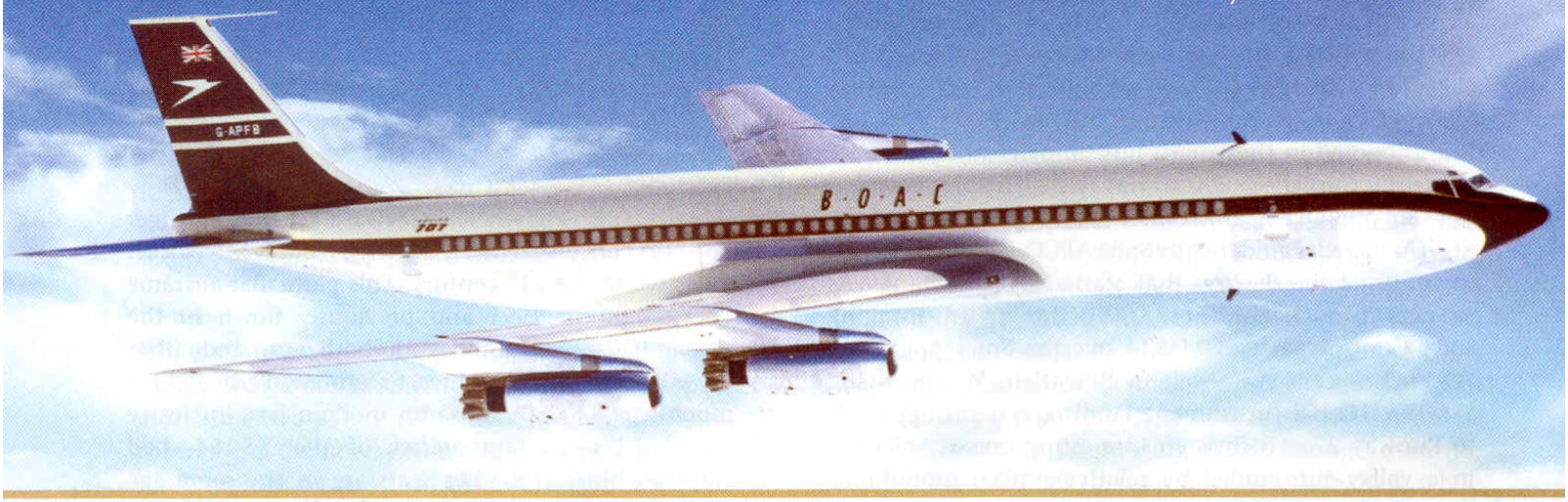
B·O·A·C and the 'Rolls-Royce 707'

by Ed Davies



'Foxtrot Bravo' photographed over the Puget Sound in the original configuration. This was the first airliner to fly with by-pass or double-flow turbojets.

On May 19, 1959, the Boeing 707 achieved yet another milestone in an increasingly impressive list when the first turbofan-powered version of the ground-breaking jetliner made its maiden flight from Renton Municipal Airport, Washington. This was the first of 15 707-436 Intercontinentals ordered by British Overseas Airways Corporation, powered by four Rolls-Royce Conway 508 (RCo.12) 'by-pass' turbojets.

The new powerplant concept, which would rapidly become the norm for jetliner engines, entailed bypassing a portion of the mass flow—23% in the case of the RCo.12—from the low-pressure (LP) compressor via an annular duct around the engine, rejoining the hot flow at the exhaust nozzle. Compared to earlier turbojets, the Conway offered an increase in thrust, a decrease in noise level, and a 2½-3% reduction in specific fuel consumption.

During the post-World War II period, Britain's commanding lead in turbine-propelled airliner development failed to translate into commercial success with long-haul applications. First there were the tragedies that befell the pioneering de Havilland D.H.106 Comet 1 (*Airways*, May 2002 & July 1999). Then, any promise of trans-Atlantic advantage to be gained by the four-engine Bristol Britannia evaporated with that type's development problems and the availability of jetliners from US manufacturers.

Therefore, BOAC's new managing director, Sir Basil Smallpeice, decided that tough times demanded tough measures. So, defying a 'Buy British' lobby and a need to conserve foreign currency expenditures, on June 22, 1956, Sir Basil sent a cable to William Allen, president of the Boeing Airplane Company.

'Personal and confidential. Request you grant us option exerciseable on or before thirty first July 1956 to purchase seventeen Boeing intercontinental aircraft with British engines and quote earliest delivery dates you can offer for whole series. Price and contract conditions to be negotiated. Am sending mission west coast beginning July and would like them visit July eleventh to nineteenth. Also request that you treat matter as strictly confidential as leakage might prejudice our position here'.

BOAC's evaluation group was headed by A C Campbell Orde, the airline's operations development director. The group flew first to Los Angeles to review the Douglas Airplane Company's factory at Long Beach,

and specifications for the rival DC-8. The 11-member team, plus Ivor Lusty, BOAC's West Coast technical consultant, was scheduled to fly to Seattle, Washington, on July 10, aboard United Air Lines Flight 771. Seizing the opportunity to really impress the British visitors, Boeing offered to send the Dash 80—Model 367-80, the prototype for the 707 and KC-135 military tanker (*Airways*, November 2005, July 2004, November 2003 & August 2002)—to Los Angeles to convey the BOAC team to Seattle. The Dash 80 had recently notched up its first 500 hours of flight, and this would be the first time that it landed at a commercial airport other than Boeing Field.

Accompanying the British on the flight north was a high-powered Boeing management team that included Senior VP Wellwood Beall, Chief of Commercial Sales Art Curren, and Senior Project Engineer Dick Rouzie. Pilot-in-command, providing a running commentary of the flight over the PA (public address) system was Boeing's legendary Chief of Flight Test Alvin M (Tex) Johnston. The Dash 80 'dash' took 1hr 57min, beating by 1hr and 23min the fastest nonstop scheduled flight available between the two cities. As though timed to provide a favorable impression of Boeing's manufacturing capabilities, the first KC-135 was rolled out at Renton and christened on the day before the BOAC team was scheduled to return to the UK.

On October 24, 1956, Harold Watkinson, the British minister of transport and civil aviation announced in parliament that the government had approved the purchase of 707s, to be powered by Conway engines. However, the size of the order, as authorized by Treasury, had been reduced from 17 to 15. The formal purchase agreement, valued at £44 million (equivalent to some $1.2 billion today), including engines and spares and executed at BOAC's headquarters at London Airport (Heathrow) on November 8, was signed by Sir Basil and Lowell Mickelwait, general counsel for the Boeing Airplane Company.

BOAC's 707s were essentially the same as the long-body 707 Intercontinental, marketed by Boeing as the 707-320 (although the official designation on the type

PHOTOS: BOEING HISTORICAL ARCHIVES

'Foxtrot Echo' after modification. Although the FAA and Boeing had been working toward implementing such an upgrade on the 707 line, it was the ARB that insisted on its incorporation before airplane delivery—at considerable expense to BOAC because of loss of revenue during the peak season. The ARB's stance demonstrated the refusal of chief pilot D P Davies to accept the need for an unreasonably high standard of pilotage during certain phases of flight.

certificate was 707-300). With Conway engines the generic dash number changed to 420 (707-400). Boeing also reserved the designation -520 for a proposed Conway Dash 100, but this was never built. The manufacturer assigned the customer number '36' to BOAC, hence the designation 707-436.

(In April 1956, Lufthansa had announced an order for four 707-320 Intercontinentals with Pratt & Whitney JT4s; a switch to Conways was made four months later, and subsequently an order for a fifth airplane was placed. Lufthansa took delivery of its first 707-430 in February 1960 and placed the type in service the following month. Other non-British airlines that purchased new Conway 707s were Air-India—six, El Al Israel Airlines—three, and Brazilian flag carrier Varig—three. The Conway was also selected by Trans-Canada Air Lines, Alitalia, and Canadian Pacific Airlines for their 32 Douglas DC-8 Series 40s.)

The RCo.12 originally had a guaranteed takeoff thrust of 16,500lb (73.4kN), but by August 1959, development led to a rating of 17,500lb (77.8kN). Britain's iconic engine-builder would also design and manufacture the noise suppressors and thrust reversers. Although the contract called for Boeing to be responsible for the purchase and installation of the engines, an offset agreement was concluded allowing BOAC to pay for the engines in pounds sterling. It was also agreed that Boeing would repurchase 14 Boeing 377 Stratocruisers that the airline had begun to withdraw from service during the latter part of 1957, and to channel the proceeds toward the 707 purchase price. Boeing appointed the Babb Company as exclusive agent for the disposal of the Stratocruisers, ten of which were sold to Transocean Air Lines, based in Oakland, California.

BOAC also benefited from Boeing structural tests that indicated, for a 314lb (142kg) tare weight penalty of a heavier landing gear, the MGTOW (maximum gross takeoff weight) could be increased from 296,000lb (134,250kg) to 312,000lb (141,500kg).

Deliveries to BOAC were scheduled to begin in December 1959, but the British flag carrier did not receive its first 707-436 until the end of April 1960, the month it had originally planned to introduce the type into service.

BOEING HISTORICAL ARCHIVES

Captain H J (Dexter) Field, BOAC resident project pilot, explains the functions of the noise suppressor and thrust reverser to a BOAC flight attendant. At 5,147lb (2,335kg), the Conway was the heaviest engine used on a 707. Although the first of the by-pass turbojets, the Conway proved more fuel-thirsty than the Pratt & Whitney JT3D turbofan, and only 37 707-400s were built.

The first aircraft (registered G-APFB), rolled out of the Renton factory on December 12, 1958, and made its first flight on May 19 the following year. On September 26, 1959, this airplane took off from Boeing Field on a 'functional and reliability' flight nonstop to Tokyo-Haneda, a distance of 4,815mi (7,750km). Pilot-in-command was Boeing's senior test pilot, R L (Dix) Loesch, assisted by Brien Wygle, Boeing 707 project pilot, and Clayton Scott, chief of production flight test. The 707 was registered N31241, one of several 'trade plate' numbers allocated to Boeing. Flight time was 10hr 47min, and was the first westbound, nonstop flight between the USA and Japan by an airliner. The return, with an intermediate stop at Honolulu, Hawai'i, landed at Boeing Field at 2027lt on September 30.

Because only a relatively small number of the 707s would be built with the Conway, provision was made for a replacement engine to be flown out on a scheduled passenger flight to an airplane grounded with engine problems at a distant airport, enabling the latter airplane to return to its home base in London. This was achieved through the use of a special streamlined pod and pylon that could be quickly attached to the wing inboard of the n° 2 (port inner) engine. Boeing's Brien Wygle and FAA (Federal Aviation Agency) pilot Sliff flew the pod certification flight with N31241 (G-APFB) on November 10, 1959; G-APFH was flown with a pod on its delivery flight to Prestwick, Scotland, in July 1960.

On February 12, 1960, the Model 707-400 Series was awarded FAA certification; however, a protracted and contentious delay arose from the differing certification requirements of the FAA and the British Air Registration Board (ARB). The ARB's concerns were the potential for stall during takeoff through an excessive angle of rotation—which had caused two Comet 1 crashes—and the 707's Dutch roll characteristics, that had led to three training accidents in 1959, with fatal results in the case of American Airlines and Braniff International Airways (*Airways*, October 2009).

Accordingly, the ARB required a demonstration of the aircraft's ability to unstick at a nose-high attitude, at various speeds. Nowadays a normal part of the flight testing for any new type, V_{MU} (velocity maximum unstick) takeoffs were conducted at Edwards Air Force Base, California, during November 1959, using BOAC's first 707. These tests showed that the 707 would only unstick after the nose was lowered. A modification resulting from these tests saw a 39in (1m)-deep ventral tail fin added to alleviate the possibility of a premature rotation—and also improve the airplane's longitudinal stability.

The low-speed stability fix took much longer, and included an addition of 35in (89cm) to the top of the vertical stabilizer and duplication of the yaw damper, although the latter device was to remain inoperative during the takeoff/climb and approach/landing phases. To counter additional engine thrust, a modification of the rudder control system—allowing the rudder to be fully powered throughout its whole range of movement (not only the first 15 degrees)—had already been incorporated on the Dash 300 and Dash 400 models.

Thus G-APFB was modified at the Boeing plant, and

JW COLLECTION

G-ARRB fitted with a 'fifth pod' to take a spare Conway down the line.

after a final series of test flights by the ARB's chief test pilot David P Davies (of *Handling the Big Jets* fame)—who had personally insisted on the changes—British certification was awarded on April 28, 1960.

Ivor Lusty, the airline's plant representative at Renton, 'accepted' G-APFD in an 'informal ceremony' on April 27, and following transfer of title (the official delivery) the next day, the 707 was flown nonstop to London, arriving on April 29. Captain T B (Tom) Stoney, BOAC's 707 flight manager, was in command for the 4,900mi (7,885km), 9hr 44min flight.

The taller vertical stabilizer became a standard feature of the entire 707/720/KC-135 series. All 707-300/-400 series also had the ventral fin, as well as Dash 100s with Pratt & Whitney JT3C turbojets and 15 low gross weight Dash 300Bs (with the JT3D turbofan), which had a 17 flaps takeoff setting. Because they had a full set of leading edge flaps, 14 flaps for takeoff, a 'series' yaw damper, improved stall warning (stick shaker) operation, and aerodynamic upgrades to the wing, the Dash 300B 'Advanced' and 'Advanced-Heavy', and -300C did not require the ventral fin. A smaller (13in/33cm) ventral fin was fitted to Dash 100Bs (with turbofans) and 720s to prevent damage in over-rotation, as the stick shaker did not activate early enough.

Boeing supplied retrofit kits without charge to operators that had already had taken delivery of 707s, an action that helped cement the manufacturer's reputation in airline circles.

Flight Training

BOAC's flight training program was unusual in that many of the pilots converting to the 707 fleet already had many Atlantic crossings under their belts, plus considerable turbojet experience on the Comet 1 and Comet 4. Ground school was provided in Seattle for selected crewmembers, who would pass on their experience during continuing instruction in London. From April 4, 1960, the action moved to Tucson, Arizona, where the dry climate and long runways promised three weeks of uninterrupted flying from dawn to dusk. Traffic was light, and instrument landings were available at relatively nearby San Antonio, Texas. Wygle and five other Boeing instructor pilots were assigned to the program, together with a maintenance crew who serviced the two modified 707-436s each night. BOAC had 45 employees in Tucson, including 23 mechanics.

A 1960 BOAC brochure advertising the 'Crowning luxury' of its first class 'Monarch' service aboard the 34 first class seats were reduced to 24 and accommodation for economy customers increased fr

The type conversion program continued in the UK, with one dedicated 707 (G-APFC) detached to the remote Royal Air Force Coastal Command station at St Mawgan in Cornwall. This phase moved to Shannon, Ireland, during October, when a runway extension was completed. In addition, each pilot was required to complete 35-40 hours in the flight simulator at Heathrow. Approximately 90 crews, consisting of six per aircraft for the 15-strong fleet, completed initial training.

e Rolls-Royce 707 on the London to New York services. From April 1, 1961, 97 to 111.

Deliveries

As deliveries moved into high gear, the second aircraft (G-APFE) was accepted by the airline on April 29 and remained in Seattle for a few days for crew training. Number three (G-APFB) was handed over on May 9 and flown nonstop to London the next day. Most of the new 707s arrived in London with a bare cabin and incomplete galley. The seats, 34 in first class—laid out with a deluxe pair, each side of the aisle, at 42in (106cm) pitch—and 97 in economy (coach), six abreast at 34in (86cm) pitch, were supplied by Microcell, and installed at Heathrow. Similarly, some of the equipment for the two GEC galleys was installed after delivery. However, in June and July the sixth and seventh airplanes (G-APFG & G-APFH) were delivered from Seattle complete with cabin furnishings, ferried to Montréal, Québec, thence operated scheduled revenue flights to the UK.

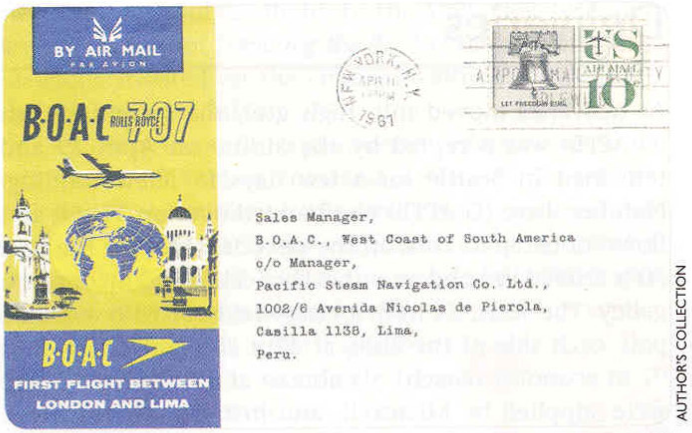
Pilot in command for the 13th delivery flight was Capt H J (Dexter) Field, who had spent the previous 12 months in Seattle as BOAC's acceptance test pilot for the Conway 707 program. He took off from Boeing Field on Thursday, November 17, at 1700lt and flew G-APFN nonstop to Heathrow—4,210nm (7,800km) in 9hr 15min. BOAC received its 15th, and last, 707-436, G-APFP, on December 22, 1960. This was also the final delivery of the year for Boeing Airplane Company—whose title was changed to 'The Boeing Company' the following year to represent the changing nature and diversity of its business; on the same day, United Air Lines received its 13th Boeing 720 (a shorter, medium-range version of the 707), bringing the total number of 707s and 720s delivered worldwide to 175.

Service entry

The last of a dozen roundtrip trans-Atlantic proving flights arrived in London on May 25, 1960. Two days later, G-APFD carried 91 fare-paying passengers, ten days ahead of the planned introduction. Capt Stoney commanded the service, assisted by Capt Gordon Stone. The 707 replaced a Comet 4 between London and New York (Idlewild, now JFK), and repeated the process on May 29 and May 31.

BOAC marketed its new jetliner as the 'Rolls-Royce 707', echoing national pride in the then-prevailing close family ties linking the manufacturers of the Conway—and other Rolls-Royce aero engines—and the Motor Car Division of Rolls-Royce, at the time widely regarded as maker of 'The Best Car in the World'.

Starting Wednesday, June 1, three scheduled trans-Atlantic services were flown by the 707s, and a week later this was increased to a daily roundtrip. The 707s



AUTHOR'S COLLECTION

First flight cover carried aboard BOAC's first Conway-powered 707 scheduled service to Lima on April 11, 1961. The service operated twice-weekly, via New York and Nassau, using aircraft equipped with 32 first class and 92 economy seats.

were also introduced on the eastern Canada routes with two services a week to Toronto, one via Montréal and one via Prestwick.

BOAC's tenth 707 (G-APFK) was delivered on Thursday, September 29, in time for passengers to benefit from the new 17-day North Atlantic excursion fares. In the first ten days of October, 50% more seats were sold than during the same period in 1959. October 16 saw the last North Atlantic service by a BOAC Comet 4, and the next day the type was superseded by the 707 on the Manchester–Prestwick–Boston–New York route. On September 24, New York–Jamaica jet service was inaugurated by the 707, initially a weekly flight via Nassau (Bahamas) to Montego Bay and the Jamaican capital, Kingston.

Just before midday on Christmas Eve, less than two months after delivery, G-APFN approached Heathrow on the final leg of a scheduled passenger service that had originated in Chicago, Illinois, with intermediate stops at Detroit (Michigan), Montréal, and Prestwick. The weather was marginal, and Capt R B Winn positioned the aircraft for a PAR (precision approach radar) talk-down landing on the 7,734ft (2,357m)-long Runway 23L. The 707 crossed the threshold at between 35 and 50ft (10-15m) and touched down nearly halfway along the wet strip. Realizing that he could not stop the aircraft on the available length, the captain attempted to make a 100-degree right turn onto Runway 33L, which began at the end of 23L (the threshold of 05R). But the airplane left the concrete and skidded sideways on the grass as its main landing gear collapsed.

Crew and passengers exited via the inflatable chutes, and despite substantial damage to the airframe and fuel leakage, there was no fire, and no serious injuries to the 95 passengers and 12 crewmembers.

Working nonstop through the Christmas holiday period, plans were immediately put in hand to move the airliner off the field to a hangar where permanent repairs could be started. Airline, airport, and contract labor crews raised the airplane with air bags, lowered and reinforced the main landing gear, built a temporary road of 2,000 railway sleepers [ties] across the mud to the nearest concrete, and on the evening of December 29 'Foxtrot November' was towed away out of sight.

A Boeing AOG (aircraft on ground) team consisting of P Jones, V Nelson, D Bowen, and I Poland was flown in to assess the damage, and on January 19 the repair program was finalized and approved by the airline. Subsequently, a repair team consisting of 48 manufacturing and support personnel from Seattle began work on January 31. Some of these mechanics had recently returned from Guadeloupe, French West Indies, where on October 7 an Air France 707-328 (F-BHSJ) had landed short, with no loss of life but extensive damage.

Repairs to the 707 were finished ahead of target, enabling the first test flight to be made on February 26, customer acceptance following two days later. Returning to scheduled service, G-APFN went on to enjoy a career exclusively with BOAC (and successor British Airways) until Boeing repurchased it in 1976.

The investigation concluded that the final stage of the approach was too fast. Consequently, the aircraft touched down too far along the runway, and failed to stop within the remaining length. During the first years of 707 operations there were several similar incidents around the world, pointing to the need for intensified training for pilots converting to the large jets and for runway extensions. The fact that fire had not broken out despite the fuel leak also prompted discussion on the relative merits of kerosene, as used exclusively by BOAC for its jetliners, and the more volatile JP-4 preferred by some other airlines.

Cunard Eagle Airways and BOAC-Cunard

At the start of the Sixties, British Eagle International Airways—founded in 1948 as Eagle Aviation by wartime pilot and aviation entrepreneur Harold Bamberg—attracted the attention of the Cunard Steam-Ship Company of trans-Atlantic fame. The latter was anxious to obtain a stake in the airlines, which, for the first time in 1955, carried more passengers to New York than did the shipping lines (*Airways*, February 2009). With Cunard buying a 60% share in British Eagle, the two unlikely partners merged to form Cunard Eagle Airways, and filed an application with the newly formed Air Transport Licensing Board (ATLB) for permission to operate a scheduled service between London and New York. Bolstered by the infusion of capital, Eagle signed a letter of agreement on March 21, 1961, to purchase two Conway-powered 707-400s, with an option for a third.

Despite vigorous opposition from BOAC, on June 22, 1961, the ATLB announced a decision in favor of Cunard Eagle, giving the national carrier 21 days in which to appeal. In a decision that shocked the UK independent airline industry, made known on November 21, the Minister of Aviation upheld BOAC's appeal against the awarding of a 15-year license to Cunard Eagle to operate a daily roundtrip service between the UK and New York.

Nevertheless, the first Cunard Eagle Airways 707-465 (registered in Bermuda as VR-BBW) was delivered on February 27, 1962, and flown to Tucson for crew training.

Denied the London to New York route, Cunard Eagle's first 707 was used initially from March 27 on an *ad hoc* basis to supplement Vickers Viscounts on the Bermuda–New York shuttle—marking the first operation of a jetliner by a British independent airline. But on May 5, with the airplane under the command of Capt G Henderson,

BOB O'BRIEN COLLECTION

BOAC operated regular services for Nigeria Airways with several Conway-powered 707s, including G-ARRA.

TOM SINGFIELD COLLECTION

BOAC 707-400s, including G-APFK, at the Heathrow maintenance base in 1968 wearing 'Golden Speedbird' trim.

BOEING HISTORICAL ARCHIVES

Cunard Eagle Airways 707-465 G-ARWD was one of two that became part of the BOAC-Cunard fleet. Cunard Eagle's brief trans-Atlantic service was marketed in the UK as the 'Cunarder Jet', and in the western hemisphere as the 'Londoner'.

B·O·A·C Rolls-Royce 707s

Of the 20 Conway 707s operated by BOAC, Cunard Eagle, BOAC–Cunard, and BEA/British Airtours, three were destroyed in accidents; 12 were returned to Boeing in part exchange for 747–200Bs; and five were disposed of directly by BA. The nose and forward fuselage of two (G–APFG & G–APFJ, respectively) are the only survivors in the UK.

G–APFB (msn 17703/ln 35)
delivered May 9, 1960
sold to Boeing 1976; forward fuselage to Renton for E–3A Sentry program, remainder scrapped Kingman, Arizona, 1988.

G–APFC (msn 17704/ln 101)
delivered May 16, 1960
sold to Boeing 1975; dismantled at Wichita–McConnell AFB, Kansas, fuselage to Atlantic City, New Jersey, and destroyed in FAA testing.

G–APFD (msn 17705/ln 112)
delivered April 28, 1960
sold to Boeing 1979; to Commercial Air Transport Sales as N888NW; to International Mailing and Printing/Air Wing International; scrapped Fort Lauderdale, Florida, 1986.

G–APFE (msn 17706/ln 113)
delivered April 29, 1960
destroyed March 5, 1966, Mount Fuji [Fuji–san], Chbu, Honshu, Japan; 113 passengers and 11 crew killed.

G–APFF (msn 17707/ln 127)
delivered May 13, 1960
sold to Boeing 1981; scrapped Kingman, Arizona, 1988.

G–APFG (msn 17708/ln 128)
delivered June 23, 1960
sold to Aviation Traders (ATEL) 1981, used for apprentice training at London–Stansted; nose preserved at Pershore, Worcestershire.

G–APFH (msn 17709/ln 144)
delivered July 15, 1960
damaged June 6, 1974 and retired; sold to Boeing 1975; scrapped Marana, Arizona, 1977

G–APFI (msn 17710 /ln 145)
delivered July 23, 1960
sold to Boeing 1976; scrapped Kingman, Arizona, 1980.

G–APFJ (msn 17711/ln 163)
delivered September 22, 1960
displayed at Cosford until scrapped May 2006; forward fuselage preserved by the National Museum of Flight, East Fortune, East Lothian, Scotland.

Cunard Eagle Airways made a triumphant 'back-door' entry onto the North Atlantic with an inaugural flight from London to Miami (Florida), and thence to Nassau, Bahamas, via Kindley Field, Bermuda. The distance of 3,454.5mi (5,559km) between London and Bermuda was covered at an average speed of 498.9mph (801kph) and set a point-to-point record.

BOAC reacted swiftly and mercilessly. The day after Cunard Eagle's first Atlantic service, it announced the formation of subsidiary BOAC-Cunard, in which Cunard Steam-Ship held a 30% interest. Starting June 24, all scheduled passenger, freight, and charter services between the UK, the eastern seaboard of the USA, Bermuda, the Bahamas, and the Caribbean would be operated on behalf of BOAC-Cunard. Three more Boeing 707-436s were ordered (G-ARRA, 'RB, and 'RC).

The last of these, 'Romeo Charlie', first flew from Renton on March 4, 1963. A ferry crew, led by Capt G H (Gerry) Easton, arrived in Seattle, having flown from London on BOAC's San Francisco service. After a single, successful customer's test flight, acceptance and payment formalities for a Conway-powered 707 were completed by a British customer for the 20th time (18 Dash 436s to BOAC and BOAC-Cunard, plus two Dash 465s for Cunard Eagle), and on March 15/16 Easton and his crew flew the 707, operating as *Speedbird* 4019, nonstop to London. One of the two engineers on this flight, Eric Draper, had also crewed delivery flights of BOAC's Boeing 314 flying boats, as well as Stratocruisers.

BOAC-Cunard's first service departed from London on Sunday, June 24, bound for Bermuda, via Manchester, Glasgow, and New York. The BOAC-operated 707 left Heathrow with only 38 passengers. Until the relevant route licenses were transferred to the new entity, the 707s remained in BOAC or Cunard Eagle colors; BOAC-Cunard titles were then adopted. As Cunard Eagle was effectively dissolved, its second 707 (G-ARWE), delivered in July, went directly to BOAC-Cunard.

At the end of September, Cunard Eagle's sole Bermudan-registered 707 was transferred to BOAC-Cunard. Since delivery, the aircraft had flown 1,569 hours, of which 350 were training, 158 on services between Bermuda and New York, and 1,062 on the London-Miami route. During the last month of operation, the 707 flew 8.6hr/day. On the London–Bermuda–Nassau–Miami/Kingston service all but one of 54 scheduled roundtrips were operated (one was canceled after the 707 was struck by a ground vehicle); 83 of the 106 departures were on time, for a punctuality rate of 78.3%.

BOAC-Cunard's renowned passenger services, operated by 707s and, later, BAC (Vickers) Super VC10s, continued plying the North Atlantic until 1966. The end of the airline/shipping line union came on September 16, with a joint announcement that BOAC

had agreed to acquire, for cash, Cunard's 30% share of the joint operation, and that the BOAC-Cunard titles would disappear from the airplanes, sales offices, and timetables as soon as practicable.

By the end of 1960, the 707 dominated BOAC's North Atlantic routes, and on October 16 of that year the Comet 4 operated the last scheduled service of this type between New York and London. Spreading its wings to the US West Coast, on October 21 BOAC started twice-weekly service between London and San Francisco, a 12½-hour schedule that included a one-hour layover in New York. On December 8, the service was extended across the Pacific to Honolulu and Tokyo, with links to Hong Kong and a round-the-world jetliner route. In October 1962 BOAC inaugurated twice-weekly 707 services between London and Sydney with intermediate stops at Frankfurt, Tel Aviv, Tehrān, Delhi, Rangoon [Yangon], Singapore, and Darwin.

The Rolls-Royce 707 made its first appearance in Los Angeles during November 1960, operating the return leg of the trans-Pacific proving flight to Tokyo and Hong Kong. By March 1961, the 707 had become a regular visitor to the USA's major West Coast gateway, when BOAC inaugurated the fastest direct jet service between London and LAX. The initial frequency was two roundtrips a week, increasing to three after May 1.The fine print called for a 'technical stop' at Montréal westbound and, when necessary, eastbound. Journey time for the 5,443mi (8,760km)-eastbound flight was 10hr 50min.

The worst accident in the history of BOAC's Conway 707s came on March 5, 1966. Flight BA911, operated by G-APFE, had originated in San Francisco and was bound for London, via the Far East, and India. On March 4, it had been diverted to Fukuoka, Japan, because of poor visibility at Tokyo International Airport. Arrangements were made to lay over at Fukuoka and 'Foxtrot Echo' arrived at Haneda at 1243lt. Takeoff was at 1358 for the next stage to Hong Kong on a course that would afford passengers an impressive view of nearby 12,388ft (3,776m)-high Mount Fuji [Fuji-san]. Some 15 minutes later the airplane broke up in flight, resulting in the deaths of all on board: 113 passengers and 11 crew, headed by Capt Bernard Dobson.

Crash-proof FDRs (flight data recorders) were only beginning to be fitted aboard BOAC's fleet, and G-APFE had a SFIM (Société de Fabrication d'Instruments de Mesure) data recorder mounted in the forward electronics bay as part of the Ministry of Aviation Civil Aviation Airborne Data Research Programme. (BOAC had ordered basic five-channel recorders from Epsylon, with the unit first flown on G-APFC on January 22, 1965.) It was not intended to be crash-proof, and thus the equipment fitted to 'Foxtrot Echo' provided no clues to the cause of the disaster. The only sources of information were movie camera shots of the break-up

G-APFK (msn 17712/ln 164)
delivered September 29, 1960
destroyed March 17, 1977, Prestwick, Scotland, in training flight accident; no casualties.

G-APFL (msn 17713/ln 169)
delivered October 21, 1960
sold to Cargo Charter Airways 1980 as 9Q-CRW;
to Coastal Airways as 5X-CAU/N9194M/5X-CAU and impounded Entebbe, Uganda (derelict).

G-APFM (msn 17714/ln 170)
delivered November 5, 1960
sold to Boeing 1976; scrapped Kingman, Arizona, 1980.

G-APFN (msn 17715/ln 171)
delivered November 16, 1960
sold to Boeing 1976; scrapped Kingman, Arizona, 1988.

G-APFO (msn 17716/ln 175)
delivered December 9, 1960
sold to Boeing 1981; scrapped Kingman, Arizona, 1988.

G-APFP (msn 17717/ln 176)
delivered December 22, 1960
sold to Boeing 1975; displayed by Franklin Institute Aeronautical Museum, Philadelphia, Pennsylvania, until scrapped 1988.

G-ARRA (msn 18411/ln 266)
delivered February 16, 1962
sold to Euro Aero Service 1981; to Coastal Airways as N4465D; destroyed October 13, 1983, in ground fire at Perpignan, France.

G-ARRB (msn 18412/ln 330)
delivered February 12, 1963
sold to Boeing 1976; scrapped Kingman, Arizona, 1979.

G-ARRC (msn 18413/ln 334)
sold to Euro Aero Service 1981; to Coastal/Cobra Airways as N4465C; to Air Charter Service as 9Q-CTK; scrapped Kinshasa-Ndjili, Zaïre, 1995.

G-ARWD (msn 18372/ln 271)
delivered February 27, 1962 as VR-BBW (Cunard Eagle Airways)
sold to Boeing 1981; fuselage used at Renton for ECX/E-6A Mercury program.

G-ARWE (msn 18373/ln 302)
delivered July 7, 1962 (VR-BBZ not taken up)
destroyed April 8, 1968, London-Heathrow; 4 passengers and one hostess killed.

A more detailed account of the production history and fates of these 20 Boeing 707s is posted (in pdf format) at our website: www.airwaysmag.com under 'News/Special Reports'.

taken from the ground, and another camera, recovered from the wreckage, that had been running during the accident. From this meager evidence the Japanese investigation report concluded that: 'The probable cause of the accident is that the aircraft suddenly encountered abnormally severe turbulence over Gotemba City, which imposed a gust load considerably in excess of the design limit'.

Subsequently, a US Navy pilot, flying a Douglas A-4C Skyhawk, sent to investigate the crash site on the eastern side of Mt Fuji, reported that he had encountered mountain wave turbulence in excess of +9g and -3g up to 16,000ft (4,900m).

Second-tier operations

In the Sixties and Seventies, IT (inclusive tour) charters were a rapidly expanding segment of commercial aviation in Europe, with many new airlines springing up, offering a lower-cost alternative for vacation travel. To protect its market share, government-owned British European Airways joined the fray in 1969, forming BEA Airtours as a wholly owned, non-International Air Transport Association subsidiary. First flights were from Gatwick, in March 1970, using a fleet of ex-BEA Comet 4Bs.

A BOAC 747 takes off from Runway 10R at Heathrow in 1971. The type would soon succeed the 707-400s in the foreground.

BEA Airtours 'Foxtrot Oscar' at Gatwick in 1974.

BOB O'BRIEN COLLECTION

One of several wet-leases was 707-465 G-ARWD to Air Mauritius.

BRIAN N STAINER/WILL BLUNT COLLECTION

The end of G-ARWE at Heathrow on April 8, 1968. Shortly after takeoff, operating BA712 from London to Sydney via Zürich and Singapore, a fire in the nº 2 (port inner) Conway led to the engine pod detaching. Returning to the airport, 'Whiskey Echo' landed on the short Runway 05R after 3min 32sec in the air, where passengers and crew evacuated as soon as the aircraft came to a stop. The left wing exploded and the cabin was engulfed in smoke and flames; of the 116 passengers and 11 crew on board 122 survived, albeit 38 with injuries; four passengers and Stewardess Barbara Jane Harrison lost their lives.

The cockpit section was picked up December 4, 1969, from Heathrow by Aero Spacelines Guppy and flown to the USA. It was then grafted ahead of the existing nose of a Convair 580 (msn 466/N21466) converted by Aero Spacelines, Santa Barbara, California, as a TIFS (Total-in-Flight Simulator) for Tex Johnston Inc. That aircraft reverted to standard 580 configuration late in the 1970s.

In 1971, BOAC decided to retire the 707 passenger fleet. At the same time, BEA Airtours began negotiations with American Airlines to buy some 720Bs. Political pressure forced Airtours to take the thirstier 707s instead, but not before BOAC had been persuaded to lower its asking price.

BEA Airtours bought seven 707-436s from BOAC, together with a substantial holding of engines and spares, for £4.3 million (equivalent to about $70 million today). Refurbished by BOAC with 189 seats at a luxurious (for an IT operation) 32in (81cm) pitch, the first (G-APFK) was handed over at Gatwick on December 30, 1971, and entered service the following month.

Displaced from scheduled long-haul routes by the wide-body Boeing 747, BOAC retained the remaining 707-436s for its own IT operation, run under its non-IATA 'paper' subsidiary, British Overseas Air Charter.

With the merger of BOAC and BEA in 1974, to form British Airways, BEA Airtours became British Airtours. But even as the titles on the airplanes were changed, the Rolls-Royce-powered 707s were nearing the end of their illustrious careers with a major flag carrier.

BOB O'BRIEN COLLECTION

Pending delivery of three new 707-320Cs in 1975, Syrian Arab Airlines wet-leased two 707-436s (G-APFB & G-APFL) from British Airtours. (In the event, Boeing never delivered the 707-320C to Syrianair.) Based in Damascus [Dimashq], the stomach problems of the BA crews were legendary, and a collective sigh of relief went up when the contract expired.

FAA

G-APFC was sold to Boeing and flown to Wichita-McConnell AFB, Kansas, on May 22, 1975. Acquired by the FAA, the wings and tail were removed and the fuselage cut in half and transported by rail to the FAA Technical Center (now the William J Hughes Technical Center), Atlantic City, New Jersey, where it is pictured upon arrival. The airframe was destroyed in 1978 during a series of tests to assess damage to a commercial airframe from improvised explosive devices.

JOHN WEGG

Eight BA 707s ended their lives at Kingman, Arizona.

Postscript

The November 29, 1962, issue of *The Aeroplane and Commercial Aviation News* featured an article titled 'Boeing Offers Improved Conways in 707 Variant'. The design study envisaged a new 707 Intercontinental powered by the 21,000lb (93.4kN) st RCo.42/1 and incorporating the same wing enhancements as the Pratt & Whitney JT3D-powered 707-320B. The new variant would be known as the 707-420B, with increased range offered as the major performance improvement.

Unfortunately the proposal failed to fly. In a January 1963 cable to Sir Denning Pearson, chief executive of Rolls-Royce, Boeing President William Allen pointed out that 'It is impractical for Boeing to invest the effort and funds necessary to launch the 707-420B, unless BOAC places an initial order for a minimum of nine aircraft'. BOAC, losing money, and suffering from declining load factors on most of its long-haul routes, was in no position to order more 707s. Moreover, waiting in the wings was a new 'Queen of the Skies'. A little more than three years later, Pan Am announced the first order for the Boeing 747—and the rest is commercial aviation history... ✈

Visit our website www.airwaysmag.com *under 'News/ Special Reports' for a free gallery of more BA 707-400 photos, as well as a more detailed account of the production history and fates of these 20 Boeing 707s.*

BOEING

The fuselage of 707-465 G-ARWD was used at Renton as an interior mockup for the ECX program, which led to the US Navy's order for 16 Boeing E-6A Mercury TACAMO ('take charge and move out') airplanes, based on 707-320B airframes, that still serve as a communications link for the Trident SSBN fleet.