiale in 1978. British Airways and Air France joined in when it became apparent that leasing time on their aircraft was of more interest to Braniff than was buying or leasing any of the unsold aircraft.

Such arrangements found favour with airline management, if not with the departments directly involved. Both the FAA Approved Maintenance Schedule and their operations Flight Manual were more restrictive than our own Franco-British documents, but since we would be sharing our aircraft with Braniff,

these would be the documents that we were supposed to work to.

Organizing the service

On the business front, it was Braniff's intention to operate British and French aircraft from Washington to Dallas – an overland route and therefore subsonic – for a year or so in order to get used to Concorde and its operation, then expand superpersonally into South America.

To facilitate the interchange, British Airways set up a "Delaware Corporation" with the intriguing acronym, Balsa – British Airways Leasing Subsidiary of America – with aircraft G-BOAE (Alpha Echo) assigned to that company, with the proviso that it may be substituted by any other Concorde, as required. (In broad terms, at the turn of the 20th century, the state of Delaware legislature set itself up to be a particularly business-friendly environment, making it easier and

less expensive to set up businesses, large and small.)

So how did it work? Our own Civil Aviation Authority (CAA) agreed to a variation in aircraft registration standard. For example: G-BOAE became G-N94AE (see box). As such the aircraft would fly the British Airways London to Washington service, BA189. Upon arrival, the waiting Braniff captain would sign a form on behalf of his airline, formally accepting responsibility for the aircraft. At that point G-N94AE would change from a British aeroplane to an “American airplane” in the care of Braniff International. Outside, on the tarmac, a ground engineer would cover the “G” with a piece of white sticky-backed plastic, to give “N94AE” as a typical US aircraft registration. The changeover was complete. I leave it to the astute reader to work out how, on the following day, the aircraft reverted to full British ownership!

Braniff crews were trained jointly by British Airways and Air France. There being only minor differences between standards of equipment, it was perfectly feasible for them to operate aircraft from both fleets.

Modifying the aircraft

There were several modifications required for US certification. Two in particular stood out: one good, involving automatic switching of hydraulic supplies to flight controls, rather than manual selection, in the event of a particular failure; and one not so good – whereby, within a period to be defined, the FAA would require two external doubler strips along the crown area of the fuselage between the centre and rear doors. This was never supported by Franco-


Strengthening works

Despite the FAA’s qualms, the Major Checks found the production joints to be sound. Left: a joint to be checked; right: the external “butt-strap” fitted to frame 46 (just aft of the centre door) to support the structure.

Photos: David Macdonald

Re-registration

There were 11 Concorde re-registered as “American” to fly with Braniff from January 1979 to June 1980.

British Airways		
G-BOAA	G-N94AA	
G-BOAC	G-N81AC	
G-BOAB	G-N94AB	
G-BOAD	G-N94AD	
G-BOAE	G-N94AE	
G-BOAF	G-N94AF	
Air France		Quick change British Concorde G-BOAE with her dual registration number, G-N94AE. On arrival in Washington, the “G-” would be taped over to give her US registration. <i>Photo © Matthew R N Clarkson</i>
F-BVFA	F-N94FA	
F-BVFB	F-N94FB	
F-BVFC	F-N94FC	
F-BVFD	F-N94FD	
F-BTSD	F-N94SD	

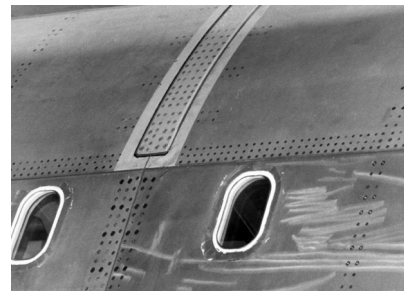
British authorities or required as a result of fatigue testing.

This latter point bears some explanation. In the quest for a 50:50 split of design and manufacture responsibility, the French team were awarded the wing. Being a Mach 2 delta wing of considerable chord length (length from front to back), the most practical design was to create an homogeneous structure comprising left wing, fuselage, and right wing. In fact, looking along the length of Concorde from centre doors to rear doors, there are five such lateral constructions riveted together. This forms an immensely robust structure, which had been fully endorsed by French and British authorities and validated by structural fatigue testing.

Now, during take-off run, when Concorde achieves flying speed and

is rotated typically to 13.5 degrees nose up, the rear of the aeroplane squats and as the whole weight of the front is heaved off the ground, the crown area of the rear fuselage goes into tension, and this is one of the most highly stressed phases of flight. Naturally, the aircraft is designed to withstand these forces for the whole of its predicted life; the design technique is known as “Safe Life”. The FAA, however, had difficulty with this concept, hence the proposed modification.

To digress from the narrative: 10 years later, during the first of the 12,000 hour Major Checks, we undertook a detailed examination of the rear fuselage. It was tricky, very tricky. It involved “unzipping” four of those production joints from window-line across the roof to window-line. Ideally, the aircraft



would have been placed in production jigs to hold everything in place, but these were no longer available. However, the Toulouse boffins devised a system of jacking and trestling whereby a specific load was carried at each support point, each load being continuously monitored and adjusted as required. Toulouse described the technique as “placing the aircraft in a structurally relaxed condition”. The production rivets were drilled out and the holes were crack-checked.

If “unzipping” was tricky, then “zip closure” was engineering wizardry. The holes were re-drilled to an extremely accurate dimension, and very special oversize rivets of a particular shape were eased into each

hole, not only closing the zip, but also creating a localized compression that improved the zone’s tolerance to the indigenous tensile loads. The statistics were: holes 1,508; cracks Nil. Very pleasing.

Epilogue

Braniff services began on 12 January 1979 and ended, just 16 months later, on 11 May 1980. We reverted to British registrations, Maintenance Schedule and Flight Manual. The experiment was over ... or was it?

Just 16 months later the agenda for a routine meeting between ourselves and British Aerospace included a puzzling word, “Fedex”. Yes, that company that began air shipment of time-sensitive packages

in 1973, that went international in 1981, now considered Concorde for trans-Atlantic work. Although the two manufacturers did examine the request, it would be an exaggeration to say that it ever became a project. Nevertheless some modifications were identified as being necessary; oxygen and air-conditioning systems would be revised, cabin smoke detectors and a fire extinguisher system fitted, and a new Landing Gear Free Fall mechanism devised.

In the end Fedex did not pursue this proposal, but I believe that shortly afterwards we began to pick up high-value packages for trans-Atlantic shipment. It’s an ill wind ...

Celebrating 40 years

Richard Benjamin Cass, Braniff Airways Foundation



On Friday, January 12, 1979, two Concorde Supersonic Transport jetliners landed simultaneously at Dallas/Fort Worth (DFW) Regional Airport, Texas, marking the beginning of Braniff International Concorde service between the Southwest United States and Washington Dulles (IAD) Airport and London and Paris. Braniff thus became the first US carrier, and the second international carrier (Singapore Airlines being the first) to operate Concorde.

Braniff had placed orders for three Concorde aircraft on September 1, 1966. However, the OPEC oil crisis of 1973 and 1974 drove fuel prices up to astronomical levels, making Concorde a more expensive

What might have been

An artist’s impression of Concorde in Braniff livery. Braniff had intended to paint one British or French Concorde with this livery on the left-hand side. *Photo: concordesst.com*

aircraft to operate than its conventional subsonic counterparts. The decision was made by Braniff, as well as the other US carriers that had placed orders, to cancel their original Concorde orders and therefore forgo actual ownership of the aircraft.

Leasing and registration

With the commencement of Concorde scheduled services by British Airways and Air France in early 1976, however, a plan was devised that allowed Braniff to operate Concorde via a unique agreement that incorporated a Moist Lease Interchange vehicle. Braniff would operate Concorde subsonically between DFW and IAD, using its own crews with either a British Airways aircraft (for London services) or Air France aircraft (to Paris).

When a foreign aircraft is leased by a US carrier for use over US airspace, the aircraft must be registered with the Federal Aviation Administration, and similar regulations were applied by the British and French Governments. Therefore, at IAD the registration of the aircraft was accordingly changed to the correct operator and the registration number on the aircraft tail was physically changed (see previous article).

Between DFW and IAD Braniff crews operated Concorde at subsonic speeds as required by Federal Regulations. At Washington Dulles, the British or French crews took over for the supersonic legs to either London Heathrow or Paris Roissy Charles De Gaulle.

Crew training

Fourteen Braniff International pilots travelled to either Bristol, England or Toulouse, France, to begin training for Concorde services on August 3, 1978, after Braniff was granted tentative authority for the new Concorde interchange services. Service

A royal Texas welcome

Concordes F-N94FC and G-N94AE, parked nose to nose, are welcomed to DFW by a marching band.

Photo: Braniff Airways Foundation

was initially scheduled to begin on November 1, 1978, but due to the obviously huge undertaking of such a ground-breaking project, the inaugural was delayed for an additional two months.

The best and brightest of Braniff's crew-members were chosen, including Captains Glenn Shoop, Dale Duncan, and Ken Larson, First Officers Wayne Richards, Jerry White, and Bill Dugan, Flight Engineers John Logan, Norwood Band, Rex Head, and Carol McGuire, Check Engineer Howard Crisp, and Check Pilot Marion Griffith. The crews trained for ten weeks, which included a self-taught ground school that required viewing 4,500 slides, simulator training, and actual aircraft flight time.

The inaugural flights

On January 11, 1979, two complete and fully trained Braniff Concorde crews were deadheaded to Washington Dulles Airport, where they remained overnight to fly their respective Concorde inaugural flights from IAD to DFW. British and French crews set out early in the morning from London and Paris, respectively, and headed for Washington Dulles, for Braniff crews to take their Concordes on to DFW Airport for a simultaneous arrival.

While the British and French flights arrived promptly as scheduled into IAD, due to the inaugural ceremonies and boarding of dignitaries for the DFW subsonic segment the two Concordes departed 20 minutes late. However, the weather was ideal and all went perfectly for the remainder of the flight. At 40 miles out, the two crews began coordinating for the simultaneous landing on the east and west runways of DFW Airport. The touchdowns were perfectly timed.



Crews on board the British Concorde, G-N94AE (N94AE), were Captain Glenn Shoop, Co-Pilot and Check Pilot Captain Marion Griffith, and Flight Engineer Howard Crisp, together with FAA Inspector Gene VanGundy, and a British Airways Captain. The Air France Concorde, F-N94FC (N94FC), was commanded by Captain Ken Larson and Co-Pilot and Check Pilot Captain Jerry White.

The British ship landed on the west side, runway 18L, while the French ship landed on the east side, runway 17R. The two Concordes, with their noses lowered to 5 degrees for taxiing, joined each other for a dual taxi to the Braniff Terminal 2W on the West Side of DFW, and pulled up between Gates 10 and 13 to a huge group of well-wishers. The Captains of both Concordes lowered the noses of their aircraft to 12.5 degrees to salute the crowd and mark the official arrival of Concorde service at DFW Airport.

The passengers received a royal Texas welcome with a serenade by the W.T. White High School Longhorn Marching Band and Drill Team. Yellow roses were handed to each passenger, and a pair of horse-drawn carriages were on hand to show the remarkable progress the world had made in transportation.

Braniff International's first scheduled Concorde services departed the next morning, Saturday, January 13, 1979 – the fifth anniversary

of the beginning of scheduled airline service at DFW. The two Concordes flew to IAD with Braniff crews and then on to London and Paris with their British and French crews.

The end of the story

The Concorde service was a monumental moment in Braniff International's storied history. Concorde achieved great strides in promoting Braniff as a leading international airline across the globe.

Braniff was fully committed to Concorde service until March–April 1980. Non-stop service from DFW to Tokyo and from Miami to Rio de Janeiro was planned. One Concorde had been chosen to be painted with the Braniff Concorde Orange Ultra color scheme on the left side while the livery of the leasing airline, British Airways or Air France, would have remained on the right. However, the worst economic downturn since the Great Depression caused traffic to drop throughout Braniff's system, and the decision was finally made to discontinue service in early May 1980.

Acknowledgement

Mach 2 thanks the Braniff Airways Foundation for their assistance in sourcing images and text for this article. To learn more about Braniff and buy a piece of aviation history, visit the Foundation's on-line shop, <https://braniffboutique.com>, and the Foundation at <http://www.braniffairwaysfoundation.org>.

Braniff: from the flight deck

Norwood Band, former Flight Engineer and First Officer for Concorde, Braniff International

Norwood Band joined Braniff International Airways in 1966, serving as Captain, First Officer, and Second Officer (Flight Engineer), and remaining with the airline until it terminated operations in 1982. Most notably, he was one of the Braniff flight crew members selected to fly Concorde.

Captain Band very kindly answered the following questions about his experience, in an e-mail interview with Mach 2 editor Katie John.

When did you first get involved with the Braniff Concorde service, and were you part of it for the full duration of that service?

During the spring of 1978 there was a bid put out by the Company (Braniff) for those interested in flying Concorde. I don't know the results of this bid, but I wasn't successful. A second bid came out and I was successful. You have to understand that everything in the airline business is based on seniority. If you are senior to me you get to choose type of aircraft, trips, vacation etc. before me. In order to fly Concorde as a Flight Engineer you had to be a B-727 Captain. To fly as a First Officer you had to be a DC-8 Captain. To fly as a Captain you had to be a B-747 International Captain. Unlike the French and British we did not use professional flight engineers.

There was an interview process where we were told we would be in training for at least three months either in the UK or in France. There would be no breaks to see family or return to the United States.

As you know, the plane, engines, etc. is 50-50 split evenly. It was decided to split the Braniff crews the same way. Three crews went to Toulouse and three to Filton. I ended up in France. (The British didn't want anyone over 55 flying their airplane. Because of this, anyone 55 or older was sent to Toulouse for training.)

In addition to the Evacuation Demonstration (see following page),



Simultaneous arrival

12 January 1979: Concorde G-N94AE and F-N94FC parked at the terminal after Braniff crews brought them in to a spectacular simultaneous landing. Norwood Band was the flight engineer on Fox Charlie.

Photo: Braniff Airways Foundation

we had to observe both the British and French in normal operation. This meant at least two crossings of the Atlantic with each company in each direction. There were differences in technique but not in operations. In addition we had a line check to complete.

As far as I know, I am the only person in the world to qualify on Concorde both as a flight engineer and as a pilot. This confused everyone since it had never been done before. The only person I think understood this was Jean Franchi, my instructor and chief test pilot on Concorde for Aérospatiale. Because of this, I didn't go to Toulouse for First Officer training until most of the ground school had been completed. Following my successful bid for the service I was initially trained as a flight engineer and started work

with the Concorde service in that capacity. Then, a year later, another bid came out, and I succeeded in my bid to become a First Officer. (There was a vacancy for a flight engineer to replace me.)

Since I had already completed the ground school and simulator training as a flight engineer, my instructors saw no need for me to repeat this. I did, however, and completed the whole simulator and aircraft training for a F/O since I had never flown the aircraft.

Did you take Concorde supersonic?

Most of our operation was subsonic over land at Mach 0.95, but our training included all phases of Concorde operation including supersonic. The rumor around Braniff was that if this worked out we would serve South America from the east

coast. At this time, Braniff had a large South American operation.

I understand that you had 346 flying hours on Concorde. Was that purely on in-service flights with Braniff, or did that include training flights?

I just checked my log book and came up with 355 hours. This includes Flight Engineer and First Officer and all training: F/E 133 hours; F/O 222 hours. This does not include any observation time or test flights with Jean Franchi.

You mentioned that your training involved a simulated evacuation of Concorde to conform with FAA requirements – what did that entail?

The emergency evacuation was accomplished in September 1978 at Heathrow Airport. It was done at night in a black environment. Preparations were made for two attempts if necessary.

The “passengers” were British Airways employees who volunteered. They had only seen the plane from the outside and were of various age groups to meet with FAA regulations. There was a person in every seat, and dolls simulated babies. The standard briefing of seat belts, oxygen, nearest exit etc. was given.

The FAA people then went through the cabin and dropped pillows and blankets in the aisle to hinder them. Only half of the exits could be used, but no one knew which ones. The flight crew and hostesses (now called flight attendants) had to be strapped into their seats. When the lights went out the FAA people moved to the left or right and blocked that exit. The reward for the “passengers” was to see Concorde up close and have some snacks and beverages. We evacuated the aircraft in 72 seconds – apparently a world record!

Finally, what was your favourite experience to do with flying Concorde, and what did you make of working with the British and French crews?

My favorite aspect of flying Concorde was how well it handled when hand flying. Concorde is one of the easiest, most maneuverable airplanes I’ve had the pleasure of flying. It is highly responsive to inputs and can do things that you wouldn’t normally think about in other planes.

The French and British crews did have somewhat different approaches; the French view was more flexible (although still rigorous), while the British attitude was more “It is done this way”. It’s amazing to me that the French and British designed and built a successful supersonic aircraft. Both countries are 20 miles apart at the closest point and they can’t even agree on the same time zone!

TECH LOG



I recently put a question on Facebook about how long would it take to change a Concorde engine. Nigel Ferris, Contributing Editor, Mach 2

A My good friend and colleague Philip Cairns has sent me this detailed description and given me permission to use it in the magazine. I am very grateful to Philip for taking the time to write this, and for allowing me to publish it. I take no credit for this piece.

Philip was a highly qualified BA engineer, working on Concorde during its service life. One time an engine out/in was completed in 6 hours, and Philip has a letter from his boss congratulating the team for a good result. He was part of the team that handled the decommissioning of Alpha Delta in New York. (See Mach 2 issue 19, Dec 2018.) This would have been a very sad operation for him, along with his colleagues.

Olympus 593 engine
Photo: Heritage Concorde



Engine change: the process

- Engine change declared in position 1. New engine ordered, and available.
- Engine doors front and rear opened, jacks installed and doors raised up.
- Engine change kit positioned and seal kit supplied from store.
- Green hydraulic case drain filter in wing checked clean. U/S engine sheet annotated for hydraulic pump found clean.
- Engine locating nut removed and engine lifting rig positioned on wing, and handed to left wing.
- Aircraft checked level with fuel adjusted as required. Engine working stands positioned under engine.
- Hydraulic and fuel engine shut-off valves closed.
- No. 1 engine circuit breakers pulled as annotated on engine change sheet.
- Engine disconnect started. Engine lifting rig connected and control pendant set up, weight of engine taken and set at 100% on pendant.
- Ground equipment fitted to support rear jet pipe, jet pipe disconnected and pushed rearwards and restrained. (Difficult.)
- PNC trim actuator removed. Primary nozzle air pipes and sensor air pipes disconnected.
- Engine bonding disconnected. Cross feed air pipe removed. P3 air pipe disconnected at top of engine from aircon valve and restrained.
- Engine fire extinguisher hose disconnected and tied back for clearance.
- Main fuel pipe disconnected and drained into a large container. Pipe blank fitted.
- Three quick release hydraulic hoses disconnected (3 pipes).
- Forward transition clamp removed and forward bonding removed (difficult and time consuming).
- Centre wall heat shield removed and engine mount guide fitted (guide is extremely heavy and awkward to fit, needs second look to check ok).
- Electrical disconnect to be actioned with electrical loom fitted to ground equipment, safely stored by the raised engine door. Igniter box and igniters removed for access, all other electrics disconnected and bagged for keeping clean and safe.
- Engine weight checked still at 100%. Forward engine mounts unlocked, nuts loosened and removed. LAE checks all disconnects completed and certified on engine change sheet. Mechanical and avionics engineers do physical inspections, give clearance to lower engine onto mobile engine stand.
- Engine main mount nuts removed, ground equipment bullets fitted to engine mount bolts at centre wall and outboard side, weight checked on pendant and correct. Bullets fitted to forward mounts with observer in position to watch as engine lowered. Observers at strategic points to check lowering. Start lowering and check on pendant for uniform descent front and rear. Engine lowered clear of bay and fitted to positioned engine stand at front and mid attachment points.
- Engine towed away and engine stand positioned for bay inspection, all points checked, clearance given for new engine fitment.
- Inspection stand removed, new engine positioned, engine lifting rig cables connected and weight taken. Clamps and bolts removed, engine lifted out of stand and into bay with bullets fitted to forward mounts, and large bullet fitted to spigot on central anti-rotation mechanism. Bearing in wing removed for access to spigot. Engine fitted to main mounts on thrust mechanism, lifting pendant checked to be at 110%, forward mounts fully up into wing attachment points. New mounts fitted to new engine, and support mount fittings positioned and torqued in accordance with maintenance manual. Front mounts torqued and locked with new locking tabs. All these attachments out with first and second inspections, timed and dated.
- Engine connections are a reverse of disconnect, with particular attention being paid to forward transition ring clamp, P3 aircon and jet pipe moved forward and attached. These jobs are sometimes tricky and time consuming. Oil levels checked and replenished on engine, engine starter, IDG which is the generator.
- New engine certification sheets checked for additional checks to be carried out during engine run.
- On completion of installation, avionics and mechanical LAEs do a final inspection on all relevant connections, and give clearance for dry cycle and engine runs.
- This intense procedure can be carried out inside 8 hours, with a good team of 5 engineers, a top man on the upper part of the wing, and 5 men underneath including top avionics lads.
- Dry cycle of engine can be done in hangar, including IDG disconnect; once engine has stopped turning, the IDG reconnect handle can be pulled and reset.
- Concorde id positioned on engine run pipes, secured to ground, engine run carried out, including starting adjacent engine, full power run carried out. Reheat checked, acceleration times checked, further leak checks at beginning and later when engine is hot. On engine shut down all oil levels checked and replenished. Paperwork all completed, and torqueing of IDG, starter motor to be carried out for the next three ramp checks.

Final thoughts from Philip

Whilst at BA, over the years I must have done many engine changes. Positions 1 and 3 were almost the same to do, positions 2 and 4 were different to each other, and very different from 1 and 3. So you had to keep your wits about you if you were using a no. 2 for a no. 1. Having said that, I enjoyed doing engine changes, working in the minor maintenance the aircraft would always be needed ASAP, so you could not be slow, the challenge was to get

the aircraft serviceable and I always thought the minors gave everything to achieve this. We all had our favourite jobs and I was no exception. As a team we would always help one another if necessary.

Why do we do engine changes? The reasons can be so different, damage to the LP and HP compressors was one, although the MM limits were nice and specific. Engine health were other contributors to a casualty engine, we used to do a thing called engine trend which

monitored the temperatures in the combustion chambers and turbines. We did this with figures supplied by the flight engineers.

Having completed an engine change I always felt a sense of achievement once the aircraft was declared serviceable. Summing up, I would like to state that the Olympus engines survived in quite a hostile environment, and Rolls-Royce were terrific in backing us up. The engine did Concorde proud.



Concorde G-BOAC

British production aircraft

Location: Runway Visitor Park, Manchester, UK

Reporter: Graham Cahill **Date:** 26 January 2019

This latest Concorde Watch report brings some spectacular news from the Runway Visitors Park (RVP), Manchester.

We have been wanting to do this for years. The RVP did want the nose restored; however, the cost of restoring it would be restrictive, so we suggested that if we could complete the restoration at almost nil cost to the RVP would they be interested? The answer was yes.

Heritage Concorde had some money in the coffers for restoration of a nose system, which was generated by kind donations from its members and the Speedbird Concorde group run by Emma Rasmussen, but we had nowhere near the amount to fund the entire project. It costs around £4000 total to make the nose

Hydraulic fluid

A can of Concorde's hydraulic fluid, M2-V, on the flight deck. ExxonMobil donated all remaining spares of the fluid, for the use of all Concordes.

Photo: Heritage Concorde

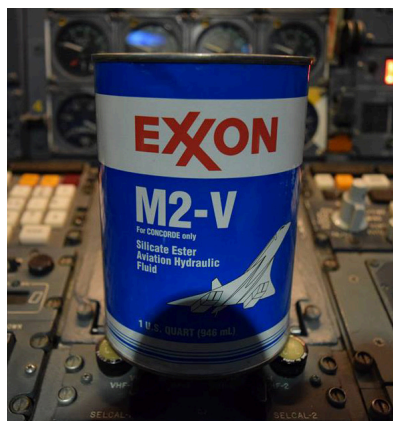
on Concorde move; this includes all electrical work and hydraulic oil and a power pack.

Funding and resources

The first thing that happened to help towards funding the project was the generous donation from an ex-British Aircraft Corporation engineer by the name of Ken Martin, who had spent much of his early working life on the aircraft in the development days. Ken donated a big power supply to Heritage Concorde for

the 28v systems on Concorde. He had wanted the power supply to go to G-AXDN at Duxford but this didn't happen, because that aircraft had already got its power systems restored and working with the same power supply. We agreed with Ken that the power supply would go to the very first Concorde that needed it (G-BOAC). The power supply was actually installed in 2016 by Heritage Concorde.

The next thing that brought the project into reach was the generous donation during 2018 from ExxonMobil, who donated all remaining stock of M2V oil to Heritage Concorde and its associated groups for use on any Concorde worldwide that needed it. This significantly reduces the cost of the project because the replacement oil we used in previous projects was expensive. ExxonMobil picked up the cost of shipping the oil to the UK as well. I have to say this donation was one of the things that spurred us into action, as we could now use original Concorde oil



at no cost. We cannot thank ExxonMobil enough for this generous donation, which will see restoration of Concorde much easier and ensure the future of already restored noses for many years to come.

We still had a significant shortfall in funding so how to solve this issue? Heritage Concorde could pay around £1000 towards the hydraulic power pack, but it was John Hepple from Manchester who came up with the suggestion that TAS (The Aviation Society) at Manchester might be able to help. TAS had raised some funds at the 10th year event in 2013 that could possibly be put towards the restoration of OAC's nose. A meeting was arranged with Peter Hampson, who runs TAS; he was extremely enthusiastic and keen to see the project through. Peter was originally responsible for getting G-BOAC to Manchester when the aircraft were retired in 2003, so seeing the work of restoring the nose would be extremely satisfying for him and ensure that the park at Manchester remained fresh and new for returning visitors. He supported the project from day one and immediately released the funds to pay the remaining amount for the project to go ahead.

We ordered the hydraulic power pack and lines from Hydraulics



Inside the nose
A view inside the nose (above). The curved runners for the visor mechanism (right); Heritage Concorde cleaned and greased the mechanism on the first day of work.
Photos: Heritage Concorde



Hydraulic equipment

Left: the power pack supplied by Hydraulics Online. Right (top of image): the line from the hydraulic pump connected ready for flow to the nose.

Photos: Heritage Concorde

Online Ltd, who could deliver just before Christmas. Great – we could arrange the job first thing in 2019!

Heritage Concorde met with the managers of the RVP, Robert Patten and Paul Emblow, and arranged a 4-day slot to complete the work. The RVP would pay for accommodation and meals for the team and supply scaffolding, spill kits, PPE and protection for the hanger floor. The start date was 7 January 2019.

Day 1

On 7 January Graham Cahill and ex BAC/BA engineer John Dunlevy (JD) arrive at Manchester to start the task of moving the nose. We already have the process in place for completing a nose move; it is the same plan as used at Duxford, with a few refinements.

The power pack is installed, and a temporary 16amp power supply from the generator at Manchester is run ready for testing. Hydraulic lines are routed to the aircraft green

hydraulic system, and all returning hydraulic pipes that run from the nose to the rest of the aircraft are isolated to prevent solidification of the oil with open pipes, and prevent any pressurized oil from returning back to other systems (including yellow return). Inspection of the oil inside the system suggests that the hydraulics are in excellent condition. The oil is not polluted or discoloured yellow; in fact, the oil is unusually clear, like new.

The power pack is filled with new M2V oil, which ExxonMobil have donated for free.

We remove all panels in the nose section in order to complete a full inspection, and all moving parts are cleaned and greased.

The nose breakers are closed, and we complete electrical tests to ensure that the nose systems are talking correctly to the hydraulic systems. All is absolutely fine.

Day 2

It is time to test the nose systems: we double-check all connections for the hydraulic power pack and test the pack at low flow to see if there are any leaks to the connections we have made. It all checks out fine.

We ask for permission to start testing the nose. The moment of truth is here.

We already have a stringent nose test procedure, which we used on G-AXDN at Duxford: if the nose



systems fail at any point, we do not proceed until the problem has been identified and resolved.

The first test is the visor. The control for the visor is moved, and the visor lowers faster than is usual; this is caused by the visor sticking on its first move after being up for such a long time. The same thing happened with G-AXDN at Duxford and with G-BBDG at Brooklands, so we are not worried.

We select “up” and the visor rises perfectly. We repeat the process five times to check correct operation. This is really good news, so we move to the next step.

The visor is moved down, and the 5-degree nose position is selected. The nose lowers perfectly. We select zero degrees to raise the nose, and it raises perfectly. The 5° position is selected five more times, and each time the nose works perfectly.

Now for the big one

The nose system when it is held at 5 degrees relies on a hydraulically operated locking mechanism. The locks are called collet locks. They are hidden away from view inside the nose actuators, so we have no way of inspecting them to determine their condition. At the 5-degree position we know these locks are holding the nose up; however, will they release after 15 years of being inactive, and if they do release will they lock again once activated?

We select the “fully down” position, and the collet locks release the nose from the 5-degree position. The nose lowers to 12.5 degrees perfectly. Indications in the cockpit show that the locks are unlocked, so this is good news! We select 5 degrees

Mission accomplished

Team members John Dunlevy of Heritage Concorde (left), John Hepple of the Runway Visitors Park (centre), and Graham Cahill of Heritage Concorde (right) celebrate the nose move.

Photo: Heritage Concorde

to raise the nose and the nose raises perfectly; the collet locks engage and hold the nose at 5 degrees again. We operate the 5-degree to 12.5-degree position another four times to check operation and correct indication. The system is working exactly as it should. Perfect!

We complete a final check and find a small leak on the nose uplock flow connection; the leak is quickly resolved. By now it's late (about 9pm) so we replace the panels, clean up, and cycle the nose a few more times before finishing for the day.

Day 3

We check the nose a few more times and double-check fluid levels. Everything is fine so we leave, having completed the job.

We plan to revisit G-BOAC in the coming months to complete the windscreen repair.

Author's note

On a personal note I am proud to have completed this work on not only the flagship of the BA fleet but also my local Concorde. This work will add new dimensions to the offering at Manchester.

Finally I would like to thank:

- All the fans and members of Heritage Concorde (<https://www.heritageconcorde.com>) who donated

money towards this exciting project – it couldn't have been done without you. Those who donated had faith in us delivering even though we couldn't at the time tell you which airframe we wanted to work on.

- Emma Rasmussen of Speedbird Concorde (<http://speedbirdconcorde.wixsite.com/speedbirdconcorde>) for helping to raise funds.
- Hydraulics Online Ltd (<https://www.hydrauliconline.com/resources/concorde-home/>) for their continued support.
- ExxonMobil (<https://www.exxonmobil.co.uk>).
- John Dunlevy, James Cullingham, Paul Evans.
- TAS Manchester (<http://www.tasmanchester.co.uk/index.html>).
- RVP Manchester (<https://www.runwayvisitorpark.co.uk>).
- British Airways (<https://www.britishairways.com/en-gb/information/about-ba/history-and-heritage/celebrating-concorde>).

NEWS FLASH

The first public nose move will take place on 2 March, on the 50th anniversary of Concorde's first flight. For details and tickets, see HC's page "Concorde at 50": <https://www.heritageconcorde.com/concorde-at-50>

