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Welcome

Hello and welcome to your October 2020 edition of *Airliner World*.

I'd like to kick off things with a message of appreciation to you, our readers. It has been a truly torrid few months not only for the commercial aviation industry, but also for much of the wider population, here in the UK and around the world. I recognise that when times are as tough as they are currently, little luxuries such as magazines can be among the first items to be struck off the shopping list. As such, I am incredibly grateful to everyone who has been in touch to share their enthusiasm for what we do. It is no exaggeration to say that we wouldn't be here without you. An extra-special thanks to the countless readers around the world who have taken advantage of our subscription options over recent weeks. If you're keen to learn how to save money while still enjoying (and supporting) the world's number one commercial aviation magazine, check out pages 64-65 or simply visit **key.aero/airlinerworld**.

The readership of *Airliner World* is a staggeringly broad church, so it is almost impossible to please everyone all of the time. I hope you'll agree that, even in these most challenging of times, we've been able to continue to provide a stimulating blend of news, analysis and features from across this most dynamic of industries. As always, if you've a suggestion for a story, get in touch with the editorial team via **airlinerworld@keypublishing.com**

I hope that the arrival of our magazine each month delivers a welcome ray of sunshine during these gloomy days – the equivalent of breaking through the clouds after a seemingly never-ending climb.

Our collective passion for travel may be subdued at the moment, but it has not gone away. The aviation business can feel cruel and unforgiving, with a seemingly infinite list of internal and external factors yielding the potential to upset the delicate ecosystem. However, amid all the uncertainty, one thing is absolutely clear: the bad times will pass and things will get better.

On a final note, sincere apologies to any readers who missed out on the British Airways 747 souvenir poster in the September issue. Due to a problem at our mailing house, the poster was not included with subscriber copies. I'm glad to report that it should be enclosed with this edition.

I hope you'll agree it was well worth the wait and the perfect accompaniment to our special BA 747 coverage, which begins on page 30.

Wherever you are in the world, I hope you enjoy your October issue,

Gordon Smith
Group Editor

COVER PHOTO:
V1IMAGES.COM/RICHARD MIRCEA GEORGE

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this month

30 **British Airways Retires the Queen of the Skies**


50


94
AERO LLOYD


72


42
Airtransat


66

News Review

AIRLINER WORLD'S **COMPREHENSIVE COVERAGE** OF WORLDWIDE NEWS

Virgin Atlantic **Restructuring**

AFTER THE Crawley-based carrier warned it could run dry of cash by September 28, Virgin Atlantic Airways has filed for bankruptcy protection in the United States as it tries to survive the COVID-19 pandemic.

Following a court appearance in the UK on August 8, the airline made the Chapter 15 filing in New York later that the same day.

As part of its restructuring plan announced on July 14 (see *Europe News*, September), the company is seeking a private-only solvent recapitalisation of the airline – a restructuring plan from private investors so it can continue to trade – involving a refinancing package worth £1.2bn over the next 18 months.

A Virgin Atlantic spokesperson told our digital platform, Key.Aero, that "the restructuring plan is going through a court-sanctioned process under Part 26A of the Companies Act 2006, to secure approval from all relevant creditors before implementation."

Virgin's restructuring plan is based upon a five-year strategy. Affected creditors are due to vote on the plan on August 25. (Photo Flickr Commons/ Tomás Del Coro)

Malta MedAir Debut

MALTA MEDAIR has launched scheduled services for the first time after the carrier's sole aircraft – sporting new company titles – departed for Warsaw/ Chopin on August 1.

Founded in 2018, Malta MedAir is a subsidiary of flag carrier, Air Malta, and both are fully owned by the country's government.

Previously, Malta MedAir operated links exclusively on Air Malta's behalf, mainly to the London gateways of Gatwick and Heathrow.

On the Malta MedAir website, the company stated it has its own operating licence from the Maltese Aviation Authority, adding that "[Malta MedAir] is [a] completely distinct company from other airlines operating in [the country]."

For the present its single Airbus A320ceo, 9H-AEO (c/n 2768), has retained the 'Valletta European Capital of Culture' livery which was applied when the jet was flown by Air Malta.

According to Malta MedAir's management, they are "pursuing plans" to grow the business "further afield" over the next couple years. (Photo Ruben Zammit)

Stobart Opens Belfast Base

AER LINGUS Regional, operated by Stobart Air, opened its newest base at Northern Ireland's Belfast/City Airport on August 27.

Proposing to serve six new destinations within the UK, it initially launched links to Edinburgh and Exeter. Manchester and Birmingham flights were due to start on September 14 and East Midlands and Leeds/ Bradford on October 1. A full strength of five ATR 72-600 turboprops are scheduled to be based at the site.

David Shepherd, chief commercial officer at Aer Lingus, commented: "Together with our up to three-times-daily service from Belfast/ City to London Heathrow, [operated by the Irish flag carrier's Airbus A320 Family jets], today's announcement means Aer Lingus/Aer Lingus Regional, operated by Stobart Air, is the largest operator out of Belfast/City, ensuring connectivity between Northern Ireland and the rest of the UK."

The move by Stobart comes as a result of the Flybe collapse in March. It was a major blow for the Northern Irish gateway as the latter carried 1.6m customers from 14 routes in 2019.

History Made in the **South Atlantic**

LONDON/STANSTED-BASED Titan Airways had the honour of operating the largest aircraft to visit St Helena's sole gateway.

The British ACMI specialist deployed Boeing 757-200, G-ZAPX (c/n 29309), after being asked by the government of the British overseas territory to repatriate travellers to and from the UK.

The 757 departed Stansted on July 29, making stops at Gran Canaria and Ascension Island (South Atlantic), before continuing to St Helena the following day, landing at 4:26pm local time, with a complement of 51 passengers.

The next day, before departing back to the UK, the crew of the 757 performed a series of take-offs, landings and missed approaches from both ends of St Helena's 6,398ft (1,950m) Runway 02/20 to familiarise themselves with the airfield. At 10:06am, the aircraft departed back to Stansted via a stop in Accra, Ghana, carrying 94 passengers.

Earlier this year, the South Atlantic facility was visited by Titan when it deployed its sole ex-British Airways Airbus A318, G-EUNB (c/n 4039), from the UK.

The controversial airport was opened in May 2016 and is prone to strong wind shear that presents challenges to flight crews, especially on approach.

Start-up **Lübeck Air Launches**

GERMANY'S NEWEST carrier, Lübeck Air, started operations with two domestic destinations on August 17.

Using a sole ATR 72-500, SE-MDB (c/n 822), it connects the cities of Munich twice-daily and Stuttgart once-daily except Saturdays, with its Lübeck City Airport base in northern Germany.

The airline has partnered with Danish operator, Air Alsie, which both sourced and operates the turboprop on behalf of Lübeck. The 12-year-old Pratt & Whitney PW127M-powered ATR was originally delivered to Aer Arann before being operated in Scandinavia by Golden Air and Braathens Regional Airlines (BRA).

Through its published schedule, Lübeck has confirmed it's set to retain the current flight schedule until a March 27, 2021.

According to the company's website, operations were originally intended for a launch this spring, but this was pushed back due to coronavirus. (Photo v1images.com/Dirk Grothe)

EasyJet Closures **Confirmed**

EASYJET HAS confirmed it will shut three of its UK bases – where 670 pilots and cabin crew are employed – as it continues to cope with the impact of the COVID-19 pandemic.

London/Stansted, Southend and Newcastle will close from August 31 as the carrier attempts to cut costs.

The low-cost firm says it has reached agreement with the Unite union on voluntary redundancy terms and selection criteria for impacted cabin crew and that it "remains committed" to working with BALPA on the next phase of discussions, which includes voluntary redundancy for pilots.

Johan Lundgren, CEO of easyJet, said: "We have had to take the very difficult decision to close three UK Bases as a result of the unprecedented impact of the pandemic and related travel restrictions, compounded by quarantine measures in the UK."

Brussels Airlines **Bail-out**

THE BELGIAN flag carrier, Brussels Airlines, has received a substantial cash injection to mitigate the costs brought on by coronavirus.

This stabilisation package comprises a €290m loan from the Belgian state, while the Lufthansa Group is set to provide €170m, both subject to EU Commission approval.

Dieter Vranckx, CEO of Brussels Airlines, commented: "Just like in the past, Brussels Airlines can also in [the] future count on the support of its [parent] company, Lufthansa. In the last [few] years, Lufthansa [has] invested more than €600m in our company, allowing us to rejuvenate our fleet and invest in a new cabin interior that increases our competitiveness and reduces [the] CO_2 footprint."

According to bosses, the investment will secure "tens of thousands of direct and indirect jobs", while making the long-term prospects of the carrier profitable. It aims to reimburse the loan provided from the government through the cash generated from its flight operations.

Prior to the onset of coronavirus, the Belgian firm had a route network of more than 80 destinations: 65 in Europe, 17 in Africa and three in the US. As of August 2020, it has a fleet of 22 Airbus A319ceos, 16 A320ceos and 14 A330s (two -200s and 12 -300s). (Photo Brussels Airlines)

in **brief**

Low-cost firm **Laudamotion** is set to be rebranded as **Lauda Europe** and to transfer its headquarters from Austria to Malta. According to aviation data specialist *ch-aviation*, it will acquire a Maltese air operator certificate (AOC) at its new base. The airline – a subsidiary of the Ryanair Group – fields a fleet of 28 Airbus A320ceos that will be transferred onto the Maltese register. Despite the shift, Vienna will remain as a base, while operations will still be focused from Düsseldorf and Palma de Mallorca, although Stuttgart is set to close by October. Additionally, Lauda will operate wet-lease contracts on behalf of other carriers.

International Consolidated Airlines Group (IAG) has outlined its strategy to "right-size" the fleet of its member airlines to combat the impact of COVID-19. Its biggest carrier, British Airways, has terminated the London/City-New York/JFK service and phased out the sole Airbus A318, G-EUNA (c/n 4007).

BA will also retire 13 single-aisle jets and ground 28 aircraft, including four A380s. Meanwhile, fellow IAG company Iberia will retire 15 A340-600s, ground a further 19 airframes and defer some A320neo deliveries. Irish flag carrier Aer Lingus is set to ground six A320s and a trio of A330s, although it still expects to receive a full complement of six A321neos from Airbus. IAG low-cost firm, Vueling, will store 48 aircraft until 2021.

Tirana, Albania-based **Albawings** has phased out its sole Boeing 737-500. The 1990-built airframe, ZA-AWA (c/n 24927), has since been acquired by British firm European Aviation Group and subsequently re-registered as 2-AAWA. The CFM International CFM-56-equipped jet has operated for Albawings since May 2016. (Photo Flickr Commons/Anna Zvereva)

Doncaster/Sheffield has been confirmed as the second British base for **Wizz Air UK**. The low-cost airline is scheduled to open seven new routes from the Yorkshire gateway using a single Airbus A320. From October 22, Alicante and Lublin (Poland) are due to follow, followed by Malaga, Košice (Slovakia) and Faro the next day. On October 25, Larnaca and Suceava (Romania) are due to come online. This is the second UK base for the Wizz Air Group subsidiary after London/Luton. Currently, the airline fields a fleet of ten, comprising a trio of 186-seat A320ceos and seven 230-seat A321ceos.

Lithuanian-based **AviaAM Leasing**'s newly acquired Boeing 747-400F has entered service with its latest operator, **Magma Aviation**. The Pratt & Whitney PW4056-powered jet, TF-AMC (c/n 26563), becomes Magma's fourth jumbo, after TF-AMI (c/n 27066), TF-AMN (c/n 27602) and TF-AMP (c/n 24801). AviaAM Leasing, an Avia Solutions Group subsidiary, bought TF-AMC earlier this year. The 26-year-old 747 was originally delivered to Singapore Airlines Cargo in August 1994 before service with El Al between 2010-2020. It has a maximum payload of 121 tons.

A Weekend Wonder...

LUXAIR HAS painted Boeing 737-800, LX-LGU (c/n 41047), in a striking livery which was photographed departing Palma de Mallorca shortly after being applied. The colourful scheme was the brainchild of artist Sumo and has been described as a "flying gallery" featuring positive messages on the fuselage.

According to the Luxembourg flag carrier, it took 200 hours of creative work and a team of 11 to design and apply the new livery. Another Sumo scheme will soon adorn a De Havilland Canada Dash 8-400, LX-LQA (c/n 4468).

Meanwhile, Luxair have started services to the Hungarian capital of Budapest. The twice-weekly rotation on Mondays and Fridays began on August 10 with the arrival of Dash 8-400, LX-LGM (c/n 4425). Balázs Bogáts, head of airline development at Budapest Airport, commented: "There is significant Hungarian commuting traffic to Luxembourg, as well as strong business links and inbound tourism to Budapest."

The carrier's previous route between the two cities was discontinued in October 2006. (Photo Javier Rodríguez)

RJ Heads for the **Axeman**

Former Braathens Regional Airlines (BRA) Avro RJ100, M-ABNF (c/n E3255), was spotted departing a very damp London/Southend Airport on July 27. After the Honeywell ALF507-powered aircraft ended its tenure with BRA (previously registered SE-DSX) in 2019, as part of the airline's shift to more economical jets, it was briefly stored at Malmo/Sturup before arriving at Southend in March. Along with the entire fleet of BRA RJs, it was purchased by UK-based Executive Jet Support, which plans to part the airframe out for spares. It's understood this was M-ABNF's last-ever flight. KEITH BURTON

767 Express Delivery

FREIGHT GIANT DHL Express has confirmed it will add four Boeing 767-300BCFs to modernise its long-haul operations as part of the company's Strategy 2025 programme, which aims to reduce emissions as demand for cross-border e-commerce operations grows over the coming years. The origin of the Boeing-converted freighters is unclear, as is the DHL subsidiary they will be assigned to.

Geoff Kehr, senior vice president of global air fleet management at DHL Express, said: "We have operated the 767-300F model across our global fleet for many years and look forward to continue investing in the platform by adding more 767-300BCFs. The freighter type offers a proven versatility and we appreciate the opportunity to further enhance efficiency while simultaneously improving our environmental footprint. This brings us closer to our Strategy 2025 goals and ensures we deliver the best quality service possible to our customers."

The introduction of more 767s – the company operates 18 -300s across multiple subsidiaries – is expected to slash costs with a high payload-to-weight ratio. The 767BCF can carry 45 tons up to 3,000nm with a maximum take-off weight of 412,000lbs.

Since last year, DHL has received 14 777Fs to replace less economical types such as the 747. Combining its global subsidiaries, it fields a diverse fleet of 260 jets including ATRs, Airbus A300s, A330s, 737s and 757s.
(Photo Flickr Commons/Ikarasawa)

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Maiden Triple Seven Spotted

THE FIRST Boeing 777F for Moscow/Sheremetyevo-based AirBridgeCargo was photographed at the US manufacturer's Everett plant on August 2. The widebody, VQ-BAO (c/n 66625), has been conducting test flights prior to its handover, which was due as *Airliner World* went to press. The aircraft will be owned by DAE Capital, and leased to AirBridgeCargo.
The Volga-Dnepr Group subsidiary placed an order for nine 777Fs at the UK's Farnborough airshow in 2018.
Meanwhile, the freight company has transported a variety of cargo to help combat COVID-19. Chartered on behalf of the Moscow government, AirBridgeCargo – along with fellow Volga-Dnepr subsidiary, Aviatrans Cargo Airlines (ATRAN) – carried more than 170 tons of medical equipment to Krasnoyarsk (southern Russia). This included: face masks, artificial respiration units and mattresses transported by 737Fs and 747Fs.
Nikolay Glushnev, general director of AirBridgeCargo Airlines, said: "Since the outbreak, we have been working on [the] enhancement and adjustment of our services, adapting them to strict safety measures throughout the whole supply chain, and sharpening the expertise of our specialists. With other carriers within [the] Volga-Dnepr Group, we have more than three decades of experience of working under severe epidemiologic conditions in the world."
Additionally, the company has been involved in pre-vaccine transportation trials. One of the airline's 747-8Fs carried 41 containers of temperature-sensitive medicines between Amsterdam and Shanghai/Pudong on behalf of logistics firm, DSV. Bosses at AirBridgeCargo have described this almost as a rehearsal to remain "well-prepared" ahead of mass vaccine transportation.
AirBridgeCargo is a prominent 747 operator, fielding an inventory of four -400s and 13 -8s.
(Photo V1images.com/Huy Do)

Azerbaijan Increases Istanbul Links

BAKU-BASED AZAL Azerbaijan Airlines has upped the frequency of its links to Istanbul/New Airport.
On August 6, the flag carrier increased services from seven to 11 times weekly. The route is served by a pair of Rolls-Royce Trent 500-powered Airbus A340-500s – 4K-AZ85 (c/n 886) and 4K-AZ86 (c/n 894) – and its two-class, 198-seat Boeing 767-300ERs – 4K-AZ81 (c/n 40343) and 4K-AZ82 (c/n 41063).
Meanwhile, the airline operated a one-off rotation – at the request of Azerbaijan's Cabinet of Ministers – between Baku's Heydar Aliyev gateway and Havana/José Martí in Cuba. One of the firm's three-class, 210-seat 787-8s, VP-BBS (c/n 37921) Ordubad, transported 115 medical specialists from the Caribbean nation to Azerbaijan to help tackle the effects of the pandemic. The 7,381-mile direct flight took more than 13 hours to complete each way.
(Photo Flickr Commons/Anna Zvereva)

A Facemask Fit for Heroes

In a tribute to medical professionals fighting COVID-19, Pobeda has adorned Boeing 737-800, VQ-BWG (c/n 41205), with a painted facemask. Additionally, the low-cost Aeroflot Group subsidiary applied markings in Russian that translates to "Thanks to the heroes in white coats". The 189-seat jet was photographed making an approach into St Petersburg/Pulkovo on July 11.

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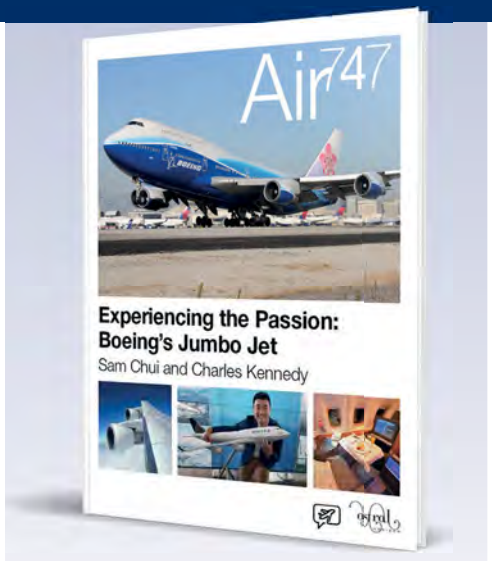

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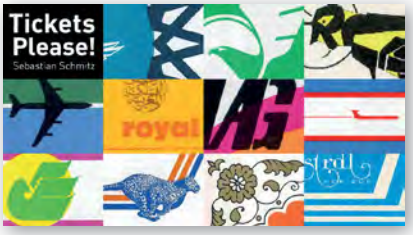

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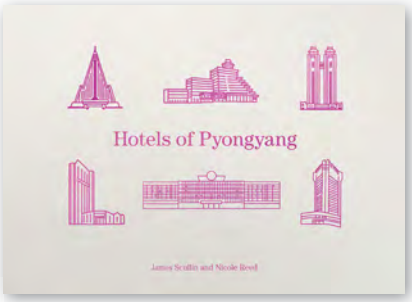

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Demonstrating **Partnerships**

ETIHAD AIRWAYS and Boeing worked on the latest ecoDemonstrator programme during August to evaluate "innovative technologies in the air". Etihad's newest Boeing 787-10 was used as the testbed and given the registration, N9572C (c/n 60768), as well as sporting special markings on the engines and fuselage. It's understood the widebody will be re-registered as A6-BMI and was due to enter service with the Abu Dhabi-based firm in September.

The ecoDemonstrator programme has aimed to improve the airspace efficiency, slash CO_2 emissions and reduce fuel consumption. There was also further collaboration with partners, NASA and British-based Safran Landing Systems, that worked towards reducing noise levels.

Finally, the Dreamliner – using a blend of sustainable fuel – flew rotations to "optimise route efficiency and enhance safety". This was achieved by sharing digital information, workload reduction and minimising radio frequency transmissions.

Stan Deal, Boeing Commercial Airplanes president and CEO, said: "Industry collaboration is a key aspect of Boeing's ecoDemonstrator programme that enables us to accelerate innovation. We're proud to broaden our sustainability partnership with Etihad Airways by testing promising technologies that can reduce emissions, help commercial aviation meet our climate goals and allow the industry to grow in a responsible manner that respects our planet and its natural resources." (Photo v1images.com/Preston Fiedler)

RwandAir Returns to Readiness

AFTER SCHEDULED services were grounded in March by the spread of COVID-19, RwandAir has finally resumed rotations from Kigali International – the country's major gateway. The first connections were to Dubai/International and Nairobi, Kenya from August 1, at three and four times weekly, respectively.

These were followed by a twice-weekly rotation to Lusaka (Zambia), then the triangular routing – Douala/Libreville (Cameroon/Gabon)-Cotonou (Benin) and Kilimanjaro-Dar es Salaam (both Tanzania) – restarted at two and three times weekly, respectively.

Yvonne Manzi Makolo, RwandAir CEO, said: "We want to ensure our return to flying matches consumer demand as the world adapts to travel in the post-COVID-19 world, where the health, safety and security of our customers and staff will continue to be of paramount importance.

"As we adjust to the 'new normal', our strict new health and hygiene measures will keep [our] customers, ground and onboard crew safe."

The Rwandan flag carrier has also carried out repatriation flights for stranded citizens. On August 14, its Rolls-Royce Trent 700-powered Airbus A330-200, 9XR-WN (c/n 1741), arrived at London/Heathrow to collect passengers before flying back to Eastern Africa via Brussels. The same routing was scheduled again for August 28. Before flight suspensions in March, RwandAir's London link operated into Gatwick Airport.

The airline has 12 jets, comprising six Boeing 737s and a pair each of the Bombardier CRJ900, De Havilland Canada Dash 8-400 and A330. (Photo Phil Whalley)

Maiden ERJ for **Mwant Jet**

MWANT JET – a start-up based in the Democratic Republic of Congo– has accepted its first Embraer ERJ145. The Rolls-Royce AE3007-powered airframe, 9S-AYE (c/n 145601), is expected to perform scheduled and charter services when it enters service, though that timeframe remains unknown. The 18-year-old aircraft was sold by British-based Skyworld Aviation and joins Mwant Jet's single Hawker 850XP which is mainly used for mining contracts.

It departed the UK on the morning of August 7, bearing temporary registration 2-TEZK, and arrived in the DRC capital, Kinshasa, that evening. This example has served with several carriers – it was delivered to Zürich-based Swiss International Air Lines in May 2002 before going to Aeroméxico Connect five years later. After a period of storage at Cotswold Airport, England, in 2016, it also flew with Bristow Helicopters Group and Humberside-based Eastern Airways.

Super Jumbo **Arrives in Clark**

EMIRATES OPERATED an Airbus A380-800 to Clark International on the Philippine island of Luzon, on August 19. The super jumbo, A6-EVI (c/n 258), was rostered as a one-off after the airline's management reported a "tremendous demand from customers in the UAE and other cities within our network to travel to the Philippines". This comes after the carrier reintroduced the six-times-weekly service, using a Boeing 777-300ER, at the start of August.

Orhan Abbas, senior vice president, commercial operations – Far East, Emirates said: "We are proud to fly our first scheduled A380 service to Clark, in the year we are celebrating our 30th anniversary of serving the Philippines. Emirates has shared a long-standing relationship with the country and our commitment to it and our customers remains stronger than ever."

Emirates has operated flights from Clark (a former USAF base) since 2014 and is its third destination in the Philippines following the capital, Manilla and Cebu.

Gulf A321neo **Breaks Cover**

THE MAIDEN Airbus A321neo for Middle Eastern carrier, Gulf Air, was spotted at Hamburg/Finkenwerder on August 10 prior to its maiden flight. The CFM International LEAP-1A-equipped airliner sported test registration, D-AYAR (c/n 9433), before being put on the Bahrain register as A9C-NA ahead of delivery. The operator has 17 A321neos on order comprising eight examples of the baseline model and nine -LRs (Long Range). It's understood it will be deployed on links to Europe. (Photo AirTeamImages.com/HAMFive)

First Look at **Wizz Air Abu Dhabi**

BREAKING WITH tradition from the standard livery, the maiden airframe for Wizz Air's Abu Dhabi subsidiary is sporting brand titles on the vertical stabiliser. The Airbus A321neo, photographed during testing at Hamburg/Finkenwerder on August 4 with temporary registration D-AVZJ (c/n 9429), has since become A6-WZB. The 239-seat, Pratt & Whitney PW1100G-powered aircraft was due to be delivered to the start-up imminently. The second example, A6-WZA (c/n 9503), was due to follow shortly after. (Photo v1images.com/Dirk Grothe)

An Unusual Sight from **Saudi Arabia...**

Jeddah-based Saudi Arabian Airlines has applied a special scheme to Boeing 787-9, HZ-ARF (c/n 41549), which was spotted at Frankfurt on August 9. The General Electric GEnx-powered Dreamliner wears a G20-inspired livery to mark the first time the country will host the summit. Subject to COVID-19 restrictions, it's due to take place in the capital, Riyadh, between November 21-22 SIERRA AVIATION PHOTOGRAPHY

in **brief**

Mali in West Africa is set to receive services from start-up **Sky Mali** soon, having recently received its Air Operator Certificate. It is scheduled to link the nation's capital, Bamako, to four domestic destinations: Gao (east), Kayes (west), Mopti and Timbuktu (both in central Mali). Sky Mali has just one 29-year-old Boeing 737-500, ZS-PKV (c/n 25418), that was originally delivered to Sabena. According to aviation data specialist, ch-aviation, the fledgling firm intends to procure another 737-500, along with examples of the 737-800, Embraer ERJ145 and a pair of turboprops for potential international rotations.

AlMasria Universal Airlines has phased out its sole twin-aisle jet. The Airbus A330-200, SU-TCH (c/n 661), which was only delivered to the Egyptian carrier in February 2018, was frequently deployed on services within Europe including Düsseldorf and Munich. Currently, the General Electric GE CF6-equipped airframe is stored in France at Lourdes/Tarbes. The A330 was originally handed over to EVA Air in May 2005 and wore two iterations of the highly popular Hello Kitty colour schemes. (Photo Flickr Commons/Marvin Mutz)

Royal Air Maroc has applied oneworld markings to a pair of aircraft. The first recipient was the two-class, 159-seat Boeing 737-800, CN-RGJ (c/n 33072), followed by the General Electric GEnx-equipped 787-9, CN-RGB (c/n 43817). The Moroccan flag carrier joined the alliance on April 1 becoming Africa's first full member of oneworld and its Royal Air Maroc Express subsidiary also joined as an affiliate.

Qatar Airways has outlined plans to resume more of its US flights. Houston/George Bush Intercontinental was due to restart from September 2, followed by Philadelphia two weeks later, with connections three and four times weekly, respectively. Rotations to Los Angeles were upgraded to daily on August 12 while New York/John F Kennedy was set to go double-daily on September 1. Bosses at the Doha-based airline are confident it will be operating 56 weekly links to multiple US gateways by mid-September. Akbar Al Baker, Qatar Airways Group chief executive, commented: "The addition of these [connections] brings us to eight US destinations and maintains our position as the largest international carrier [in] the United States."

Solenta Aviation Gabon – a Solenta Aviation subsidiary – has received its first ATR cargo turboprop. The Pratt & Whitney PW127-powered ATR 72-200, TR-LCL (c/n 467), is understood to be operating for DHL. The 25-year-old airframe was handed over to Italian firm, Avianova, in a single-class, 66-seat passenger configuration. After its tenure had concluded with Myanmar carrier Air Mandalay in 2017, the Toulouse-built airliner was converted for freight use in the same year.

E-Jets Converted for Cargo

AZUL LINHAS Aéreas Brasileiras is the first airline to put a temporary cargo-converted Embraer E-Jet into service. The E195, PR-AYO (c/n 19000391), was spotted on August 4 at Belo Horizonte/Pampulha and has been renamed Full Cargo while new Azul Cargo titles have been applied – replacing the jet's former special pink ribbon livery. The ten-year-old jet was delivered to the South American operator in December 2010 in a single-class, 118-seat configuration.

The Brazilian manufacturer says several airlines had asked if their jets could be modified to take more cargo owing to passenger numbers being hit hard by the pandemic.

Speaking in July, Johann Bordais, president and CEO, Embraer services and support, commented: "Embraer's engineers rose to the challenge when our customers asked them if they could find a way for their [aircraft] to carry more cargo payload.

"Today, customers can choose from a portfolio of solutions to carry cargo in the cabins of their EMB 120s, ERJ145s and E-Jets."

Following the exemption approval granted by Brazil's civil aviation regulatory authority, ANAC, the General Electric CF34-powered Azul E195 can carry 3.7 tonnes of freight.

Cargo can be scattered throughout the cabin with small items placed in overhead bins and storage compartments. Larger objects can be tethered to the floor with netting attached to the seat tracks.

Azul already has a small cargo contingent in the form of a pair of Boeing 737-400Fs. The jets, PR-AJZ (c/n 28198) Cargo Team and PR-AJY (c/n 28053) Azul Cargo nas Alturas, were delivered to the firm in August and November 2018, respectively. (Photo Gabriel Almeida Araújo)

Caribbean Connectivity

TRINIDAD AND Tobago-based Caribbean Airlines has launched new services from Bridgetown, Barbados. The two short-distance routes will be operated as a triangle rotation until September 30.

The Barbados-Saint Vincent and the Grenadines-Grenada-Barbados link runs four times weekly. Conversely, the reverse leg is flown just twice weekly. Both connections are rostered by the firm's fleet of seven-strong, 68-seat ATR 72-600s.

Garvin Medera, CEO of Caribbean Airlines, said: "Transport is a main pillar of Caribbean states, where it provides a space for facilitation of trade, investment, and movement of people. Regionally and internationally, there is a lot to restart, and subject to regulatory approvals, Caribbean Airlines is resuming 2020 plans to expand routes in the Eastern Caribbean.

"This will begin from Barbados, as its borders are now open to commercial services. For us, improving connectivity is a strategy that has been in the making and we have carefully planned for this using data and other research to guide our decisions."

Prior to COVID-19, it flew more than 600 weekly links to 22 cities across the Caribbean, North and South America. (Photo Flickr Commons/Ian Gratton)

Heathrow T5 Accommodates American

DALLAS/FORTH WORTH-BASED American Airlines has temporarily moved into London/Heathrow's Terminal 5. Following the closure of Terminals 3 and 4, due to low traffic figures associated with COVID-19, the transition allows American to operate "seamlessly" with fellow oneworld members, including T5's permanent residents, British Airways and Iberia/Iberia Express. Since American moved it has been flying four daily rotations to Chicago/O'Hare, Dallas/Fort Worth, New York/John F Kennedy and Miami from the London facility.

Customers who hold American's 'Flagship First' tickets can check-in using BA's 'First Wing', giving travellers space, privacy and dedicated security lanes. Additionally, Admiral Club members also have access to BA's portfolio of club lounges.

Rhett Workman, managing director Europe and Asia-Pacific, commented: "Moving American's operations to Terminal 5 for the first time will greatly improve the customer travel experience, enabling faster and easier connections by working closely alongside our valued joint business partners."

Fellow oneworld members Japan Air Lines (JAL) and Qatar Airways have since joined American in the relocation as well as ex-SkyTeam member, China Southern Airlines. It remains unclear when or if the new carriers will vacate Terminal 5.

JetBlue Trials UV Cleaning

NEW YORK-BASED JetBlue Airways has implemented a 90-day trial of a revolutionary ultraviolet (UV) machine to clean aircraft cabins. Built by Honeywell Aerospace, the UV Cabin System has been introduced by JetBlue on turnarounds between New York/John F Kennedy and Fort Lauderdale/Hollywood.

The use of UV has been mooted as a quick and effective way to decontaminate aircraft interiors. The carrier has received eight machines, which are similar in size to a drinks trolley. Disinfecting a cabin, involving two arms sweeping across each row of seats, can take as little as ten minutes.

Joanna Geraghty, JetBlue's president and chief operating officer, says the carrier has adopted a "multi-layered approach" to its 'Safety from the Ground Up' initiative which prioritises the well-being of passengers and crew through high cleanliness. "As we look to add additional layers of protection by utilising cutting-edge technology, we have identified the Honeywell UV Cabin System as a potential game changer when it comes to efficiently assisting in our efforts to sanitise surfaces onboard," she added. (Photo Honeywell Aerospace)

Looking Sharp!

US-based Omni Air International has applied a special livery to 23-year-old Boeing 767-300ER, N495AX (c/n 27613). The General Electric CF6-powered widebody was spotted departing Washington/Dulles not long after the silver scheme was adorned. This 767 is understood to operate charter flights on behalf of the US Department of Defense. The aircraft has had a varied career since its delivery to LAN Chile in 1997 having flown for, among others: LAN Ecuador, Privatair, TUI Netherlands and Eurowings. BRIAN MCDONOUGH

Aerolíneas Arrives in Cyprus

SOUTH AMERICAN operator, Aerolíneas Argentinas, flew its first ultra-long rotation to Cyprus on August 17. The Airbus A330-200, LV-GHQ (c/n 1737), delivered 250 Argentine troops on a UN peacekeeping deployment *(see Americas News, September edition)* before returning a similar number whose tour had concluded.

The direct flight departed Buenos Aires/Ezeiza at 8:41am and flew non-stop on the 7,863-mile (12,654km) link landing in Larnaca 14hrs 7mins later at 4:48am local time. According to Airbus, the A330-200 has a range of 8,343 miles (13,450km).

The return left Cyprus, arriving back in Argentina 15hrs 20mins later on August 22. At the time of writing, Aerolíneas Argentinas has scheduled another round-trip to the Mediterranean island on September 5, returning five days later. (Photo Airbus)

in brief

US-based aftermarket aviation parts supplier **Aventure Aviation** has acquired ex-Air Astana Boeing 757-200, P4-KCU (c/n 27971). Its purchase of the 25-year-old, Rolls-Royce RB-211-powered jet comes in response to a perceived "boom in the cargo market". Talha Faruqi, Aventure Aviation vice president, said: "We are seeing strong demand of aircraft parts from both airlines and freight carriers to support their operations." While the company is known for parting out aircraft, it is possible that P4-KCU is being eyed for cargo conversion. Aventure also procured another 757, the former Thomson Airways G-BYAT (c/n 27208), which remains stored in Goodyear, Arizona.

VivaAerobus' newest aircraft carried more than 200,000 facemasks on its delivery flight to Mexico. The Airbus A320neo, XA-VIX (c/n 10062), departed Toulouse/Blagnac on August 1, making technical stops via Reykjavík/Keflavík, Iceland and Bangor, US before arriving in Monterrey. The masks were donated by the Airbus Foundation to the Mexican Red Cross. The airframe became the 20th and last example of the A320neo to be delivered to the ultra-low-cost carrier from the current order. The firm is due to receive two more jets this year, comprising the larger A321neo – of which it has 40 left on order. (Photo Airbus)

United Airlines has revealed intentions to implement a winter expansion from Florida which would "add up to 28 daily nonstop flights". Four gateways in the Sunshine State – Orlando/McCoy, Fort Lauderdale/Hollywood, Fort Myers and Tampa – are scheduled to be connected to new destinations in the US northeast and Midwest regions. From November 6, Boston/Logan, Cleveland and New York/LaGuardia are set to be linked to the four Florida airports. Then on December 17, Columbus, Indianapolis and Pittsburgh will connect with Fort Myers and Tampa, while Milwaukee is due to be linked with the former. All links are due to operate until January 10 using mainly Airbus A320ceos and Boeing 737-800s.

Aeroméxico has resumed connections to Ecuador's Quito/Mariscal Sucre on a thrice-weekly basis. On August 3, the Mexican flag carrier's Boeing 737-800, XA-AME (c/n 36708), touched down in the Ecuadorian capital before receiving a water cannon salute from the airport's fire service. Andrew O'Brian, president and CEO of Corporación Quiport, commented that reintroduction of Aeroméxico services will "contribute to the economic recovery of the city [Quito] and the country [Ecuador]."

Alaska Airlines has implemented a new stopover on its former direct service between Washington's Seattle/Tacoma and Charleston International, South Carolina. Since August 1, the 2,423-mile flight now stops via Atlanta. The link is operated by Alaska's 91-strong fleet of Boeing 737-900s.

SpiceJet Set to **Link with London**

INDIAN LOW-COST firm, SpiceJet, has confirmed its intentions to launch links to London/Heathrow.

In a stock exchange filing, SpiceJet revealed it had secured slots at the UK's biggest airport until October 23. While the release said flights would be "effective September 1", there was no indication of which Indian gateways would be connected as *Airliner World* went to press. It stated it was "in [an] advance discussion" to secure winter slots to enable "regular operations".

Ajay Singh, chairman and managing director, SpiceJet, said: "London is one of the busiest long-haul destinations from India and this is a huge milestone for SpiceJet. Providing non-stop connectivity from India to different parts of the world, which in turn strengthens our own airport hubs, is a dream that we have long cherished and this is a small step in that direction. The identical arrival [and] departure slots that we have secured at London/Heathrow should suit the convenience of [SpiceJet's] passengers."

It also remains unclear which aircraft type SpiceJet will use on the route. With a fleet of 111 narrowbodies, comprising Boeing 737s and De Havilland Canada Dash 8s, there is speculation of a possible wet-lease contract. For example, in August, the airline chartered an Airbus A330-900, CS-TKY (c/n 1929), from Hi Fly on one-off long-haul repatriation links to Amsterdam in the Netherlands and Toronto/Pearson, Canada.

It is thought the UK launch could coincide with fellow Indian carrier, Vistara, introducing links to neighbouring Gatwick with 787-9s.

Before coronavirus, the UK-India market was served by Air India, British Airways and Virgin Atlantic offering direct links to the sub-continent, as well as Jet Airways until it suspended operations in April 2019.

(Photo Flickr Commons/Anna Zvereva)

Retirement for **A330 Pioneer**

HONG KONG-BASED Cathay Dragon has retired the oldest Airbus A330 after its final rotation from Shanghai/Pudong.

The 1992-built A330-300, B-HLJ (c/n 012), was the programme's prototype and participated in extensive flight-testing – with registration F-WWKA – to certify the aircraft ahead of the type's entry into service.

After four years with Airbus, the widebody was acquired by Cathay Pacific in October 1996 – as VR-HLJ, becoming B-HLJ a year later – and re-equipped with Rolls-Royce Trent 700 engines. It served with the carrier until it was transferred to the operator's international regional subsidiary, Dragonair (now Cathay Dragon) in 2013. At retirement, the A330 accumulated 63,900 hours and 26,983 cycles during its service. Currently, the two-class, 307-seat airframe is stored at Taipei/Taoyuan, Taiwan.

Cathay Dragon has an all-Airbus fleet of 47 aircraft including 25 A330s. The second oldest A330, B-HLK (c/n 017), is also operated by the airline and remains in active service.

(Photo Flickr Commons/byeangel)

Presidential Triple Seven

The Indian government's newest VIP-configured Boeing 777-300ER, VT-ALV (c/n 36320), was spotted at Fort Worth Alliance Airport in Texas, USA, on August 11. The former Air India widebody was delivered to the flag carrier in January 2018 and stored there prior to its cabin reconfiguration. It is understood that the General Electric GE90-powered airframe will transport high level officials of the Indian government. AIRTEAMIMAGES.COM/KEVIN BOYDSTON

Virgin Australia **Plans for Post-COVID World**

BOSSES AT Virgin Australia have outlined a six-point plan to make the firm "stronger, more profitable and competitive". As part of this exercise, the airline will become an-all Boeing 737 operator as it aims to dispose of the ATR 72-600, Airbus A330 and Boeing 777. As a result, approximately 3,000 jobs will be impacted by the move.

It also stated that the Tigerair Australia subsidiary, comprising 15 jets, would be "discontinued" due to a lack of demand – although it seeks to keep the Air Operator Certificate for a potential revival.

The latest move follows the airline's acquisition by US-based Bain Capital (see Asia Pacific News, September edition).

Paul Scurrah, Virgin Australia Group CEO and managing director, said: "Demand for domestic and short-haul international travel is likely to take at least three years to return to pre-COVID-19 levels, with the real chance it could be longer, which means as a business we must make changes to ensure the Virgin Australia Group is successful in this new world.

"Working with Bain Capital, we will accelerate our plan to deliver a strong future in a challenging domestic and global aviation market. We believe that over time we can set the foundations to grow Virgin Australia again and re-employ many of the highly skilled team..."

As the carrier plans to exit voluntary administration, initially Virgin Australia will focus on domestic and short-haul international destinations.

Despite the widebodies being axed, management has ambitions to reinstate long-haul links by an unspecified date in the future only when "sufficient demand returns".

Vistara Bolsters Fleet With A321neo

AIRBUS HAS handed over the maiden A321neo to Indian carrier Vistara. The first from a 50-strong order, which was signed in 2018, the jet, VT-TVA (c/n 9297), is on lease from Air Lease Corporation (ALC). The three-class, 188-seat airframe can hold 152, 24 and 12 passengers in economy, premium economy and business class, respectively.

Leslie Thng, CEO at Vistara, said: "This new addition to our fleet reinforces our long-term commitment to international expansion plans, despite the challenges of current times. The new cabin products on our A321neo aircraft complement our promise of providing a premium and world-class flying experience to travellers [to and from] India." The CFM International LEAP-1A-powered airliner features 12 63in (160cm) lie-flat beds in a 2-2 configuration for travellers in business class.

As a result, the Delhi-based firm becomes the first in South Asia to use such a product on narrowbody aircraft.

By the end of August, no information had been released regarding which routes the type will use. However, bosses have mooted that "short to medium-haul international routes within seven hours of flying time" are scheduled by an unspecified date. (Photo AirTeamImages.com/ Mathias Dueber)

Destination **Nowhere!**

IN THE wake of worldwide travel restrictions caused by the coronavirus pandemic, EVA Air operated a unique flight.

After an influx of requests by travellers wishing to return to the skies, bosses at the carrier offered tickets costing about £140 for an experience lasting two hours and 45 minutes around Taiwan – seats quickly sold out.

For the one-off rotation, EVA rostered the popular Hello Kitty-themed Airbus A330-300, B-16332 (c/n 1268). On August 8, flight BR5288 departed Taipei/Taoyuan at 10.30am local time, routing down the eastern side of the country before it flew a heart-shaped path at the southern tip of the island. It cruised at an altitude between 20,000 and 25,000ft for most of the flight, giving passengers in the cabin great views of the ground – before heading back to the capital.

The 'flights to nowhere' have become increasingly popular in Taiwan, with fellow operators performing such sorties. The day before, nearly 200 passengers boarded a Starlux Airlines jet for a similar experience. Both carriers are set to operate more of the flights over coming months. (Photo Flickr Commons/Steven Byles)

in **brief**

Pakistan International Airlines (**PIA**) has charted Airbus A330-300s from Portuguese wet-lease specialist, Hi Fly, and its Maltese subsidiary, on links to the UK. In August, rotations between PIA's Islamabad International base were reconnected with Manchester on August 14. London/Heathrow followed the next day, then again on August 22 while Birmingham resumed on August 29. The schedule from September onwards remains unpublished at the time of writing. The move comes after PIA was banned by the European Union Aviation Safety Agency (EASA) for six months, which came into effect on July 1, following issues with pilot licences.

Australian flag carrier, **Qantas**, confirmed that from September it would store most of its Boeing 787-9 Dreamliner fleet at the Mojave Air and Space Port in California. With a contingent of 11 Dreamliners, it remained unclear by the end of August how many will be sent away. During the airline's post-COVID-19 recovery plan, it outlined a three-year strategy for its "return to growth in a changed market". It stated that international connections would be either reduced or suspended for a "long period" and 100 jets would be grounded for up to 12 months or more. (Photo Qantas)

Guangzhou-based **China Southern Airlines** has deployed its five-strong fleet of Airbus A380-800s to Paris/Charles de Gaulle across select dates. The first of its super jumbos to touch down in Paris was the three-class, 506-seat B-6136 (c/n 031) on August 11. The A380s were scheduled to arrive at the French capital on August 25, September 1, 15 and 22, followed by October 6 and 13. The twice-weekly rotation is normally operated by the carrier's A350-900 jets. Currently, China Southern has rostered A380s on twice-weekly international connections to Amsterdam, Sydney/Kingsford Smith and Vancouver while London/Heathrow and Los Angeles are weekly.

With the intention of "expanding its fleet", **Alliance Airlines** has signed a contract with US-based lessor, Azorra Aviation. The deal – worth US$79.4m at list prices – includes the purchase of 14 Embraer E190s with an option for a further five, and six spare General Electric CF34 powerplants. The commitment allows the Brisbane-based carrier options to procure a full flight simulator and additional training equipment. The Brazilian-built jets will be sourced from Central American operator, Copa Airlines, and are due over eight months starting from September. The Australian firm fields a 47-strong, all-Fokker fleet comprising five F50s, 15 F70s and 27 F100s.

China Airlines is set to extend its Taipei/Taoyuan-London/Heathrow rotation until March 27 next year. It was originally reported that the four-times-weekly link to Heathrow would remain only until October 24 (see Asia Pacific News, August edition) before reverting to neighbouring Gatwick Airport – 25 miles (40km) to the south. The service is flown by Airbus A350-900s.

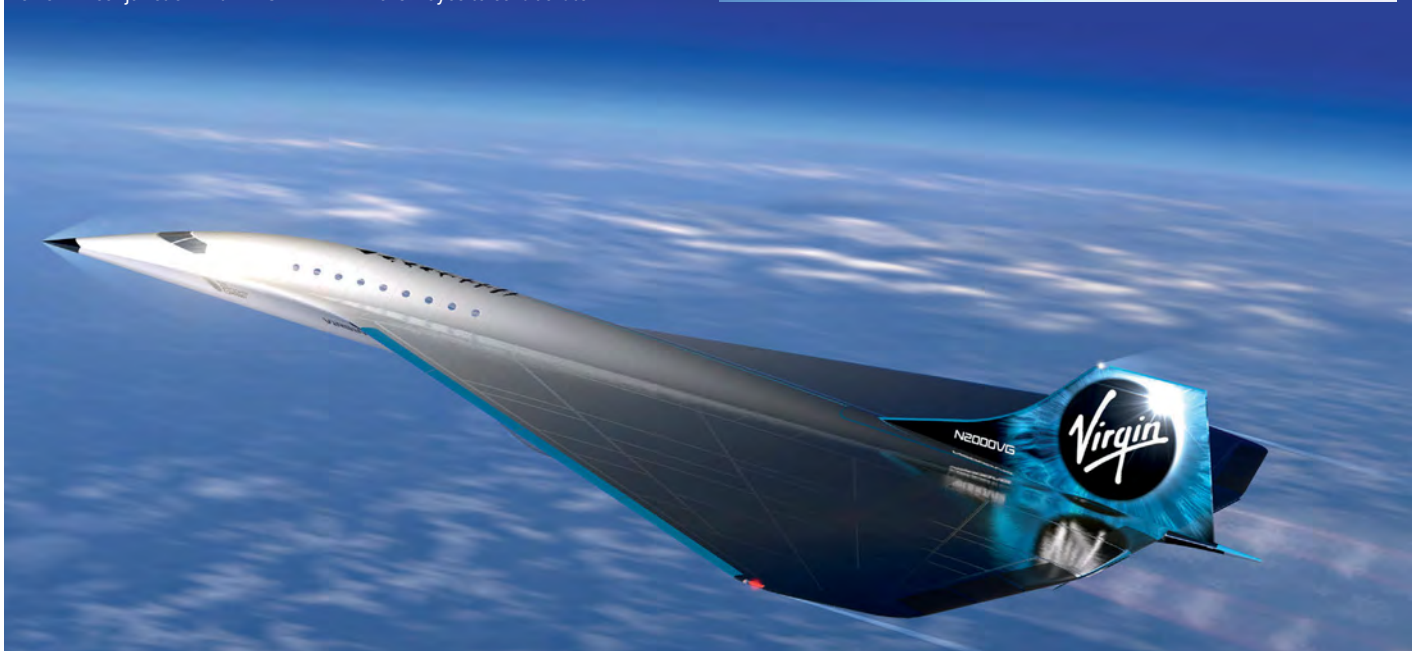
A Truly Galactic Proposal

VIRGIN GALACTIC has unveiled its concept for a revolutionary new delta-winged aircraft capable of travelling at up to Mach 3. Flying at an altitude of 60,000ft and above – the same height that the Aerospatiale-BAC Concorde flew – the Virgin Galactic aircraft would have a capacity of between nine and 19 passengers in a first and/or business-class configuration. Proposals suggest it will take off and land like a conventional jet and "integrate into existing airport infrastructure". The company has recently completed a mission concept review in conjunction with NASA representatives, which confirmed that the design "can meet high-level requirements and objectives". The next phase will investigate what manufacturing materials should be used while other tasks include focusing on potential noise and maintenance challenges.

Virgin Galactic is also working with the US Federal Aviation Administration (FAA) through its Center for Emerging Concepts and Innovation to "outline a certification framework".

Virgin Galactic has also signed a non-binding memorandum of understanding (MOU) with Rolls-Royce to collaborate in "designing and developing engine propulsion technology".

Project ambitions include using sustainable aviation fuels for its powerplants. Bosses at Virgin Galactic said Rolls-Royce was chosen due to its "proven track record" on Concorde. The British propulsion manufacturer – along with Snecma – developed the Olympus 593 engine for the supersonic jet.
(Photos Virgin Galactic)



E175-E2 Pushed Back

EMBRAER HAS delayed its E175-E2 jet, blaming the decision on the impact of COVID-19. In its second quarter earnings release, the Brazilian manufacturer has now proposed 2023 will mark "the start of operations" but has confirmed aircraft development will still take place. The original certification date was December 2021.

This is the smallest E2 of the family – which includes the E190-E2 and E-195-E2. The E175-E2 has a range of 2,000nm, a service ceiling of 41,000ft, a top cruise speed of Mach 0.82 and a maximum take-off weight (MTOW) of 98,120lb. The typical cabin layout can be outfitted from a three-class 80-seat configuration up to a 90-seat single-class layout. Compared with the first-generation E175, its E2 predecessor has an extra row of seats and boasts a 16% and 25% decrease in fuel and maintenance costs, respectively. The jet is powered by Pratt & Whitney PW1700G powerplants that produce take-off thrust up to 17,000lb.

The E175-E2 flew its maiden flight from Embraer's São José dos Campos plant last December on a 2hr 18min sortie. There are no firm orders yet.
(Photo AirTeamImages.com/ Matthieu Douhaire)

A321XLR Rear Centre Tank Takes Shape

PRODUCTION HAS started on the rear centre fuel tank for the Airbus A321XLR (Xtra Long Range). Manufactured by Premium AEROTEC in Augsburg, Germany, the first stage involves constructing the tank's sub-assembly. Afterwards, it will move on to the structural assembly phase before being tested. Once completed, the tank is due to be integrated into the rear fuselage of the A321XLR at the Airbus plant in Hamburg.

The high-capacity rear centre tank can hold up to 2,639 gallons of fuel and, combined with a higher maximum take-off weight (MTOW), has a range of 4,700nm. The type has more than 450 orders and is scheduled to enter service in 2023.

Russian Built, Russian Power

THE IRKUT MC-21-300 is set to make its maiden flight before the end of the year with domestically produced engines, according to the firm's CEO.

Yuri Slyusar, chief executive officer at United Aircraft Corporation – the parent company of Irkut – told President Vladimir Putin in a meeting at the start of August that the engines have already been mounted on the type at the airframer's facility in Irkutsk.

"Our latest event this year will be the flight of [the] MC-21 with the domestic PD-14 [engines]. We should complete this work by the end of [2020]," he added.

The type completed its maiden test flight on May 28, 2017, but all operations so far have been powered using the Pratt & Whitney PW1000G turbofan engine, a powerplant commonly found on the Airbus A220 and Embraer's second-generation E-Jet. The company received its first Aviadvigatel PD-14 turbofan for installation in January. Meanwhile, the Russian aerospace firm completed a series of water-ingestion ground runs in August. Over six days, Irkut conducted 29 trials – all at speeds varying from 10 to 150kts.

The testing took place at Ulyanovsk/Vostochny Airport in western Russia, where a 229ft wide and 65ft long pool of water was placed on the runway for the jet to roll through. The ground runs were in support of the MC-21-300's certification programme, which began shortly after its maiden sortie.

Four airframes have been built with deliveries expected to begin in 2021. (Photo AirTeamImages.com/Alexander Mishin)

Third Test Airframe Airborne

THE NEWEST Boeing 777X performed its maiden flight on August 3 from Paine Field, Washington. The General Electric GE9X-equipped 777-9, N779XY (c/n 65799) – designated WH003 by Boeing – is set to test the auxiliary power unit (APU), engine performance, avionics and flight loads. This comes shortly after the US manufacturer confirmed in second quarter earnings that the first 777X delivery would be pushed back until 2022. This aircraft wears a revised Boeing house livery compared with the previous two examples. It's understood that N779XY was earmarked to join the German flag carrier, Lufthansa, as D-ABTE once testing had been completed, but the status of this is now unclear.

The 777X programme, which was launched in November 2013, is currently offered in two variants, the -8 and -9, and features revolutionary folded wingtips. Inclusion of the latter means the widebody can be classified as International Civil Aviation Organization (ICAO) code E, a wingspan between 170ft and 213ft, rather than code F, such as the Airbus A380 which has a 261ft wingspan. Additionally, the larger wing provides greater efficiency generating a 3% fuel saving over older models.

The 777-9 will be able to carry 426 passengers in a two-class configuration over a range of 7,285nm. Boeing has gained 309 orders for the 777X programme. (Photo v1images.com/Huy Do)

Airbus Deliveries

Middle East Airlines received its first two Airbus A321neos from an order for nine during July.
AIRTEAMIMAGES.COM/MATHIAS DUEBER

Airbus delivered the following aircraft in July:

A220-300	2	Air Canada; EgyptAir
A320neo	32	AerCap (EgyptAir) (3); AerCap (HK Express); AerCap (Loong Air); Air China; Aviation Capital Group (Juneyao Airlines); Avolon (Vistara); CALC; CALC (Sky Airline); China Eastern Airlines; CMB Financial Leasing (Flynas); easyJet (2); Frontier Airlines (3); GECAS; GECAS (Air Travel); GoAir (3); IndiGo (2); Loong Air; Lufthansa; Qingdao Airlines; SMBC Aviation Capital (Air Astana); SMBC Aviation Capital (S7 Airlines); Viva Aerobus; Volaris; Wizz Air Hungary
A321neo	15	AerCap (Air Transat) (2); Air Lease Corporation (Vistara); American Airlines (3); easyJet; Iberia Express; IndiGo; JetBlue Airways; Middle East Airlines (2); TAP Air Portugal; Turkish Airlines; Wizz Air Hungary
Total	49	

Boeing Deliveries

Air France's tenth Boeing 787-9 Dreamliner was delivered to Paris/Charles de Gaulle on July 24.
AIRTEAMIMAGES.COM/DIPANKAR BHAKTA

Boeing delivered the following aircraft in July:

767-300F	1	FedEx Express
777F	1	AeroLogic
787-9	2	Air France; Turkish Airlines
Total	4	

Global 5500 First in USA

BOMBARDIER HAS announced delivery of the first Global 5500 to a US-based customer, following the type's entry into service in July. It arrived at Unicorp National Developments, based in Orlando.

During the handover ceremony at Bombardier's Global 5500 delivery centre in Wichita, Kansas, Chuck Whittall, president of Unicorp National Developments, said: "Our team is beyond excited to benefit from the first Global 5500 aircraft in the United States. This [type] will allow us to travel with less fuss and more peace of mind."

Unicorp is a long-term Bombardier customer, having acquired the first Bombardier Learjet 60 to be completed in the manufacturer's Wichita facility in 2004. The company is intended to make the new Global 5500 available for charter from Orlando/McCoy via Elite Air, under a Part 135 certificate.

The first G5500 was delivered to an undisclosed customer in June. (Photo Bombardier)

G700 Flight Test Milestones

GULFSTREAM AEROSPACE Corporation's new G700 has now accumulated in excess of 100 sorties during the type's flight test campaign, the firm announced on July 28.

In addition, Gulfstream reported that the G700 has recently completed flutter testing and expanded the aircraft's flight envelope at both high and low speeds. It has exceeded its maximum operating speed and cruising altitude, achieving Mach 0.99 and 54,000ft. The operational limits of the G700 design are typically Mach 0.925 and 51,000ft. Gulfstream president Mark Burns commented: "These accomplishments at this stage in [the] flight test point to the impressive maturity of the [Gulfstream] G700 programme."

Launched in October 2019 at NBAA-BACE, the G700 made its maiden flight from Savannah's Hilton Head International Airport on February 14. At the launch ceremony, Gulfstream announced that Qatar Airways was the initial customer, with an order for ten jets for its business aviation division, Qatar Executive. In other news, Gulfstream also announced on August 17, that it has received US Federal Aviation Administration (FAA) approval to install a high-speed, dual internet system on its G650 and G650ER aircraft. The system will be provided by Viasat's Ku/Ka dual band satellite communications terminal and the upgrade is available through Gulfstream's company-owned service centres throughout the US and at Farnborough in the UK. (Photo Gulfstream)

Embraer's Medevac Phenom 300

EMBRAER PLANS to optimise a version of its Phenom 300 light business jet for the medical evacuation (medevac) market, called the Phenom 300MED.

The new variant was announced on August 4 and the configuration will be available as a retrofit for existing Phenom 300 customers, in partnership with Umlaut and Aerolite. The Brazilian manufacturer is working with Umlaut to produce a Supplementary Type Certificate (STC) using equipment supplied by Aerolite.

The work is set to be performed by Embraer's Services and Support organisation and will offer its customers a number of options, including either one or two stretchers, an incubator and additional medical equipment.

Michael Amalfitano, president and CEO of Embraer Executive Jets, commented: "Given the current health crisis, we are proud to be working with two world-class medevac partners, and we are primed to immediately start taking orders for this unprecedented air ambulance solution." (Photo Embraer)

NetJets Europe Plans for Market Upswing

IN RESPONSE to what it describes as an "increasing and positive" market outlook, fractional business aviation operator NetJets Europe announced in July, that it will restore its Dassault Falcon 2000EX fleet to service.

Based in Portugal, NetJets Europe is a partially-owned subsidiary of US operator NetJets Inc. The company reported that it has offered to reinstate all crew members who had been placed on furlough in April 2020 in response to the effects of the COVID-19 pandemic. NetJets also confirmed that it had reduced scheduled aircraft purchases and accelerated its European fleet rejuvenation by disposing of some airframes after it was unclear when international flying would recover.

The company said that traffic in the US did not fall as low as it did in Europe, because domestic travel was not subject to border restrictions, and it has seen a strong increase in new owners in the American market. NetJets said that private aircraft travel has now begun to rebound across much of the globe, although current levels are still 20% less than they were before the pandemic on some days.

The firm said: "NetJets plans to add more than 60 additional aircraft across the fleet between now and the end of 2021, ensuring that the highest levels of service are maintained."

BUSINESS AVIATION NEWS BY NIGEL PITTAWAY

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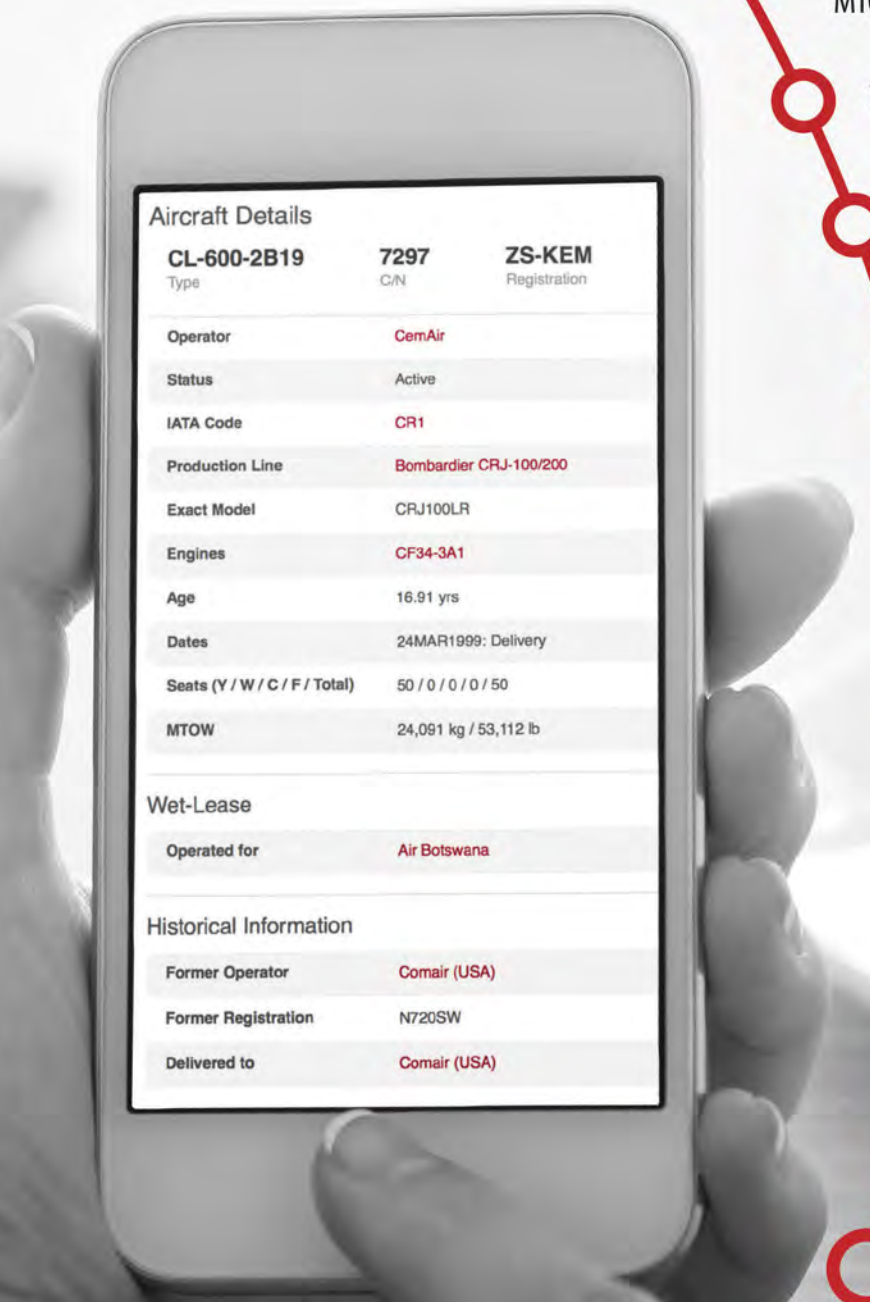

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Welcome

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Aviation Arrivals: 2019

Name	Country
Air Arabia Abu Dhabi	United Arab Emirates
Wizz Air Abu Dhabi	United Arab Emirates
Bakhtar Afghan Airlines	Afghanistan
Sundown Jet	Argentina
Amira Air	Austria
Aquiline Austria	Austria
Zimex Aviation Austria	Austria
Pilbara Airlines	Australia
Air Antwerp	Belgium
Holiday Europe	Bulgaria
Air Bénin	Benin
Amas Bolivia	Bolivia
Amas Brasil	Brazil
Globalia Linhas Aéreas	Brazil
Voe Parana	Brazil
De Havilland Aircraft of Canada	Canada
FlyCemAir Canada	Canada
MHI RJ Aviation	Canada
EBIRD	Switzerland
flyBAIR	Switzerland
Chex Air	Chile
Express Airline	China
Central Airlines	China
Lingnan Airlines	China
Sino-LAC Airlines	China
Sunan Airlines	China
Aérea	Colombia
ELA Cyprus	Cyprus
DRA Aero	Germany
German Airways	Germany
Citiair de Aviación	Ecuador
Cobra Jet	Egypt
Latino American Air	Spain
Karhu Aero	Finland

Name	Country
Amelia	France
Penzance Helicopters	United Kingdom
Aero Georgia	Georgia
Flywings Aviation	Georgia
GAT - Guyane Aéro Transport	French Guiana
Air Demerara	Guyana
Best Wings	Croatia
UR Airlines	Iraq
flyPersia	Iran (Islamic Republic of)
Pardis Air	Iran (Islamic Republic of)
PLAY	Iceland
Aerolinee Siciliane	Italy
EGO Airways	Italy
HelloFly	Italy
Sky Alps	Italy
Jam Air Express	Jamaica
Toki Air	Japan
ZIPAIR Tokyo	Japan
KAP.KG Aircompany	Kyrgyzstan
Cayman Bellawings Jet	Cayman Islands
Six West (Cayman Islands)	Cayman Islands
Jenis Air	Kazakhstan
Alraqeem Air	Libya
MedLib	Libya
Air Bikini	Marshall Islands
Afrikayes Air	Mali
Sky Mali	Mali
galistair (Malta)	Malta
Malta Air	Malta
Six West Malta	Malta
Aeroméxico Private Jets	Mexico
Amal by Malaysia Airlines	Malaysia
Love2Fly	Malaysia
Scanda Sky	Malaysia

Name	Country
Sipadan Air	Malaysia
FlyWestair	Namibia
Air Oceania	New Caledonia
Rahma Air	Nigeria
Wingo (Panama)	Panama
Aerolíneas Estelar (Peru)	Peru
Peru Pacific Airlines	Peru
Sunlight Air	Philippines (the)
Animawings	Romania
Aviatsiya Kolymy	Russian Federation
Heart Aerospace	Sweden
Air Adriatic (Slovenia)	Slovenia
Air Safari	Somalia
Flysom Airline	Somalia
Salaam Air Express	Somalia
Sky Travel and Aviation	South Sudan
South Sudan Airways	South Sudan
Golden Wings (Syrian Arab Republic)	Syrian Arab Republic
Naya Airlines	Syrian Arab Republic
Peter Airlines	Syrian Arab Republic
Siam Seaplane	Thailand
FlyUnion Airlines	Tajikistan
DMD Aviation	United States of America
FLOAT	United States of America
Quantum XYZ	United States of America
Rocky Mountain Airways	United States of America
Sky Palace Airways	United States of America
Thrive Aviation	United States of America
Amas Uruguay	Uruguay
Avinter	Uruguay
SilkJet	Uzbekistan
Air Corail	Wallis and Futuna
Hadramout Airways	Yemen
Tamifield	South Africa

Hello and welcome to Airliner World's Global Airline Report 2020. This year, following reader feedback, we're excited to present a fresh new format, bringing you a concise round-up during a turbulent period for the commercial aviation sector.

Most of the data on which our report is based has been supplied by airline intelligence specialist, *ch-aviation*. Our editorial team has crunched the figures to bring you the big stories from airlines and manufacturers around the world, from the dizzying highs of late 2019 through to the onset of the coronavirus crisis.

We kick off with an overview of start-ups and departures, along with the latest roll call of alliance members. We then examine the fascinating global trends in airframe deliveries and retirements. With many big names mothballing some – if not the majority – of their fleet, we later analyse aircraft in storage pending a revival in passenger traffic.

We conclude our report with a regional-specific focus, highlighting the major developments that have shaped the local aviation landscape. All data is correct as of July 7, 2020. While we endeavour to present as timely a report as possible, the rapid pace of change within the industry means further adjustments will inevitably have occurred between data extract and publication.

Aviation Departures: 2019

Company Name	Country	Merged with (if applicable)
Al Jaber Aviation	United Arab Emirates	
Taron-Avia	Armenia	
Fly Orana	Australia	
TIA 2000	Barbados	
Bulgarian Eagle	Bulgaria	
KD Air	Canada	
Services Air	Congo (the Democratic Republic of the)	
Super Constellation Flyers Association	Switzerland	
ADA - Aerolínea de Antioquia	Colombia	
InselAir	Curaçao	
Deutsche Lufthansa Berlin Stiftung	Germany	
FlyAlpha	Germany	FAI Rent-A-Jet
Germania	Germany	
Privateways	Germany	
Stuttgarter Flugdienst	Germany	Atlas Air Service
Thomas Cook Airlines Scandinavia	Denmark	Sunclass Airlines
EgyptAir Express	Egypt	EgyptAir
Aigle Azur	France	
IGavion	France	
Joon	France	Air France
Wijet	France	
XL Airways France	France	
Sky Gabon	Gabon	
flybmi	United Kingdom	
Thomas Cook Airlines	United Kingdom	
VVB Aviation	United Kingdom	
Asia Link Airlines	Indonesia	
CHIM-NIR Flight Services	Israel	
JetLite	India	
Al Naser Wings Airlines	Iraq	
WOW air	Iceland	
SW Italia	Italy	
Fly Jamaica Airways	Jamaica	
Vanilla Air	Japan	Peach Aviation
Tristar Air (Kenya)	Kenya	
Cambodia Bayon Airlines	Cambodia	
KC International Airlines	Cambodia	
Air Ylang	Comoros	
Air Philip	Korea (the Republic of)	
Cosmos Aviation	Sri Lanka	
Global Air	Mexico	
Fastjet Mozambique	Mozambique	
Air Nelson	New Zealand	Air New Zealand
Mount Cook Airline	New Zealand	Air New Zealand
Globus	Russian Federation	S7 Airlines
Shar Ink	Russian Federation	
Direktflyg	Sweden	Amapola Flyg
Adria Airways	Slovenia	
Far Eastern Air Transport	Taiwan (Province of China)	
Fastjet	Tanzania	
AtlasGlobal UA	Ukraine	
Dream Wind Airlines	Ukraine	
Kharkiv Airlines	Ukraine	
Continental Aviation Services	United States of America	
Encompass Aviation	United States of America	
Homer Air Service	United States of America	
JetSmarter	United States of America	XO Powered by JetSmarter
L-3 Communications	United States of America	L3 Harris Technologies
Regional Sky	United States of America	
Texas Sky	United States of America	
XOJET	United States of America	XO Powered by JetSmarter
Special Aviation Works	Uzbekistan	Uzbekistan Airways

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Alliances at a Glance: 2020

Airline Name	Alliance
Air Austral	Alliance Vanille
Air Madagascar	Alliance Vanille
Air Mauritius	Alliance Vanille
Air Seychelles	Alliance Vanille
Int'Air Îles	Alliance Vanille
Air Antilles	Caribsky
LIAT	Caribsky
Winair	Caribsky
Air Nostrum	oneworld
American Airlines	oneworld
BA CityFlyer	oneworld
British Airways	oneworld
Cathay Dragon	oneworld
Cathay Pacific	oneworld
Comair (South Africa)	oneworld
Eastern Australia Airlines	oneworld
Envoy Air	oneworld
Fiji Airways	oneworld
Fiji Link	oneworld
Finnair	oneworld
Iberia	oneworld
Iberia Express	oneworld
J-Air	oneworld
JAL - Japan Airlines	oneworld
Jetconnect	oneworld
JTA - Japan Transocean Air	oneworld
Malaysia Airlines	oneworld
Network Aviation	oneworld
NoRRA Nordic Regional Airlines	oneworld
OpenSkies	oneworld
Piedmont Airlines	oneworld
PSA Airlines	oneworld
Qantas	oneworld
Qatar Airways	oneworld
Royal Air Maroc	oneworld
Royal Jordanian	oneworld
S7 Airlines	oneworld
SriLankan Airlines	oneworld
Sun-Air	oneworld
Sunstate Airlines	oneworld
Aeroflot	SkyTeam
Aerolineas Argentinas	SkyTeam
Aeroméxico	SkyTeam
Air Europa	SkyTeam
Air France	SkyTeam
Alitalia	SkyTeam
China Airlines	SkyTeam
China Eastern Airlines	SkyTeam
CSA Czech Airlines	SkyTeam
Delta Air Lines	SkyTeam
Garuda Indonesia	SkyTeam
Kenya Airways	SkyTeam
KLM Royal Dutch Airlines	SkyTeam
Korean Air	SkyTeam
MEA - Middle East Airlines	SkyTeam
Saudia	SkyTeam
Tarom	SkyTeam
Vietnam Airlines	SkyTeam
Xiamen Airlines	SkyTeam
Aegean Airlines	Star Alliance
Air Canada	Star Alliance
Air China	Star Alliance
Air India	Star Alliance
Air New Zealand	Star Alliance
Air New Zealand Link	Star Alliance
ANA - All Nippon Airways	Star Alliance
Asiana Airlines	Star Alliance
Austrian Airlines	Star Alliance
Avianca Airlines	Star Alliance
Brussels Airlines	Star Alliance
Copa Airlines	Star Alliance
Croatia Airlines	Star Alliance
EgyptAir	Star Alliance
Ethiopian Airlines	Star Alliance
EVA Air	Star Alliance
LOT Polish Airlines	Star Alliance
Lufthansa	Star Alliance
SAS Scandinavian Airlines	Star Alliance
Shenzhen Airlines	Star Alliance
Singapore Airlines	Star Alliance
South African Airways	Star Alliance
Swiss	Star Alliance
TAP Air Portugal	Star Alliance
Thai Airways International	Star Alliance
Thai Smile	Star Alliance
Turkish Airlines	Star Alliance
United Airlines	Star Alliance
Cebgo	Value Alliance
Cebu Pacific Air	Value Alliance
Jeju Air	Value Alliance
Nok Air	Value Alliance
Scoot	Value Alliance

Next-gen Narrowbodies Win Out

The retirement of Avianca Airlines' ten Airbus A318s along with Avianca Brazil's four examples reduced the global fleet of the type by 37% WIKIMEDIA COMMONS/JOAO CARLOS MEDAU

No two years are ever the same when it comes to the composition of the global airline fleet. Although seemingly a constantly changing mishmash of aircraft, there is a clear trend of renewal which underlines the expected modernisation of the roster.

As expected, the next-generation narrowbody series of aircraft were the clear winners in 2019. The Airbus A220 enjoyed a 36% rise in total airframes sold compared with the previous year after the European manufacturer managed to deliver 29 new examples to customers including airBaltic and EgyptAir, who received eight and seven jets respectively. Meanwhile, the A320neo Family chalked up strong global fleet growth of 162% and 233% for the A320neo and A321neo.

Boeing's 737 MAX woes have continued to impede the US aerospace giant's ability to compete within the narrowbody market. Despite this, in the three months leading up to the grounding, the American airframer managed to deliver 197 examples, increasing its global fleet count to 371, up 113% from the previous year.

As the next-generation jets enter fleets, airlines have been phasing out their older examples, on most occasions either selling or leasing them to other operators, meaning the global fleet of the types has largely remained unchanged. The A319 and A320 fleets decreased by 8% and 2% – or 106 and 93 airframes, respectively. Notable examples include UK low-cost carrier easyJet, which scrapped two A319s, G-EZEB (c/n 2120) and G-EZEG (c/n 2181), in November 2019 following 15 years of loyal service.

Among the other significant figures, the A318 experienced one of the largest percentage declines in fleet numbers, losing 37% or 14 airframes in 2019. Avianca Airlines and Avianca Brazil phased out ten and four examples during the year, which they had acquired from Mexicana de Aviación. The jets were returned to their lessor and have not yet been reactivated.

Within the widebody market, the A340 saw its airframe count drop by 21% or 35 airframes as airlines looked for more fuel-efficient options. Meanwhile, the A330 experienced a 6% dip, with 81 examples being withdrawn from use, while 25 A330neos were delivered to customers including TAP Air Portugal, Air Mauritius, and Delta Air Lines.

Boeing has continued to edge ever closer to its 1,000th 787 as it now boasts 958 active airframes, a rise of 100 compared with 2019. Airbus, on the other hand, also saw modest growth of its next-generation widebody, the A350, with a total of 357 in service.

Within the turboprop sector, market leader ATR increased the airframe count of its ATR 42/72 by 4% or 47 examples. The number of De Havilland Canada Dash 8s dropped by 7% or 80 airframes to 913, mostly due to the demise of Flybe in March, as it operated 54 examples, the majority of which have remained idle as lessors have struggled to find new operators.

Global Fleet

Type	2019	2020	Unit Change	% Change
Airbus A220	80	109	29	36%
Airbus A318	38	24	-14	-37%
Airbus A319	1289	1211	-78	-6%
Airbus A319neo	0	0	0	0%
Airbus A320	4233	4110	-123	-3%
Airbus A320neo	701	952	251	36%
Airbus A321	1681	1646	-35	-2%
Airbus A321neo	203	322	119	59%
Airbus A330	1308	1227	-81	-6%
Airbus A330neo	19	44	25	132%
Airbus A340	164	129	-35	-21%
Airbus A350	289	357	68	24%
Airbus A380	235	218	-17	-7%
ATR 42/72	1131	1178	47	4%
Boeing 737-100/200	98	90	-8	-8%
Boeing 737 Classic	838	806	-32	-4%
Boeing 737 NG	6600	6558	-42	-1%
Boeing 737 MAX	373	371	-2	-1%
Boeing 747-100/200/300	28	28	0	0%
Boeing 747-400	360	316	-44	-12%
Boeing 747-8	123	127	4	3%
Boeing 767	793	767	-26	-3%
Boeing 777	1461	1465	4	0%
Boeing 787	858	958	100	12%
De Havilland Canada Dash 8	993	913	-80	-8%
Embraer E-Jet	1449	1404	-45	-3%
Sukhoi Superjet 100	131	123	-8	-6%

At the time of its collapse, Flybe operated 54 De Havilland Canada Dash 8 examples MARTIN NEEDHAM

Storage Spotlight

Hungarian low-cost carrier Wizz Air significantly increased is scheduled flights during July, in turn helping the country reactivate 95% of its 136 registered airframes WIZZAIR

In recent months, the subject of aircraft storage has taken on unusual prominence with airlines scaling back their active fleets in response to the COVID-19 pandemic.

Analysis of *ch-aviation* data shows that at the height of the coronavirus pandemic in early April, 55% of the total airline fleets around the world were grounded – equating to 17,944 aircraft.

At that time, the highest percentage of inactive airframes was based in Africa, where 74% of its more than 1,500-strong fleet was grounded.

Europe was a close runner-up with 72% or 5,796 individual examples, the greatest number of any region.

The lowest proportion was in North America, where 39% of airframes were grounded, but this can be explained by the fact that at the beginning of April, airlines were still in the process of schedule reductions and aircraft parking.

By the end of the month, the global storage picture had worsened following a 4% rise in parked aircraft, with the number peaking at 19,068.

Claiming the top spot with 75%, Europe's increase of 3% reflected the widespread lockdowns experienced in the region during March, which airlines then responded to by reducing their active fleets.

With reference to narrowbody fleets, 69% of the global Airbus A320 roster was grounded compared with only 59% of its American counterpart, the Boeing 737-800. Notably, the A320neo and 737-700 experienced the lowest levels of storage, with just 41% being parked.

Meanwhile, widebody examples generally fared worse than their single-aisle counterparts. Among popular types, the A330-200 was the most grounded aircraft (80%), though the A380 fleet experienced the largest widespread grounding with just four examples remaining active and 234 parked.

The least idle long-haul jet was the 787-9, of which just under half were still active at the end of April.

By July 31, the global storage picture had changed dramatically. From an all-time high of 59% at the close of April, the proportion of the global fleet grounded had reduced to 40%. Over the space of around three months, 5,500 aircraft returned to service with reactivation intensifying that month when more airlines resumed flying after full or part suspensions.

Europe continued to lead the recovery with more than 1,000 examples returning to flying duties in the first half of the month. The region subsequently had 45% of its fleet on the ground.

As a result of Wizz Air's ramp up in operations in July, Hungary boasted a 95% active fleet. Seychelles, Croatia and Luxembourg followed closely behind with 92%, 88% and 86% in service, respectively.

Despite this growth, 13,500 airframes remained grounded at the end of July and, according to the International Air Transport Association (IATA), it's likely to take years for them all to re-enter service.

Groundings by region at the end of July

Region	Active airframes	Total	% grounded
Africa	633	1,550	59%
Asia	7,366	11,376	35%
Europe	4,558	8,264	45%
North America	6,601	10,136	35%
Oceania	556	956	42%
South America	541	1,444	63%

Groundings by type at the end of April

Type	Active airframes	Total	% grounded
737-800	1,966	4,841	59%
A320-200	1,268	4,144	69%
A321-200	558	1,611	65%
A319-100	443	1,217	64%
737-700	586	987	41%

Of the popular narrowbodies, the Boeing 737-700 was grounded the least with 41% of the global fleet being inactive at the end of April
WIKIMEDIA COMMONS/BRIYYZ

Countries with the most active fleets at the end of July

Country	Active airframes	Total	% active
Hungary	129	136	95%
Seychelles	11	12	92%
Croatia	14	16	88%
Luxembourg	51	59	86%
China	3,443	4,170	83%
Netherlands	197	239	82%
Vietnam	197	239	82%
Taiwan	192	234	82%
New Zealand	106	132	80%
New Caledonia	11	14	79%

European Bouncebackability

Adria Airways was one of four European airlines to collapse in quick succession during September and early October 2019 MARTIN NEEDHAM

Twelve months ago, Europe and its largest aircraft manufacturer – Airbus – were riding the crest of a wave.

The Paris Air Show concluded with more than 240 commitments for the A321XLR, while passenger numbers continued to grow, undeterred by the collapses of Thomas Cook Airlines, XL Airways France, Aigle Azur and Adria Airways. Orders for the 'XLR swelled to more than 450 as Christmas rolled around and Airbus reasserted itself as the world's biggest aircraft producer – by which time China was in the middle of what is now an era-defining crisis which would soon consume the rest of the world.

A slight wobble in mid-January cushioned by a government bailout wasn't sufficient to save Exeter-based Flybe, which ceased services on March 5. However, within weeks of the carrier's collapse, its now-redundant fleet of De Havilland Canada Dash 8-400s and Embraer E175s were quickly joined in storage by vast swathes of airliners from Europe's remaining airlines. Not since the volcanic eruption of Eyjafjallajökull in Iceland in 2010 – almost a decade to the day – had the continent's airports fallen silent in such an abrupt manner.

Thanks to a mixture of proactive government handling of the coronavirus outbreak and a resilient short-haul network, European carriers have led the way in returning to the air following several months of near inactivity – in the week prior to the UK entering lockdown on March 23, more than 18m seats had been available across Europe; within a week, this had almost halved to 10m and within a month had further plummeted to fewer than 2.5m. The continent's bouncebackability has been and continues to be driven primarily by low-cost airlines not burdened by long-haul networks of their legacy carrier rivals. As of early August, 11.2% of available capacity was offered by Ryanair, with Wizz Air and easyJet holding 5.7% and 4.2%, respectively. Subsidiaries only served to extend this gulf, Ryanair's Malta Air held a 4.2% market share while easyJet's numbers are almost doubled by the inclusion of its Austrian and Swiss arms, which control 3.8% of capacity. Air France-KLM was the only flag carrier group within the top five European airlines by seats offered, boasting 3.8%. It, like many other legacy companies has made swingeing cuts to stave off further financial damage.

Air France's A380s are the tip of the iceberg when it comes to high profile fleet casualties among Europe's widebody operators. Lufthansa has also opted to lessen its load of super jumbos, handing six examples back to the manufacturer while A340s and 747-400s are also on the chopping block. British Airways, KLM and Corsair have also ditched their jumbos, expecting a long, slow shuffle back to the heady passenger figures enjoyed fewer than 12 months ago.

More stability can be found in the short-haul arena, with single-aisle jets not subjected to the same uncertainty as their widebody counterparts.

The ongoing 737 MAX saga (as this issue of *Airliner World* hits news-stands, the jet is entering its eighteenth month of grounding after two fatal crashes) has further complicated matters for 737NG operators unsure if to end or extend leases on their current complement of jets, while those such as easyJet, Lufthansa and Scandinavian Airlines have continued to swap older A320s and 737s for A320neos.

While leading the charge, Europe is by no means out of the woods. The International Air Transport Association's (IATA) August update forecasted a drop of 705m passengers – or 60% – versus 2019's figures and that came ahead of the UK's decision to reinstate quarantine measures on arrivals from France, Malta, Monaco and the Netherlands. Unsurprisingly, Ryanair has reduced its planned capacity for September and October by 20% and other carriers are likely to follow suit.

EasyJet and its Swiss and Austrian subsidiaries hold a combined 8% market share as of the start of August MARTIN NEEDHAM

Avianca's ability to restore at least some of its network has been curbed by the Colombian government's hesitancy to reopen the country's airspace. As a result, the company has filed for Chapter 11 bankruptcy protection to keep operating WIKIMEDIA COMMONS/ALAN WILSON

A Tale of Two Continents

In the early stages of the COVID-19 pandemic, the number of scheduled airline seats offered by carriers in the US suggested that the country was quickly getting back on its feet. Despite hitting a low of 5.5m during the week beginning May 4, operators quickly began adding capacity throughout June and into early July in a bid to return to pre-pandemic averages of around 30m seats. The ambitious bounceback has faltered in recent weeks, almost plateauing at around 14m since mid-July.

With the virus taking hold across the continent, staff breathed a sigh of relief after being spared the mass redundancies seen following the September 11 terrorist attacks in 2001 thanks to the Coronavirus Aid, Relief, and Economic Security Act (CARES Act), but carriers scrambled to trim the fat from their once vast fleets to match anticipated capacity.

Delta Air Lines was quick to phase out the last of its McDonnell Douglas MD-88s and MD-90s, while its 18-strong fleet of Boeing 777-200s – a mixture of Extended Range and Long Range variants – followed close behind, as did the company's final seven 737-700s. Reductions have also been made to the Atlanta, Georgia-based carrier's 767-300 and Airbus A320 complements, the latter type having been inherited from Northwest Airlines in their October 2008 merger. Similarly, American Airlines dispensed with the final 16 examples from a once 107-strong 767 fleet. Other casualties from the Dallas/Fort Worth-based airline included Embraer E190s, while the retirements of 757-200s and A330-300s are to be expedited.

The remainder of the US Airways-inherited A330s – some 15 examples of the smaller 200 variant – are to be placed in long-term storage and aren't expected to return to the air until at least 2022.

Further south, the picture isn't as bright. Brazil's Gol and Azul account for almost half the available scheduled seats in the region, with LATAM taking the trio's share to 72% of total capacity. Large numbers of coronavirus cases and over-cautious responses from several nations have stemmed the rate at which the continent has been able to move again. The Colombian government shut its airspace on March 23, closing off Latin America's third biggest aviation market and grounding operators including the national carrier Avianca and low-cost regional EasyFly. The decision has had a detrimental effect on both companies: the former has filed for Chapter 11 bankruptcy protection, while the latter has filed for insolvency and plans to restructure.

LATAM, South America's largest airline group, also filed for Chapter 11 in late May, and has deferred or renegotiated orders for 44 new Airbus aircraft and seven Boeing 787 Dreamliners.

While seat availability in South America continues to hover around the 1m mark – less than 20% of the number available in mid-March – there is some optimism. Azul founder and chairman David Neeleman anticipates rapid improvement in the coming months and believes the airline will be operating at 60% of its pre-pandemic network. Referencing the carrier's recent acquisition and rebranding of TwoFlex Aviação Inteligente as Azul Conecta, Neeleman stated: "Azul's fleet has flexibility like no other airline in Brazil, and we are using this to our advantage... We have aircraft ranging from nine seats to 214 seats in domestic markets, which allows us to customise our network to the evolving demand scenario."

Brazil's largest airline, Gol, also believes that some semblance of normality is just around the corner. Despite the country's COVID-19 cases continuing to climb, it anticipates that corporate travel will begin to pick up in September and October, with 80% of all pre-pandemic frequencies returning by the end of the year. This hinges on a substantial reduction in the number of new cases being reported – in the two weeks prior to this issue of *Airliner World* going to press, *The Guardian* advised that 548,313 people in Brazil had tested positive for the virus, with 12,992 deaths recorded.

American Airlines was quick to retire its Boeing 767-300ERs following the coronavirus outbreak. The type had been removed from the Dallas/Fort Worth-based carrier's fleet before the end of March MARTIN NEEDHAM

Going Nowhere Fast

Qantas initially parked several of its Airbus A380s at Los Angeles. As the pandemic raged on, these aircraft were moved to long-term storage at Southern California Logistics Airport AIRTEAMIMAGES.COM/JOHN KILMER

With both foreign and domestic carriers highly dependent on connectivity with and within China, it is unsurprising that airlines in the Asia/Pacific region have been the hardest hit by the coronavirus pandemic. Despite this, Chinese carriers have leveraged their country's massive manufacturing capability to maintain new links, often solely flying belly cargo and much-needed personal protective equipment to affected areas. An added incentive to get the country's airlines back in the sky was a Chinese Ministry of Finance scheme that paid airlines as much as ¥0.0528 (US$0.0076) per seat kilometre between January 23 and June 30. While a seemingly paltry amount, a single flight between China and Europe could earn carriers up to ¥300,000 (US$43,400).

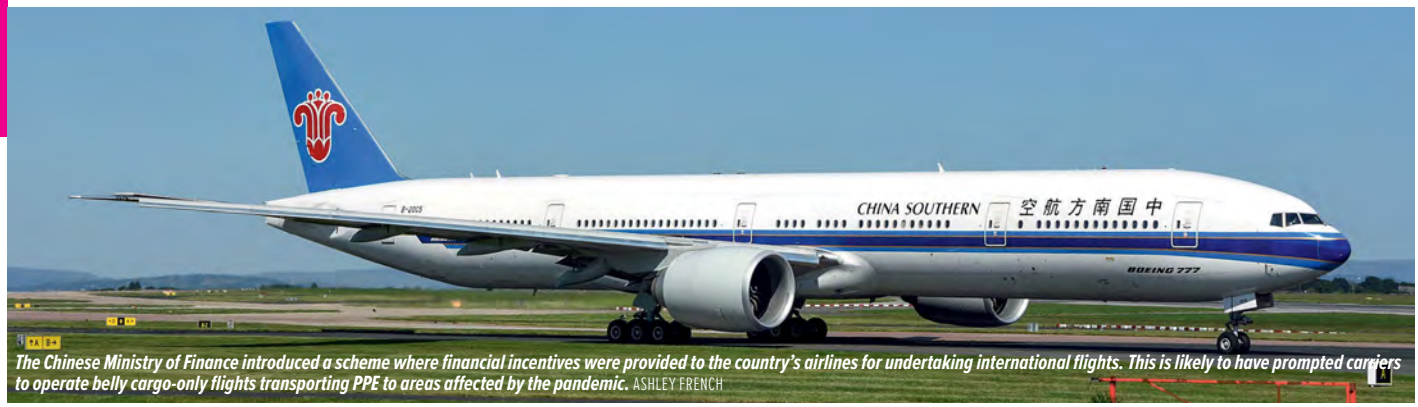
In neighbouring Hong Kong, Cathay Pacific saw its passenger numbers rise during July. The carrier and its Cathay Dragon subsidiary carried 42,984 travellers during the month. While this marked a decrease of 98.7% from 2019, it was an increase of 58.6% on the previous month. The Swire Group airlines' combined capacity for August and September was likely to be around 8% of pre-COVID-19 levels.

Australia is reliant on China for a large part of its tourism industry, so it has also suffered from the downturn in passenger numbers. Qantas was quick to mothball its ambitious Project Sunrise effort for non-stop flights from Sydney to London and New York, and brought forward the retirement of its final 747-400ERs by six months. The centenarian carrier has also taken the unprecedented step of placing three-quarters of its Airbus A380 fleet in storage at Victorville's Southern California Logistics Airport, with reports stating that the remaining three jets – stored in Los Angeles and Dresden – are likely to join them. The carrier's CEO, Alan Joyce, has stated that the superjumbos will likely be stored there for "at least three years", with the majority of its 11-strong 787-9 fleet due to spend time in the Mojave Desert air from September. Its fans rushed to buy 'care packages', comprising snacks, pyjamas and amenity kits as it cleared bulk-bought items from its warehouses.

Rival Virgin Australia has also been forced to tighten its belt considerably. After entering administration in April, the Brisbane-based airline has ditched low-cost subsidiary Tigerair and axed all international flying, with the Airbus A330 and Boeing 777 leaving the fleet. The Virgin Australia acquired by Bain Capital in June, bears little resemblance to the carrier that is set for a post-COVID return to fly Boeing 737-800s exclusively. It is likely to be going back to the Chicago-based manufacturer to renegotiate its order for 737 MAX 8s and 10s for a sixth time since the deal was firmed up in 2012.

Oceania is the single most heavily affected region, with scheduled weekly seat numbers collapsing ten-fold from 2.5m during the week beginning March 16 to around 250,000 a month later.

As evidenced by the steps taken by Virgin Australia and Qantas, international traffic has all but dried up and domestic flying remains severely dented. Prior to COVID-19, Sydney-Melbourne was the world's second-busiest domestic route, with around 150 flights between the two cities each day. This has now dropped to as few as four daily connections.



The Chinese Ministry of Finance introduced a scheme where financial incentives were provided to the country's airlines for undertaking international flights. This is likely to have prompted carriers to operate belly cargo-only flights transporting PPE to areas affected by the pandemic. ASHLEY FRENCH

Dilemmas in Dubai and Durban

South African Airways deployed four leased Airbus A350-900s on long-haul services in early February. Just five weeks later, on March 20, the company stated that it would cease all international services with immediate effect AIRTEAMIMAGES.COM/MARKUS MAINKA

When you think of Emirates, you inevitably think of the Airbus A380. The Dubai-based carrier's 115-strong superjumbo fleet enabled it to play a commanding role in the Middle East. The twin-deck airliner was deployed on anything and everything from short hops to Muscat – the world's shortest A380 route – to bleary-eyed 16-hour slogs to Los Angeles. But this reliance on the type – and the 142 Boeing 777s it also fields – has hindered the carrier's ability to operate effectively during the COVID-19 pandemic compared to rivals Etihad Airways and Qatar Airways, both of which have been able to roll out smaller, more fuel-efficient jets such as 787 Dreamliners and Airbus A350s on routes with greatly reduced passenger demand to assist dedicated 777F fleets in maintaining the flow of belly cargo around the world.

The A380's inability to compete on this stage has been evidenced by Emirates having parked as many as 105 of its Dubai-based double-deckers at one point during the pandemic. The carrier's move to shave 39 A380s from its 162-strong order book in February 2019 and sign up for 50 A350-900s may have been a nod to this lack of fleet diversity, but a scenario which highlighted this as starkly as the ongoing pandemic could hardly have been predicted. However, it is notable that of the largest players based in the Middle East, all bar two – Emirates and Kuwait Airways – have purchased the 787, with Kuwait instead opting for the Dreamliner-rivalling A330neo. As other airlines, particularly those in Europe, quickly move away from the A380, will Emirates look to lessen its load of leviathans? It's difficult to say, especially with the type forming an intrinsic part of the carrier's business model.

While Qatar Airways has deliberately positioned itself as a facilitator in repatriation efforts worldwide, Etihad's keenness to continue flying is part of a quest to regain financial stability. Losses of US$1.95bn in 2016 and US$1.52bn in 2017 have sparked a major restructuring, leading to cancelled orders and the storage of five brand-new A350-1000s at Bordeaux/Merignac with no entry into service planned.

Whereas the Middle Eastern aviation industry's recovery from COVID-19 has been slowed by the inability to restart long-haul services on a meaningful scale, Africa's bounceback has been limited compared with Europe's, partly due to an underdeveloped short-haul network and lack of low-cost carriers. A major stumbling block to the success of no-frills, cheap fares airlines is the lack of a sustainable regional aviation market within the continent, something likely to change with the creation of the Single African Air Transport Market (SAATM, see *Airliner World* July 2020) which the International Air Transport Association (IATA) says will "advance the liberalisation of civil aviation in Africa." Thus far, 34 countries representing more than 80% of the continent's existing aviation market have signed up to the project.

Long-embattled South African Airways has only had its collapse drawn out further by the coronavirus outbreak, having entered bankruptcy protection in December 2019 after failing to turn a profit for eight years.

In February, the carrier stood down its ageing fleet of A340s in favour of four leased A350-900s, but within weeks of the Rolls-Royce Trent XWB-powered jets beginning long-haul rotations, the airline stopped services as COVID-19 compounded financial problems.

The South African government confirmed it had pulled funding with immediate effect in April and has begun working to create a new, restructured airline that could launch as early as January. While the painful demise of South African Airways isn't going away any time soon, the opportunity to almost create a national carrier from scratch may prove beneficial to South Africa, a weakened industry could give a new airline the chance to quickly expand and assert itself while competitors are more concerned about their own survival than the new kid on the block.

Emirates has found it challenging to compete with the more nuanced fleets of Etihad Airways and Qatar Airways during the coronavirus pandemic. The Boeing 777 is the smallest aircraft type operated by the Dubai-based carrier MARTIN NEEDHAM

Farewell to the Queen

An integral part of the company's long-haul line-up mere months ago, British Airways' 747-400 fleet is now grounded and in storage across the UK, Europe and the US. **Tom Batchelor** considers the carrier's long association with the jumbo, spanning five decades, and the circumstances which forced the type's early retirement

British Airways (BA) bid farewell to the 'Queen of the Skies' in July – the 747 had served nearly 50 years with the UK flag carrier, with the jet's retirement ending a golden era of air travel that had seen millions of passengers flown around the world in the iconic double-decker.

The Boeing 747 is credited with democratising long-haul air travel with more affordable tickets and greater comfort. But as the devastating impact of the COVID-19 pandemic unfolded, BA announced in July that its remaining fleet of 31 747-400 aircraft would be retired with immediate effect. It came just a year after BA re-painted three of its jumbo jets in heritage colours to mark the company's centenary – a demonstration of the airline's proud connection with the jet. One, G-BYGC (c/n 25823), sported the British Overseas Airways Corporation (BOAC) livery as worn by the BA predecessor from 1964 to 1974; another, G-CIVB (c/n 25811), the Negus livery (first introduced in 1974); and a third, G-BNLY (c/n 27090), with the Landor livery (in use between 1984-1997). In fact, until the fleet was grounded, British

British Airways' first Boeing 747 was delivered to predecessor British Overseas Airways Corporation (BOAC) at London Heathrow on April 22, 1970, BRITISH AIRWAYS

The company has operated 101 examples of the iconic widebody type AIRTEAMIMAGES.COM/ THE SAMBA COLLECTION

The Covid-19 pandemic brought forward British Airways' 747-400 retirement plans by four years AIRTEAMIMAGES.COM/MIBFIJI

Airways was the world's biggest operator of 747-400 aircraft. In its heyday, the 747 was the largest commercial airliner in the world (boasting that title until Airbus' A380 super jumbo entered service in 2007) and it still remains the world's fastest commercial jetliner by many metrics– as well as a firm favourite with passengers and crew.

However, as the economics of the aviation industry changed, and the importance of limiting the environmental impact of flying came to the fore, the 747's card was marked. BA, which described the jumbo as "fuel-hungry", was already phasing out its 747 fleet before the coronavirus struck. BA's bosses were keen to replace the aircraft, the average age of which was 23 years, with more efficient, younger types. But the plan to mothball the last 747 by 2024 was brought forward in response to a dramatic fall in demand for global air travel – particularly on the transatlantic routes that made the jumbo viable. Passengers travelling from London to destinations as diverse as Johannesburg, Riyadh and San Francisco, can now expect to fly on much leaner and more fuel-efficient jets, such as 787 Dreamliners and A350 XWBs, which will make up the bulk of BA's long-haul fleet as it weathers the pandemic. The airline has invested heavily in modern twin-aisle aircraft, including 12 A350-1000s and 42 787s that burn around 25% less fuel than the venerable 747. An order for up to 42 777-9s is also on Boeing's books.

Only a single operator – Japan Airlines – has flown more jumbo jets in passenger service.
AIRTEAMIMAGES.COM/ BOB ROBINSON

The Heathrow-based airline has operated 57 747-400s, while Global Supply Systems flew a trio of 747-400Fs on behalf of British Airways World Cargo. Three 747-8Fs were flown under a similar contract between November 2011 and May 2014
AIRTEAMIMAGES.COM/ PHILIPPE NORET

Heart-breaking goodbye

Álex Cruz, British Airways' chairman and CEO, said at the time the withdrawal of the 747 was announced: "This is not how we wanted or expected to have to say goodbye to our incredible fleet of 747 aircraft. It is a heart-breaking decision to have to make. So many people, including many thousands of our colleagues past and present,

To mark its centenary, British Airways flew this BOAC-liveried 747-400 in formation with the RAF's Red Arrows at the 2019 Royal International Air Tattoo. BRITISH AIRWAYS

have spent countless hours on and with these wonderful planes – they have been at the centre of so many memories, including my very first long-haul flight. They will always hold a special place in our hearts at British Airways. We have committed to making our fleet more environmentally friendly as we look to reduce the size of our business to reflect the impact of the Covid-19 pandemic on aviation. As painful as it is, this is the most logical thing for us to propose.

"The retirement of the jumbo jet will be felt by many people across Britain, as well as by all of us at British Airways. It is sadly another difficult but necessary step as we prepare for a very different future."

BOAC – BA's predecessor – operated its first 747 London to New York service on April 14, 1971, under the registration G-AWNF. After three years, BA placed an order for four more new Rolls-Royce-powered 747-200 aircraft, taking delivery of the first two of the type in June 1976. The airline's first jumbo freighter, G-KILO (c/n 22306), entered service in 1980, but fell victim to a period of economic stagnation and was eventually sold to Cathay Pacific in March 1982. Further economic strife in the early 1980s forced BA to sell two 747-136 aircraft to Trans World Airlines (TWA) and put several more 747-236 aircraft directly into storage in the US. But as the demand for air travel improved, BA made what was at the time the largest single aircraft order ever placed, for 16 Boeing 747-436 aircraft plus another 12 on option, worth US$4.3bn, to replace the classic variant of the widebody. Fast-forward to July 1989 and the first 747-400, G-BNLC (c/n 23910), took to the skies in BA's colours, flying the London-Philadelphia-Pittsburgh route. BA put in further orders, taking its total order for the aircraft type to 42. The upgraded variant was immediately identifiable by the addition of wingtips, but also included improved avionics and a new flight deck for a cockpit crew of two instead of the previous three – dispensing with the flight engineer.

Owing to political sensitivities, BA formed British Asia Airways, a wholly owned subsidiary, in 1993 to fly between the UK, China and Taiwan using dedicated 747-400 aircraft wearing a Landor-based livery. In 1995, BA and Qantas announced a partnership allowing co-ordinated scheduling, sales and marketing on their 35 weekly Boeing 747-400 'Kangaroo Route' services between the UK and Australia. But by 1998, Boeing's twin-engined 777 was beginning to challenge the less efficient quadjet, and BA used an order for five Boeing 777-236ER aircraft to replace an earlier order for four 747s. Months later, BA converted even more 747 orders to the 777, while G-AWNF, BA's first jumbo, was retired as part of the sale of the airline's 747-136 fleet. The 57th and final 747-400 for BA was delivered in April 1999.

While BA's original jumbos seated 319 passengers – 27 in first class seats and 292 in economy – this grew to 345 customers across four classes in the latest iteration of the airline's flagship jet. Initially, the upper deck, widely described as the 'bubble', contained a lounge, which featured chair seating. It was known as the 'club in the sky' and the aircraft also played host to the world's first flatbed seat, which BA pioneered in 1999.

Size matters

While the 747 had been seen by many as playing a supporting role to its larger and more spacious rival, the A380, BA had until recently demonstrated its commitment to the jumbo with an upgrade of 18 of its 747 aircraft interiors. The refit involved 61 miles of new wiring for the in-flight entertainment system, enough new carpets to cover 34 tennis courts, nearly six miles of new LED lights and fabric changes to 4,950 seats – but passengers had just four years to enjoy the cabin upgrade before the entire fleet was grounded.

Just two Boeing 747-400s – a pair of freighters used by CargoLogicAir – will be active on the UK civil register once BA and Virgin Atlantic have disposed of their examples. AIRTEAMIMAGES.COM/YOCHAI

BOAC's original 747 first class cabin and the most recent Club World product installed on the 747-400. BRITISH AIRWAYS

The scale of these aircraft was one of the many reasons they proved so popular with customers and aviation enthusiasts alike. The wings of a 747-400 span 213ft – compared with the A380-800's 262ft wingspan – and are large enough to accommodate 50 parked cars. Additionally, the winglets on the 747 measure 6ft high while the tail stretches 64ft into the air, equivalent to a six-storey building.

BA's 747s are likely to be remembered by the retro liveries that adorned three of the jumbo jets in the years immediately before they were retired. But there is another set of equally iconic tails that defined the BA brand in the late 1990s – the 'World Images'. In 1997, the airline unveiled its new branding designed to completely replace the Landor livery across the airline. Referred to using the code name Project Utopia, the livery intended to "reflect the best of British values blended with the nation's more modern attributes – its friendly, youthful, diverse and cosmopolitan outlook, which is open to many cultures". Fifty images representing examples of art from across the world were used as part of a wider rebrand led by London-based design agency Newell and Sorrell to position BA as the "undisputed leader in world travel". While they were not solely reserved for the 747s, many of the iconic images of the painted tails featured the jumbo fleet. But despite their eye-catching and colourful designs, they faced opposition from politicians and some members of the public over their decision to drop the Union Flag. Former British prime minister Margaret Thatcher famously draped a handkerchief over the tail of a model BA jumbo with one of the new tail designs at a Conservative party conference in 1997. The controversy prompted Virgin Atlantic to apply the red, white and blue of the flag as part of its livery amid a fierce rivalry between the two UK airlines, with a company spokesman claiming the older and more established competitor had "lost their way" with the tail designs.

In decline

British Airways is not alone in erasing the jumbo from its future. Analysis by travel data firm *Cirium* published when the UK flag carrier announced the retirement of its jumbo fleet, found 139 of the remaining 170 passenger 747s were grounded by their respective airlines – a clear signal that the Heathrow-headquartered airline was not alone in struggling to justify inclusion of the large and inefficient jet in its long-haul fleet. According to *Cirium*, at the beginning of July more than half of the world's Airbus A350 and Boeing 787 widebody passenger jets were in active service, while only 7% of four-engined passenger 747s were flying, and just 2% of ultra-large A380s, "underscoring how airlines are turning predominantly to latest-generation twin-jets as they gradually restore widebody operations".

A 42-strong fleet of Boeing 787 Dreamliners comprising examples of all three variants is likely to shoulder most of British Airways' long-haul flying following the 747's retirement. AIRTEAMIMAGES.COM/ CARLOS ENAMORADO

The majority of 747s in the skies today are cargo variants operated by the likes of Atlas Air, UPS, Cargolux, Cathay Pacific Cargo and ASL Airlines. Other passenger carriers still fly the jumbo – notably Lufthansa, Air China and Korean Air, which operate the latest -8 variant. But others have, like BA, terminated their jumbo operations, including Delta Air Lines and Air France before the coronavirus pandemic took hold. In March, KLM operated its last 747 passenger rotation, but continued to fly its Combi variant in a cargo capacity. Days before BA's 747 announcement, Virgin Atlantic's last jumbos began departing Manchester Airport for Ciudad Real, Spain, where they will almost certainly be scrapped. The airline announced in May that it was removing all seven 747-400s from its fleet as part of a post-COVID recovery plan to "reshape and resize" the business "to ensure that is it fit for the future", which also involved axing its London Gatwick base and firing thousands of staff. *Tinker Belle*, *Ladybird*, *Ruby Tuesday*, *English Rose*, *Hot Lips*, *Barbarella* and *Pretty Woman* – all names given to Virgin Atlantic's jumbo fleet – were no more.

Elsewhere, Australian flag carrier Qantas also flew its last-ever jumbo in July on a route to the aircraft graveyard in the US Mojave Desert. As a farewell gesture, the jet drew its kangaroo logo in the sky before heading across the Pacific.

The disappointment for 747 admirers was compounded later in the summer when Boeing announced it would be axing overall production of the jumbo. In a July update to employees on the manufacturer's quarterly results and "market realities", the company said: "In light of the current market dynamics and outlook, we'll complete production of the iconic 747 in 2022. Our customer commitment does not end at delivery, and we'll continue to support 747 operations and sustainment well into the future." Boeing delivered just one 747 in the six months to the end of June 2020.

But for jumbo devotees, there is still one way to keep the BA 747 memories alive, at least in part: collecting souvenirs from the retired airframes. BA staff were recently given a keyring made from the metal skin of one retired jumbo, and salvage firms dealing with the airline's surplus 747s say they have been inundated with requests from the public to hold onto their own small piece of BA's iconic queen of the skies. AW

Former British Airways aircraft – including Hawker Siddeley HS.121 Tridents, BAC One-Elevens and all seven of its Aerospatiale-BAC Concordes – have all been preserved, but it is unlikely that one of the company's jumbos will become a museum piece in the UK.
AIRTEAMIMAGES.COM/ STEVE FLINT

BA has only operated one jumbo as a dedicated freighter. Boeing 747-200F, G-KILO (c/n 22306), served with the company between 1980 and 1982, before being sold to Cathay Pacific.
AIRTEAMIMAGES.COM/ THE SAMBA COLLECTION

British Airways operated 101 Boeing 747s, including 57 examples of the Rolls-Royce RB211-powered 400 series.
AIRTEAMIMAGES.COM/MIBFIJI

British Airways' Boeing 747s

Reg'n	Model	C/n	Delivered	Retired	Fate
G-AWNA	747-136	19761	Apr 22, 1970	Oct 31, 1998	Scrapped Bruntingthorpe 11/98
G-AWNB	747-136	19762	May 22, 1970	Aug 30, 1998	Scrapped Roswell 09/1998
G-AWNC	747-136	19763	June 29, 1970	Nov 29, 1999	To Air Gulf Falcon as P4-GFA, later 3D-GFA; scrapped Pinal Air Park 2005
G-AWND	747-136	19764	Feb 28, 1971	Aug 2, 1990	Captured by Iraqi forces invading Kuwait on 02/08/1990; destroyed 27/02/1991 during Iraqi retreat.
G-AWNE	747-136	19765	Mar 5, 1971	Dec 1, 1999	To Kabo Air as 5N-RRR, stored Kano/Mallam Aminu
G-AWNF	747-136	19766	Mar 14, 1971	Nov 17, 1999	To Kabo Air as 5N-JJJ, stored Kano/Mallam Aminu
G-AWNG	747-136	20269	Sept 8, 1971	Dec 2, 1998	Scrapped Roswell 12/98
G-AWNH	747-136	20270	Nov 23, 1971	June 2, 1999	To Federal Aviation Administration for use as Airworthiness Assurance Nondestructive Inspection Validation Center testbed; scrapped 2014.
G-AWNI	747-136	20271	Jan 7, 1972	Mar 25, 1981	To Trans World Airlines as N17125; to Tower Air as N605FF; w/o New York/JFK 20/12/1995
G-AWNJ	747-136	20272	Mar 21, 1972	Nov 30, 1998	Scrapped Roswell 12/1998
G-AWNK	747-136	20273	Mar 24, 1972	Mar 30, 1981	To Trans World Airlines as N17126; to Tower Air as N606FF; scrapped Victorville 01/2003
G-AWNL	747-136	20284	Apr 19, 1972	Oct 29, 1998	Scrapped Roswell 11/1998
G-AWNM	747-136	20708	May 3, 1973	Oct 31, 1999	Scrapped Roswell 12/1999
G-AWNN	747-136	20809	Nov 7, 1973	May 3, 1999	Scrapped Roswell 03/1999
G-AWNO	747-136	20810	Dec 7, 1973	Oct 31, 1999	Scrapped Roswell 12/1999
G-AWNP	747-136	20952	Nov 6, 1974	Jan 31, 2000	To Kabo Air as 5N-OOO, stored Kano/Mallam Aminu
G-BBPU	747-136	20953	Mar 14, 1975	Nov 26, 1999	To Air Gulf Falcon as P4-GFB, later 3C-GFB; to Spirit of Africa; scrapped Sharjah 2005
G-BDPV	747-136	21213	Apr 8, 1976	June 18, 1999	Scrapped Roswell 06/1999
G-BDPZ	747-148	19745	Apr 1, 1976 Feb 2, 1979	Oct 27, 1978 May 6, 1981	Leased from Aer Lingus on two occasions, returned as EI-ASJ; to Kabo Air as 5N-AAA; scrapped Roswell 2006
G-BDXA	747-236B	21238	July 27, 1977	Jan 23, 2001	Scrapped Pinal Air Park 02/2001
G-BDXB	747-236B	21239	June 16, 1977	Oct 1, 2001	To Xiamen/Gaoqi as an instructional airframe
G-BDXC	747-236B	21240	June 22, 1977	Mar 8, 2002	To European Air Charter, scrapped Cardiff 08/2002
G-BDXD	747-236B	21241	Apr 4, 1978	Dec 5, 1999	Scrapped Roswell 12/1999
G-BDXE	747-236B	21350	Mar 27, 1978	Jan 11, 2002	To European Air Charter, scrapped Kemble 10/2007
G-BDXF	747-236B	21351	Apr 24, 1978	May 23, 2002	To European Air Charter, scrapped Kemble 09/2006
G-BDXG	747-236B	21536	June 16, 1978	Feb 7, 2002	To European Air Charter, scrapped Bournemouth 05/2008
G-BDXH	747-236B	21635	Mar 27, 1979	Jan 20, 2002	To European Air Charter, scrapped Bournemouth 07/2009
G-BDXI	747-236B	21830	Mar 5, 1980	May 21, 2003	Scrapped Cardiff 05/2003

Reg'n	Model	C/n	Delivered	Retired	Fate
G-BDXJ	747-236B	21831	May 2, 1980	Mar 10, 2002	To European Charter; to Aces High for film use at Dunsfold
G-BDXK	747-236B	22303	Mar 30, 1983	Oct 4, 2002	To Air Atlanta Icelandic as TF-ARG; scrapped Kemble 2007
G-BDXL	747-236B	22305	Feb 9, 1984	Oct 4, 2002	Leased to British Airtours 19/03/84-31/10/84; to Air Atlanta Icelandic as TF-ARF; scrapped Pinal Air Park 08/2008
G-BDXM	747-236B(M)	23711	Feb 25, 1987	Apr 30, 2001	To Air Atlanta Icelandic as TF-ATX, to MK Airlines as G-MKLA, to The Cargo Airlines as 4L-GEO
G-BDXN	747-236B(M)	23735	Mar 17, 1987	Apr 4, 2003	To Air Atlanta Icelandic as TF-ARJ, stored Pinal Air Park 2012-2019, to Geo-Sky as 4L-GEN
G-BDXO	747-236B	23799	Apr 23, 1987	Mar 18, 2003	To European Air Charter; scrapped Amsterdam/Schiphol 11/2005
G-BDXP	747-236B	24088	Feb 24, 1988	July 25, 2001	To Air Atlanta Icelandic as TF-ATZ, op for MASKargo; scrapped Subang 2013.
G-BJXN	747-230B	20527	Apr 14, 1988	May 31, 1990	Ex Lufthansa, Braniff International, British Caledonian. To Continental Airlines as N78019; to Air Atlanta Icelandic as TF-ATA; to Logistic Air as 5U-ACE; stored Roswell 11/2007, still present 12/2019
G-BLVE	747-2B4B(M)	21097	Apr 29, 1985	Apr 24, 1990	Leased from Middle East Airlines, returned as N202AE, later OD-AGH; to American International Airways as N710CK, to Kitty Hawk International, to Kalitta Air; scrapped Oscoda, Michigan date unk
G-BLVF	747-2B4B(M)	21098	Nov 1, 1985	June 22, 1990	Sub-leased from Middle East Airlines, returned as N203AE; to Kalitta Air as N712CK; to Dubai Air Wing as A6-GDP; scrapped Kemble 05/2010
G-BMGS	747-283B	20121	Mar 5, 1986	Feb 2, 1990	Ex Scandinavian Airlines. To Virgin Atlantic Airways as G-VOYG; scrapped Kemble 01/1999
G-CITB	747-2D3B	22579	Apr 14, 1988	Nov 15, 1990	Ex Royal Jordanian, British Caledonian. To All Nippon Airways as JA8192; to Jett8 Airlines Cargo as 9V-JEA; scrapped Singapore 04/2015
G-GLYN	747-211B	21516	Oct 1, 1986	Apr 14, 1988	Ex Wardair Canada. To Philippine Airlines as RP-C8850; scrapped Pinal Air Park 2007
G-HUGE	747-2D3B(M)	21252	Apr 14, 1988	Nov 5, 1990	To Cargolux as LX-ZCV; to Atlas Air as N506MC; scrapped Roswell 01/2009
G-KILO	747-236F	22306	Sept 30, 1980	Mar 15, 1982	To Cathay Pacific as VR-HVY, later B-HVY; scrapped Kemble 10/2008
G-NIGB	747-211B	21517	Apr 14, 1988	Feb 11, 1991	Ex Wardair Canada, British Caledonian Airways. To Philippine Airlines as RP-C8830; scrapped Pinal Air Park 03/2006
G-BNLA	747-436	23908	Jun 30, 1989	Oct 26, 2009	Scrapped Victorville 12/2018
G-BNLB	747-436	23909	July 31, 1989	Nov 3, 2008	Scrapped Cardiff 12/2011
G-BNLC	747-436	23910	July 21, 1989	Oct 29, 2008	Scrapped Cardiff 11/2011
G-BNLD	747-436	23911	Sept 5, 1989	Feb 6, 2010	Scrapped Victorville 10/2019
G-BNLE	747-436	24047	Nov 15, 1989	Oct 30, 2014	Stored Victorville 11/2014, still present 05/2020
G-BNLF	747-436	24048	Feb 28, 1990	Mar 26, 2016	Scrapped Teruel 05/2016
G-BNLG	747-436	24049	Feb 27, 1990	Dec 7, 2014	Stored Victorville 12/2014, still present 08/2019
G-BNLH	747-436	24050	Mar 28, 1990	Sept 29, 2009	Scrapped Victorville 03/2019
G-BNLI	747-436	24051	Apr 21, 1990	Aug 11, 2014	oneworld livery; scrapped Victorville 04/2018
G-BNLJ	747-436	24052	May 23, 1990	Oct 1, 2016	Scrapped Teruel 06/2018
G-BNLK	747-436	24053	May 25, 1990	Jan 14, 2019	Scrapped St Athan 05/2019
G-BNLM	747-436	24055	Jun 28, 1990	Nov 27, 2013	Scrapped Victorville 02/2018
G-BNLN	747-436	24056	Jul 27, 1990	Jun 21, 2019	Scrapped St Athan 03/2020
G-BNLO	747-436	24057	Oct 25, 1990	Mar 11, 2017	Scrapped Teruel 12/2018
G-BNLP	747-436	24058	Dec 17, 1990	Dec 3, 2018	Scrapped St Athan 08/2019
G-BNLR	747-436	24447	Jan 15, 1991	Jan 16, 2014	Scrapped Victorville 02/2018
G-BNLS	747-436	24629	Mar 13, 1991	May 11, 2014	Scrapped Victorville 10/2018
G-BNLT	747-436	24630	Mar 19, 1991	Apr 1, 2014	Scrapped Victorville 02/2018
G-BNLU	747-436	25406	Jan 28, 1992	Oct 4, 2014	Scrapped Victorville 11/2018
G-BNLV	747-436	25427	Feb 20, 1992	Jul 31, 2016	Scrapped Teruel 2017
G-BNLW	747-436	25432	Mar 5, 1992	Nov 5, 2015	Scrapped Kemble 07/2016
G-BNLX	747-436	25435	Apr 3, 1992	Nov 5, 2015	Scrapped St Athan 12/2017
G-BNLY	747-436	27090	Feb 10, 1993	Mar 23, 2020	Landor 1984-1997 livery; stored Cardiff 06/2020
G-BNLZ	747-436	27091	Mar 4, 1993	Mar 31, 2015	Scrapped Kemble 2016
G-BYGA	747-436	28855	Dec 14, 1998	Mar 21, 2020	Stored Cardiff 03/2020
G-BYGB	747-436	28856	Jan 17, 1999	Mar 21, 2020	Stored Cardiff 03/2020
G-BYGC	747-436	25823	Jan 19, 1999	Apr 5, 2020	BOAC 1964-1974 livery; stored Cardiff 06/2020
G-BYGD	747-436	28857	Jan 26, 1999	Mar 16, 2020	Stored Cardiff 03/2020
G-BYGE	747-436	28858	Feb 5, 1999	Mar 23, 2020	Stored Cardiff 03/2020
G-BYGF	747-436	25824	Feb 17, 1994	Apr 9, 2020	Stored Heathrow 04/2020
G-BYGG	747-436	28859	Apr 29, 1999	Apr 3, 2020	Stored Cardiff 06/2020
G-CIVA	747-436	27092	Mar 22, 1993	Mar 28, 2020	Stored Teruel 04/2020
G-CIVB	747-436	25811	Feb 15, 1994	Apr 6, 2020	Negus 1974-1984 livery; stored London Heathrow 04/2020
G-CIVC	747-436	25812	Feb 26, 1994	Mar 28, 2020	oneworld livery; stored Cardiff 06/2020
G-CIVD	747-436	27349	Dec 14, 1994	Apr 18, 2020	oneworld livery; stored Castellon 08/2020
G-CIVE	747-436	27350	Dec 20, 1994	Mar 25, 2020	Stored Heathrow 08/2020
G-CIVF	747-436	25434	Mar 29, 1995	Apr 6, 2020	Stored Cardiff 06/2020
G-CIVG	747-436	25813	Apr 20, 1995	Nov 17, 2019	Scrapped St Athan 07/2020
G-CIVH	747-436	25809	Apr 23, 1996	Mar 18, 2020	Stored Heathrow 03/2020
G-CIVI	747-436	25814	May 2, 1996	April 6, 2020	oneworld livery; Stored Heathrow 04/2020
G-CIVJ	747-436	25817	Feb 11, 1997	Apr 6, 2020	Stored Kemble 04/2020
G-CIVK	747-436	25818	Feb 28, 1997	Mar 19, 2020	oneworld livery; stored Heathrow 03/2020
G-CIVL	747-436	27478	Mar 28, 1997	Mar 26, 2020	oneworld livery; stored Kemble 04/2020
G-CIVM	747-436	28700	Jun 5, 1997	Mar 16, 2020	oneworld livery; stored St Athan 03/2020
G-CIVN	747-436	28848	Sept 29, 1997	Mar 26, 2020	Stored Kemble 04/2020
G-CIVO	747-436	28849	Dec 5, 1997	Jun 2, 2020	Stored Cardiff 06/2020
G-CIVP	747-436	28850	Feb 17, 1998	Mar 31, 2020	oneworld livery; stored Heathrow 06/2020
G-CIVR	747-436	25820	Mar 2, 1998	Mar 20, 2020	Stored Teruel 03/2020
G-CIVS	747-436	28851	Mar 13, 1998	Mar 29, 2020	Stored Teruel 04/2020
G-CIVT	747-436	25821	Mar 20, 1998	Feb 28, 2020	Stored Teruel 04/2020
G-CIVU	747-436	25810	Apr 24, 1998	Mar 27, 2020	Stored Cardiff 06/2020
G-CIVV	747-436	25819	May 22, 1998	Mar 23, 2020	Stored Cardiff 03/2020
G-CIVW	747-436	25822	May 15, 1998	Mar 29, 2020	Stored Cardiff 06/2020
G-CIVX	747-436	28852	Sept 3, 1998	Mar 19, 2020	Stored Teruel 04/2020
G-CIVY	747-436	28853	Sept 29, 1998	April 5, 2020	Stored Heathrow 04/2020
G-CIVZ	747-436	28854	Oct 31, 1998	Mar 17, 2020	oneworld livery; stored Cardiff 03/2020

The Queen and her Captain

Few people on Earth know the Boeing 747 better than the pilots that flew it and perhaps none more so than retired British Airways training captain **Paul Howard. Thomas Haynes** caught up with him to find out more about his long career flying the Queen of the Skies

After soloing in 1966 at the age of 17, Paul Howard joined British Overseas Airways Corporation (BOAC) as a London/Heathrow-based co-pilot on the Vickers VC10 in 1970.

His first encounter with the Boeing 747 came in January 1978 when he joined the Classic fleet (-100 and -200 series) at British Airways. A move to the Gatwick-based McDonnell Douglas DC-10 to gain his command drew him away from the Jumbo before he returned in December 1997, this time to the 747-400 back at the carrier's Heathrow hub. He remained on the fleet until his retirement in April 2004.

During his years flying the 747 for BA, Howard accrued 11,500 hours on type. He flew 6,400 of them as co-pilot on the Classic and later accumulated 5,100 hours captaining the -400.

In total, during his flying career at the flag carrier, Howard logged an overall 21,300 hours – more than half of which were on the 747.

Conversion Training

Before he could fly the jumbo, Howard had to undergo a rigorous conversion course at British Airways' training centre near Heathrow. The first task was a familiarisation visit to a parked aircraft at the airline's hub.

Speaking about his first impressions of the type, Howard commented: "Having flown nothing larger than a VC10 upon my introduction to the 747 Classic, I really was truly amazed at the size of the fuselage – it was like looking up at a ship in port.

"Sitting in the pilot's seat for the first time and feeling so very far above the ground, I was quite aware of the sheer size of this awesome flying machine, which is so aptly named the Jumbo."

A series of classroom-based learning then followed, which culminated in a Type Technical Exam that contributed to the 747 endorsement on his licence.

The next crucial part of the conversion training consisted of ten simulator sessions each lasting about four hours. Beginning with learning basic start-up checklists and procedures for taxiing, Howard then progressed to circuits with touch-and-go landings, go-arounds, crosswinds and general handling of the aircraft in every configuration.

"This followed on to practising every flight manoeuvre you can think of, like an emergency descent from 35,000ft and combined multiple engine and system failures," Howard recalled.

The final test was a route flight with several unscheduled emergencies and problems. Howard quipped that the only thing you could be sure of was that "you wouldn't have four engines wherever you landed".

The first 747 he piloted was G-AWND (c/n 19764), a former BOAC example which was transferred to BA after being formed in 1974. AIRTEAMIMAGES.COM/ THE SAMBA COLLECTION

His final flight on the 747 Classic came on January 11, 1989 with a rotation from Los Angeles to Heathrow. AIRTEAMIMAGES.COM/ THE SAMBA COLLECTION

Howard flew the 747 for a total of 18 years and accumulated 11,500 hours on the type. AIRTEAMIMAGES.COM/ CARLOS ENAMORADO

First Flight

Following this initial conversion training, Howard was ready to put into practice the drills and procedures he had learnt in the simulator, through base training at Glasgow/Prestwick. On January 15, 1978, he sat in the co-pilot's seat of G-AWND (c/n 19764), a 747-100 that had been delivered to BOAC in February 1971 and transferred when British Airways was formed in 1974.

"The engines were started and after the checks were completed, I gingerly advanced the thrust levers," Howard said.

Being so high above the ground you get less sensation of speed and so, he said, it was important to keep an eye on the inertial navigation readout. "On first attempt you might feel you are ten knots while actually doing 20 or more. The simulator was good, but the actual feel of the aircraft made you very alert to the new sensation," he noted.

As this was a training flight, the aircraft was relatively light as 747s go, which meant that a small amount of braking was required from time to time to "stop it running away from you" – this is in stark contrast to a fully loaded example, which would require power to keep it rolling.

"After all the checklists were complete, we lined up on Runway 31 for take-off, just as we'd done in the simulator. I applied power and almost at once I got the calls from the left-hand seat of 'power set, speed building, 80 knots, V1, rotate, positive climb'. I then called for the gear up – it all happened so quickly and before I knew it, we were rocketing towards circuit height of 1,500 feet," Howard recalled.

Reflecting on the flight now, more than 40 years later, Howard said it was a "truly awesome" experience flying the jumbo for the first time.

"I did six very busy take-offs and landings that day and it was hard work trying to get everything right and improve height and speed control each time, but the training captain was brilliant and gave me plenty of tips and encouragement.

"I must admit, I was a bit sweaty and worn out after all the concentration and effort on that first flight even though it only lasted 1 hour 10 minutes, but I was very elated to have done it," Howard said.

Over the next four days, he flew four separate details, which included some local flying around Scotland away from the circuit, and completed 19 landings, "some of which were better than others of course". He also practised a few go-arounds on three and four engines including one from the flare, which he described as an "interesting exercise" and "no big deal" because the aircraft was already in a good attitude to start climbing away upon the application of power.

Six weeks after starting ground school with his licence now endorsed to fly the 747, Howard was ready to start route training on scheduled links with full crew and passengers.

Returning to the Jumbo

In January 1989, 11 years after he began flying the 747, Howard moved on to British Airways' DC-10 fleet in order to gain his command upgrade. Just over eight years later, he returned to the type but this time to the -400 series.

The first major difference Howard recalled, between the two generations

Seen here on March 5, 1998, Howard counted the Hong Kong flight, which included an instrument guidance system (IGS) approach to Runway 13 at Kai Tak, as one of his favourites. VIA AUTHOR

BELOW RIGHT: *The London to Los Angeles route was a service Howard flew very often with the -400.* AIRTEAMIMAGES.COM/ALVIN MAN

Ahead of his retirement, Howard stands in front of G-CIVL (c/n 27478), on the ground at Heathrow. VIA AUTHOR

of 747 was that the -400 was only a two-person crew whereas the -100 and -200s included a flight engineer as a third member.

"The dual crew operation worked well as the level of automation and aircraft systems were cleverly designed to always ensure a safe and efficient operation," Howard commented.

Another noticeable difference of course, was the introduction of the glass cockpit which he described as "very user-friendly". There was one piece of automation that he found particularly impressive.

"The most remarkable bit for me was the autoland system which used the three autopilots and in theory could do a blind landing [zero visibility]. I say in theory, because in practice we had to have 100m runway visual range (RVR) because we had to taxi off the runway."

Operational Reliability

The 747 is known for its operational dependability – helped considerably by the fact it has four engines and multiple sets of redundancy for each system.

Despite this, Howard recalled an incident involving an "irregularity" with one of the engines which occurred on a flight between Kuwait and Dubai. After consulting the quick reference handbook (QRH) and liaising with operations in London, it was decided that a diversion to Bahrain would be suitable – mainly because the airport had a British Airways maintenance facility.

After five hours on the ground, BA engineers managed to fix the issue and the flight was able to continue as normal to Dubai.

"All the other things I dealt with were relatively minor," Howard commented. "We had occasional problems with flaps or hydraulic leaks and diversions from time to time, generally because of passenger medical issues or weather."

Fun Flying Destinations

Having flown all over the world with British Airways during his 33-year career, there is one destination that sticks in Howard's mind as one of his favourites to fly to.

The now closed Kai Tak Airport in Hong Kong was well known for its challenging approach, which saw aircraft line up with a checkerboard on the side of a hill. At 700ft a turn through 047° commenced and once abeam the ground marker at 400ft, the aircraft was levelled out aligned with the runway.

During his time with BA, Howard estimates he visited the hub more than 30 times but said the enjoyment he got from flying the approach "never wore off".

"Both the Classic and -400 were a delight to handle on that approach," he recalled. "It was always an enjoyable challenge and was one of the many experiences that made flying the 747 such a pleasure."

A Fond Farewell

The announcement of the 747's retirement from British Airways' fleet did not come as a huge surprise to Howard: "I was expecting it to go, but not so quickly," he said.

"Quite simply, four engine widebodies are too expensive to run in today's environment especially with decreased passenger demand on long-haul services – it was an inevitable commercial decision, but it was definitely a surprise that it happened so quickly," he commented.

He made clear that the 747 had an immeasurable positive effect on both BA and the commercial aviation industry as a whole, saying that everything else had been compared to it for the last 50 years. "Hearing of its retirement was a very sad day indeed," he added.

Howard said the type will be remembered most fondly by "those of us lucky enough to pilot it" and the many millions of people who flew on it as a passenger over its 49-year service with the flag carrier. AW

The last 747 Howard ever flew continued to serve with British Airways and was only withdrawn from use on March 26 this year
AIRTEAMIMAGES.COM/ STEVE FLINT

For the final time, Howard sits in the captain's seat of G-CIVL (c/n 27478), ahead of his retirement.
VIA AUTHOR

BELOW LEFT: ***The most significant change between the Classic and -400 for Howard, was the introduction of a glass cockpit which provided enhanced pilot input into the automation and aircraft systems***
AIRTEAMIMAGES.COM/ DANIEL NICHOLSON

BELOW: ***Howard (left) and the rest of the flight deck crew gather for a photo ahead of his retirement from BA.***
VIA AUTHOR

AIRBUS A350 - A FULL-BODIED TWIN

KEY PRESENTS

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As airlines tighten their belts, the need for an efficient fleet is more important than ever. **Tom Batchelor** examines the runners and riders in this ultra-competitive field

The Single-Aisle Space Race

While uncertainty continues to weigh heavily in many corners of the aviation industry, there is one rather meaty slice of the market where opinion is united: this is the era of the next-generation single-aisle jet. With Airbus announcing in February 2019 that it is wrapping up its A380 programme and Boeing confirming in late July that the final 747 is due to roll off the production line in 2022, manufacturers are increasingly focusing their efforts on narrowbodies to ply both short- and medium-haul routes.

The latest major entrants in this battle – the A320neo (new engine option) and 737 MAX – are reshaping how airlines configure their fleets, with more single-aisle aircraft now deployed on transatlantic routes and those linking Europe with the Middle East. That's not to say that these aircraft have had an easy ride over

The Boeing 737 MAX has been grounded since spring 2019 following fatal crashes involving two examples
BOEING

While Airbus was relatively late on the scene, it has snapped up precious market share from its US rival over the past two decades
AIRBUS

the past few months. Recent global events have decimated once healthy order books, with two deadly crashes involving the 737 MAX and the COVID-19 crisis causing shock waves across the industry.

John Strickland, aviation expert and director of JLS Consulting, told *Airliner World* that the fallout caused by the coronavirus is likely to accelerate the importance of narrowbody aircraft in long-haul markets for the short- to medium- term. He highlighted that such examples "reduce risk by offering fewer seats to the market as well as improved cost efficiency", but added: "This should be put in the context of ownership and lease costs of acquiring new aircraft and for some markets, range will still not be sufficient for viable operations. Demand on some routes is still likely to require larger widebodies as well as greater cargo capacity which is frequently an important consideration."

View from the US

Boeing's dominance in the narrowbody market stretches back to the late 1950s, when production of the four-engine 707 began, a design which helped revolutionise air travel.

The US aerospace giant went on to build several other single-aisle types, including the 717, 727 and 757, but it was the 737 which cemented the company's position in the market. With designs first unveiled in 1965, the 737 quickly earned two nicknames: 'Baby Boeing', when compared with the larger, multi-engined jets the company was better known for producing, and 'the square plane', because it was said to be as long as it was wide.

In order to streamline production, the firm gave the jet the same upper fuselage as the 707 and 727, which allowed identical cargo pallets to be used on all three types.

Lufthansa and United Airlines were among the first carriers to deploy the jet into revenue service and, by the early 1990s, with more than 3,000 of the type ordered, the company turned its attention to the Next-Generation 737 which also proved to be hugely successful. Aware of the increasing popularity of Airbus' A320 Family, Boeing continued to evolve its 737 platform, culminating in the 2011 unveiling of the MAX variant. Orders flooded in and within six months had exceeded 1,000 aircraft from global soon-to-be operators.

In total, Boeing has produced more than 10,000 737s – the first commercial jet to reach this »

Airbus A320neo In Numbers

Range	3,400nm
Typical seating (two-class)	150-180
Maximum seating	194
Overall length	123ft 3in
Wing span (geometric)	117ft 5in
Height	38ft 7in
Max fuel capacity	7,060 US gal
Engines	Pratt & Whitney PW1100G or CFM International LEAP-1A

milestone. More recently, however, the firm was rocked by two 737 MAX crashes in which 346 people died – the first involving a Lion Air example in October 2018, the second an Ethiopian Airlines service in March of last year.

While investigations continue into the exact circumstances which lead to the accidents, they have been enough to knock consumer and regulatory confidence in the type.

This, coupled with the COVID-19 crisis and other external factors, has led to hundreds of orders for the MAX being cancelled since the start of 2020 alone.

Asked about Boeing's overall strategy for consolidating the single-aisle market, a spokeswoman told *Airliner World*: "As we see it today, narrowbody airplanes will lead the way in the recovery as airlines progressively bring their networks back online." But she added that the company's current focus was on "continuing to work diligently on safely returning the 737 MAX to commercial service".

Airbus Overview

The Toulouse-based manufacturer has cemented its position in the narrowbody market almost entirely with a single family of aircraft. The first A320 example rolled off the production line in 1988, for French airline Air Inter – later merged with Air France – followed by the first delivery of an A321 to Lufthansa in 1994. Just two years later the first A319 was welcomed by Swiss Air, then in 2003 by the smallest variant in the family – the A318 – to Colorado's Frontier Airlines.

Before the coronavirus pandemic took hold, Airbus could boast that an A320 variant took off or landed somewhere on the globe every 1.6 seconds. The type also lays claim to being the first civil aircraft to pioneer fly-by-wire technology, which as Airbus puts it, "replaced a web of cables and pulleys... with a computer which calculates exactly which control surface deflections are needed to make the aircraft respond as the pilot wishes", and a side stick control where the pilots' central control column once stood. In total, the A320 family has attracted some 15,522 orders from more than 300 customers – with more in service than any other passenger airliner.

Battle Ready

The transatlantic duopoly began in earnest in the 1990s and arguably reached its peak around a decade ago

TAP Portugal is one of those which has traded in inefficient older aircraft for the next-generation of narrowbodies
AIRBUS

ABOVE LEFT • ***The A320 family of jets comprises the A318, A319, A320 and A321 – with many airlines operating multiple variants***
AIRBUS

Many analysts believe the competition posed by Chinese and Russian manufacturers will intensify in the coming decade
UAC

Ryanair has stood firm by its plans to introduce the 737 MAX when the type is recertified for commercial service
AIRTEAMIMAGES.COM/ BASTIAN DING

Boeing 737 MAX: In Numbers

	737 MAX 7	737 MAX 8	737 MAX 9	737 MAX 10
Seats (two-class)	138 – 153	162 – 178	178 – 193	188 – 204
Maximum seats	172	210*	220	230
Range nm	3,850	3,550	3,550*	3,300*
Length	116ft 8in	129ft 8in	138ft 4in	143ft 8in
Wingspan	117ft 10in	117ft 10in	117ft 10in	117ft 10in
Engines	CFM International LEAP-1B			
Notes		*210 seats: 737-8-200 variant	*one auxiliary tank	*one auxiliary tank

when Airbus and Boeing revealed their re-engined A320 and 737 jets within six months of each other.

This battle for a larger slice of the reconfigured, more fuel-efficient single-aisle market intensified when American Airlines, at one point an exclusive Boeing customer, came close to announcing a bombshell deal with Airbus for hundreds of new jets.

The US manufacturer was reportedly so spooked by the possible move that it dropped plans for a complete redesign – often regarded as a 'clean sheet' approach – in favour of updating the existing 737 model. In the end, American Airlines signed a deal for aircraft from both Airbus and Boeing.

Criticism of Boeing in the wake of the MAX crashes included allegations in the *Wall Street Journal* that it rushed production of the 737 MAX to keep pace with its European rival, though Boeing insists safety was and continues to be its "highest priority".

Andreu Carbonell, managing director of consultancy group Flare Aviation, told *Airliner World* that recent competition between Boeing and Airbus was not concentrated on one specific aircraft segment, such as the neo and MAX, but rather across their entire portfolio. "Airlines have become more aware of harmonising fleets to incur lower costs in terms of maintenance, pilots, training and handling equipment. So the big swing has been Boeing versus Airbus rather than neo versus MAX, and Airbus has definitely gained some big battles recently. ULCCs [ultra low-cost carriers] such as Hungary's Wizz Air or VivaAerobús in Mexico have focused their strategy on the A321neo to reduce unit costs to the MAX. This has meant that Airbus has gained some of Boeing's traditional markets, such as those in and around Latin America."

Both the MAX and the neo offer airlines cost savings compared with older models, not only from more fuel-efficient engines but also because those aircraft can cope with extended ranges which allow the narrowbody jets to ply routes once largely reserved for widebodies. »

Airlines are banking on this latest generation of narrowbody aircraft to make previously unprofitable city pairs more commercially viable
JETBLUE

Airlines have been quick to remove the Boeing 757 from their fleet portfolio as efficiency drives continue
WIKIMEDIA COMMONS/ ISTEVE FITZGERALD

With wing-tip Sharklets, more fuel-efficient engines and innovations in the cabin, the key benefits of the A320neo compared with A320ceo (current engine option) include 20% fuel burn reduction per seat, 5% lower airframe maintenance costs and 14% lower cash operating costs per seat. Airbus claims the A320neo offers between 4-6% lower fuel burn per seat compared with the 737 MAX 8 and the A321neo offers 7% lower fuel burn per seat against the Boeing 737 MAX 10.

On the contrary, Boeing claims the 737 MAX has an 8% lower operating cost than its main competitor, without specifying precisely which aircraft this is, and a 19% increase in range compared with earlier variants.

Its distinctive 'V'-shaped winglets are described by the company as the "most efficient ever designed for a production aeroplane". Where the neo really leaps ahead of its US rival is in its sales and delivery figures.

Airbus delivered more than 1,200 narrowbody neos since the first of the new type was produced in 2016. The Toulouse firm has orders for approximately 6,000 more across the three variants – although this figure has been subject to change amid COVID-related industry turbulence.

Across 'The Pond', Boeing's 737 MAX programme, largely grounded in the wake of the two crashes, has achieved deliveries of 387 examples, with orders for 4,559 jets as of June 2020.

Indian low-cost carrier IndiGo is the world's biggest customer for the A320neo family, while Indonesian budget airline Lion Air and Southwest Airlines will, if all the orders are converted into deliveries, be the largest operators of the MAX.

Strickland suggests that while Boeing "had the advantage of time with the 737 family, Airbus, late to the scene in the 1980s, has been able to embody newer technology and make many innovative adaptations of the A320s... Recently it has been able to move ahead with the early decision on launching the neo family, as airlines

Dutch flag carrier KLM is one of the main customers for Embraer's E2 programme
EMBRAER

Embraer E195-E2 In Numbers

Range	2,600nm
Typical seating (two-class)	132
Maximum seating	146
Overall length	136ft
Wingspan	115ft 2in
Height	35ft
Max fuel capacity	3,616 US gal

have increasingly sought improved fuel efficiency."

According to Bradley Dailey, director at Hong Kong-based Alton Aviation Consultancy, the 737 MAX 8 and the A320neo are largely similar both in capacity and range performance, with "minimal differentiation in passenger comfort" between them. "There are subtleties within each family of aircraft.

Airbus acquired the C-Series programme from Bombardier and rebranded the aircraft as the A220. Since the name change, the type has enjoyed strong sales from around the world FLICKR COMMONS/ TJDARMSTADT

For example, when considering the larger gauge end of the families, namely the A321neo and 737 MAX 9 or 10, the A321neo exhibits both a capacity and range advantage over its MAX counterparts. In terms of replacing widebodies on the long-haul routes, the most capable narrowbody aircraft for range, the A321XLR, is limited to around 4,700nm on a 175-200 seat configuration. It is feasible that in the future, widebodies that are currently serving routes under 4,000nm may be replaced with narrowbodies, though routes beyond 4,000nm will continue to require the payload and range performance offered by widebodies."

Enter the Challengers

While Airbus and Boeing aircraft dominate single-aisle jet sales, they are by no means the only players in what is an increasingly crowded market. Japan's Mitsubishi, China's Comac, Brazil's Embraer and Russia's United Aircraft Corporation (incorporating the Irkut MC-21) are all vying for orders from airlines more familiar with dealing with the European and US behemoths.

Embraer's E-Jet E2 family, announced at the Paris Air Show in 2013, shone a light on how manufacturers of sub-150 seat jets were competing for orders.

The E2 boasts drastically reduced fuel burn, maintenance costs and noise pollution compared with its earlier variant. Meanwhile, in June this year, China Eastern, China Southern, and Air China each took delivery of a handful of Comac's 90-seat ARJ21-700 aircraft.

China Eastern and China Southern created new subsidiary airlines to operate the home-grown jets, fuelling suggestions that these »

Airbus A220-300 In Numbers

Range	3,350nm
Typical seating (two-class)	120-150
Maximum seating	160
Overall length	127ft
Wingspan	115ft 1in
Height	38ft 8in
Max fuel capacity	5,681 US gal

domestic offerings are receiving a rather lukewarm reception among some customers. Comac's larger C919, which more closely resembles its European and American rivals with its 3-3 seat configuration, has more than 1,000 order commitments, 305 of which are firm, mostly from Chinese leasing firms or airlines.

Elsewhere, Mitsubishi's 90-seat SpaceJet has suffered delays since its test flight in 2015, with the pandemic dealing another blow to the Japanese manufacturer, which has endured technical and design headaches.

Commenting on the challenger plane makers, Strickland said: "Embraer has already established a successful market presence and with increased range and capacity offered by the new E-Jet family they can continue to gain share. Comac can claim an important part of its home market in China but making progress much beyond that will remain challenging, not least due to the need to have a sufficiently reliable spares and tech support function in key global markets. However the market for larger narrowbodied aircraft is the bigger segment and still leaves Airbus and Boeing in a strong position not least, in the case of Airbus, because it has the A220 in its portfolio."

Adding to the debate, Lusi Adut, of AviaPro Consulting, told *Airliner World* the pandemic offered a window of opportunity to manufacturers of smaller, regional jets: "As the industry recovers from the effects of COVID-19, airlines will focus on domestic operations, and less capacity. Does that mean regional aircraft will preclude 737s and A320s? The airlines that survive will have preserved their core operational infrastructure, which are the flight and maintenance crews of the 737 and A320. To this end, airline networks will retrench and drop destinations that cannot be served profitably with either of these types, only to be picked up by new market entrants in the future. Under these circumstances, opportunities exist for smaller, modern single aisles such as the A220 and E195-E2."

Russia's Sukhoi SuperJet 100 has faced a number of difficulties since its first commercial flight in 2011. Carriers including Brussels Airlines and Mexico's Interjet have since removed the type from their fleets UAC

BELOW LEFT • ***Improvements to cabin technology are allowing for greater flexibility and customisation for single-aisle jets*** JETBLUE

BELOW • ***Boeing's dominance in the narrowbody market stretches back to the late 1950s.*** BOEING

Despite a series of high-profile cancellations, the order book for the Boeing 737 MAX remains relatively healthy
BOEING

Putting Theory into Practice

The popularity of fuel-efficient, single-aisle jets is driven by airline demand for lower cost bases and greater flexibility with how and where they operate aircraft. Directly owing the success of the neo and – on paper at least – the MAX, airlines have announced plans to fly further than ever with this new generation of narrowbodies. Some of the most eye-catching examples include Jazeera Airways flying from Kuwait to London using the A320neo, Aer Lingus using A321LR jets to link the Irish capital with the US East Coast, France's all-business-class boutique airline, La Compagnie, offering premium hops to the Big Apple with its A321neo, and Lisbon-based carrier TAP Portugal deploying the same type for some of its transatlantic operations, including Porto to Newark/Liberty.

Some of these routes, such as those operated by the Irish flag carrier, have historically relied on ageing single-aisle 757s, but many others are replacing widebodies traditionally used for flights of six or more hours with leaner aircraft – both in size and cost. Ryanair, on the other hand, is using a large order for 737 MAX jets not to expand its network geographically, but to cut costs. The Irish budget carrier is one of the biggest customers for the beleaguered airliner, with its CEO, Michael O'Leary committing to the orders despite the pandemic, noting that the fuel-efficient jet would allow the firm to take advantage of "growth opportunities" from 2021.

So what will the future of the single-aisle jet market look like once coronavirus has eased and airlines reassert themselves? Some, including Flare Aviation's Carbonell, believe the industry is unlikely to see a significant shift away from widebodies in favour of smaller examples for operations to far-flung destinations. "The long-haul segment will remain dominated by twin-aisle aircraft, as airlines will continue seeking lower unit costs (achieved through higher-density aircraft seating) and the fuel efficiency that is already brought by the 787 and A350, which have been a big hit [commercially] and very well received from the industry. From aircraft capacity databases we know that widebody aircraft in international markets represented roughly 21% of all international flights in 2019, but most important is that this ratio has remained stagnant for the last ten years, showing no change in strategy so far."

Others point to the extended range of narrowbodies as a sign that orders for larger aircraft could suffer. Final thoughts belong to Andrew Charlton, managing director at strategic advisory firm, Aviation Advocacy, who states his case for the smaller jets: "The market has turned to make smaller aircraft the new black... so the neo and the MAX are in a very good place, size-wise. Add to this the steady increase in range those aircraft are delivering and you can see how it is eating into the larger aircraft turf. Against that, there will be a lot of spare aircraft available for a few years as airlines resize and reshape. Still, the more efficient, cheaper-to-run, longer-range new neo and MAX aircraft will be likely to be attractive." AW

Interview with a senior executive in the airline industry.

THE FUTURE OF FUELS

It has been a turbulent year for the commercial aviation sector, however the longer term questions regarding sustainable fuels haven't gone away. ***Airliner World*** spoke with **Tom Parsons**, Air bp's commercial development manager, low carbon, to discuss some of the biggest issues facing the industry

Tom Parsons works to develop low carbon projects at Air bp.

ALW: We hear a lot about biofuels – what are they and how do they work in an aviation context?

TP: Biofuel is also known as sustainable aviation fuel (SAF). It's produced from sustainable, renewable feedstocks and is very similar in its chemistry to fossil jet fuel. SAF gives an impressive reduction of up to 80% in CO_2 emissions over the lifecycle of the fuel compared with the fossil jet fuel it replaces, depending on the sustainable feedstock used, production method and the supply chain to the airport.

Some typical feedstocks used are cooking oil and other non-palm waste oils from animals or plants; solid waste from homes and businesses, such as packaging, paper, textiles and food scraps that would otherwise go to landfill or incineration. Other potential sources include forestry waste, such as waste wood, and energy crops, including fast-growing plants and algae. Air bp's SAF is currently made from used cooking oil and other waste.

Jet fuel packs a lot of energy for its weight and it is this energy density

Interview with a senior executive in the airline industry.

Airlines and aircraft manufacturers often use delivery flights as opportunities to showcase sustainable aviation fuels
AIRBUS

that has really enabled commercial flight. Today, there aren't any other viable options for transporting groups of people quickly over very long distances, so we're dependent on this type of fuel in aviation.

A return flight between London and San Francisco has a carbon footprint per economy ticket of nearly 1 tonne of CO_2. That's the same as driving a diesel car 3,750 miles or 6,035km. It is essential that we act to reduce aviation's carbon emissions, and SAF is one way in which we are doing that.

Air bp worked with partners in Sweden and further afield to coordinate 'the perfect flight' in 2019.

ALW: Sustainable aviation fuels have been in development for decades without an obvious game-changing breakthrough. What's taking so long?
TP: At the moment, the production of SAF is limited as the higher cost for SAF is preventing wider uptake. A reduction in cost is the key to greater acceptance and deployment of SAF. The higher cost is down to a combination of the current availability of sustainable feedstocks and the continuing development of new production technologies. As the technology matures it will become more efficient and so the expectation is that it will become less costly for customers.

To date, Air bp has supplied SAF at 16 locations in six countries across three continents. Air bp's SAF has been used to fuel many different types of aircraft, from small private jets to large passenger aircraft. We're working on helping create more demand in the short-term which will lead to more production and hopefully lower costs in future.

ALW: What about the longer term picture?
TP: Over the long term, greater acceptance and deployment of SAF will require investment in advanced technologies to process feedstocks more efficiently at greater scale and investment in the development of sustainable and scalable feedstock options. However, in the short term, interim support from governments and other stakeholders through policy incentives is needed. This support needs to be part of a long-term framework to give investors the confidence to make the big investments required to grow supply.

ALW: Do you think we'll see government-level intervention on the introduction of less harmful aviation fuels?
TP: In June, the UK government announced its ambition to see a zero carbon transatlantic jetliner within our generation. The government is creating the 'Jet Zero' Council with airlines, airports and environmentalists, to help make flying more sustainable. In Norway, the government mandate has required that airlines operating in Norway must blend 0.5% advanced biofuel with aviation fuel since January 2020. At Air bp, we welcome these initiatives and look forward to seeing more of them in future.

ALW: Air bp is one of the biggest players in this space – what are you as a company doing?
TP: Air bp has been taking significant steps to help shape a lower carbon aviation industry for over a decade. In 2018, we agreed a collaboration with Neste, one of the world's leading renewable products producers, to develop SAF supply chains, and we've also invested $30 million in waste to fuels company Fulcrum BioEnergy.

It was through our supply chain in Sweden that we were able to fuel Braathens Regional Airlines for its 'Perfect Flight' back in May 2019, which combined the latest in aircraft efficiency and the use of SAF to cut emissions by 46% compared with regular flights on the same route. Last year we also supplied SAF for Delta Air Lines and Airbus in the USA. In all, we have supplied around 20 different customers with SAF so far.

ALW: Does the prospect of electric aircraft make the need for sustainable aviation fuels redundant?
TP: The electrification of aircraft is an exciting space but the industry is still in the very early stages of development for battery-powered planes. The world is a few decades off seeing large-scale commercial electric passenger jets taking to the sky.

We believe that the use of sustainable aviation fuels within conventional aircraft will likely make the biggest impact on carbon emissions and we are actively working to increase its supply. We will continue to work with the aviation industry to provide our customers with the energy they require to keep the world moving.

OPPOSITE • *The application of biofuel technology is seen as an important part of improving the environmental impact of commercial aviation.*
ALL IMAGES VIA AIR BP UNLESS STATED

Interview with a senior executive in the airline industry.

ALW: With many airlines struggling amid the COVID-19 crisis, do you think environmental progress will be put on hold?
TP: This is certainly a very challenging time for the industry and we're doing all we can to support our partners and customers during the COVID-19 pandemic. Our commitment to safe, reliable fuelling operations remains unwavering. We anticipate that the aftermath of the pandemic will accelerate the pace of transition to a lower carbon economy and energy system, as countries seek to 'build back better' so that their economies will be more resilient in the future.

ALW: Could aircraft and engine manufacturers be doing more to help reduce the impact of flying?
TP: Airlines, companies across the supply chain, governments and industry bodies are taking action on a number of fronts to cut industry carbon emissions and reduce the environmental impact of flying. Aircraft manufacturers are constantly innovating with more efficient aircraft. As a result, we are already seeing engines that are lighter and more efficient, which mean they burn less fuel.

ALW: What does carbon offsetting mean and how is it put into practice?
TP: In aviation, carbon offsetting starts with measuring how many tonnes of carbon are produced by a flight in total and on a per passenger basis. This creates the carbon 'footprint' for the flight and for each individual passenger. Once this is measured, carbon credits can be purchased for the same amount of emissions, effectively balancing out the carbon emitted so the net impact on the climate is neutral.

Carbon credits are purchased from projects around the world that are reducing emissions, including initiatives such as forest planting, replacing open fires with more efficient cooking equipment, and biogas installations.

Not all offsets are created equally so it's important that the offsets you purchase come from vendors who comply with the requirements of ICROA's (International Carbon Reduction and Offset Alliance) code of best practice. The standards set out in the code ensure a project's emission reductions are real, additional (i.e. that they would not have happened without the project), permanent and unique. Bp Target Neutral – bp's carbon offsetting programme – adopts these standards. We visit each carbon offset project to ensure the carbon accounting work of the auditors is of the highest quality, and to examine aspects outside the auditors' scope such as human rights, health and safety.

ALW: Does offsetting encourage passengers to continue polluting by easing their perceived impact?
TP: Carbon offsetting can help as part of a broader carbon reduction approach. It should be done in conjunction with other actions in the industry to reduce carbon emissions, including improving aircraft technology, the efficiency of aircraft operations, improving infrastructure, and increasing the use of sustainable aviation fuel (SAF).

ALW: What's your outlook for the future of sustainable aviation fuels? Where will we be in ten years?
TP: Sustainability is a key priority for us. In 2020 we expect up to 50,000 tonnes of sustainable aviation fuel (SAF) to be produced globally, which is a sign of good progress, but it comes from only two commercial scale producers today. In the next few years, we should see additional suppliers come online. Bp's carbon offsetting programme is also part of the company's vision to achieving a lower carbon future. It complements Air bp's own carbon neutral aircraft fuelling operations at 250 locations around the world.

In February, Bernard Looney – bp's new CEO – delivered a landmark speech outlining a new ambition for bp to become a net zero company by 2050 or sooner, and to help the world get to 'net zero'. It's all part of bp's purpose to reimagine energy for people and our planet. We're under no illusion as to the scale of the challenge ahead but we're embracing this opportunity for change. AW

In 2018, air bp agreed a collaboration with Neste, a major renewable products producer, to develop SAF supply chains.

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106/20

The Centre Spread

OCT 2020

British Airways Boeing 747-400, G-BNLI (c/n 24051) pictured above Heathrow in April 2010. Christened City of Sheffield, the jumbo was delivered new to the airline in 1990 and was scrapped in 2016.

PHOTO • AVIATION IMAGE NETWORK/ SIMON GREGORY


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352/20

A Contactless Airport Journey?

With COVID-19 continuing to influence where, how, and when we fly, airports and airlines alike are scrambling for ways to make travel safer. *Airliner World's* **Gordon Smith** spoke with **Tony Chapman** from Collins Aerospace to find out more about the firm's vision for travel in a post-pandemic world

ABOVE • ***With lingering doubts about the safety of air travel amid the coronavirus crisis, airports and airlines are working hard to encourage passengers back to the skies*** BUDAPEST AIRPORT

Tony Chapman has worked in the aviation technology sector for more than 30 years. COLLINS AEROSPACE

There are few places as exciting as an airport. Whether we're travelling for work or leisure, if the destination is near or far, there is a special buzz and sense of anticipation which is seldom found elsewhere. In recent months, however, as the list of departures has dried up – so too has passenger confidence. The COVID-19 crisis has fundamentally reset what were previously considered established norms. While safety has always been paramount in the aviation sector, the parameters we use when assessing what is and isn't 'safe' have changed radically since the start of the year.

The global picture remains fragmented, but there are early indications that parts of the aviation ecosystem are starting to return to something closer to normality. Restrictions on international air travel – imposed by many governments at the beginning of the coronavirus outbreak – are slowly easing within some regions. While countless bans are still in place for non-essential overseas travel, airlines and airports are reporting strong demand, particularly among leisure travellers, for destination pairs which are coming back on stream.

To truly leverage this early momentum, the airport experience for passengers needs to be a positive one – but what proactive steps can be taken to make travellers feel safer and more likely to return in the near future? Tony Chapman has more than 30 years' experience in the aviation technology sector and is director of global product

management and strategy within the information management services division of Collins Aerospace. He looks after airport products for the company, which includes passenger and baggage processing, airport operations, resource management and flight information displays. Put simply, he oversees pretty much anything that goes on inside the terminal and airside ramp operations area for the firm.

Chapman and his team have recently published a vision for how air travel could look during and after COVID-19. Titled *Re-imagining Air Travel for a Post-pandemic World*, it argues that creating a contactless passenger journey is key to restoring confidence and speeding up the recovery. At the heart of it all is a belief that the application of existing technologies can not only help counter the virus but improve the air travel experience. Chapman suggests that airports, airlines and government regulators – together with their industry partners – must act now to shorten the duration of the slump, limit the damage and accelerate the bounce back. The goal is to reassure passengers they are safe in the air-travel environment and that flying is, once again, a low-risk activity.

"Our biggest driver is to form a 'contactless passenger processing journey', with a view that it is probably going to start further out from the airport. There are already instances where check-in facilities and baggage drops are available remotely, for example people coming to your home. If you can take passenger processing away from the terminal – it can relieve congestion inside the check-in hall," he noted.

Chapman acknowledged that this requires not only the technology but also the processes to handle the bags and is therefore considered a longer-term objective in most markets. "Almost everybody can check-in 'off-airport' now – you can use a mobile device – it's then the question of handling the bag between that point and the airport itself safely and securely and within the local authority or government's security restrictions."

Once customers arrive at the airport, there are a number of "easy wins" to make current processes less contact-based. "We're looking at what can we do with existing technology which reduces the amount of time that a passenger needs to touch the equipment. Take self-service check-in kiosks for example – we're developing solutions where passengers can scan a barcode and take control [of the unit] through their mobile, so they don't have to touch screens. It's about reducing that contact time with kiosk hardware."

Chapman also emphasised the need for passenger education where new technology is being offered: "There's no point in making the kiosk contactless if you don't tell anyone how to use it and what to expect. If processes change, let passengers know what they're doing. The use of simple videos that show them how to use the technology can go a long

Chapman suggests that relatively simple changes to processes and procedures can result in major benefits to the passenger experience. AER LINGUS

As airlines slash capacity, many airports have consolidated terminal operations. DAA

way. Airlines can also help with their marketing when travellers check-in."

For those who prefer to use more traditional check-in desks, it is suggested that simple changes, such as turning around bag-tag printers so they face the passenger and not the agent, could reduce unnecessary contact. In a similar vein, turning around scanners so customers can allow their passport to be read instead of handing it over to a member airport staff, may also be a sensible approach.

Chapman underscored that small changes could have a big impact when rolled out across an airport operation: "Often they aren't very dramatic, they can be incremental options that reduce the contact".

Once these relatively modest changes have taken place, attention naturally turns to the bigger picture, and for the Collins Aerospace team, biometrics offer an enormous opportunity. The firm now has the technical capability to roll out a biometric platform which uses a passenger's mobile device. Combine this with mobile check-in and it becomes increasingly feasible to transit through the airport using only a facial scan at the relevant processing points. "You don't have to hand documents over, you don't have to pick up coupons, or place passports on scanners, be that at check-in, airside security or [aircraft] boarding – you can do that in a totally contactless way – we see this as a really big driver."

Even prior to COVID-19, the company was trialling its SelfPass facial scan technology with JetBlue Airways at its busy New York/JFK hub. The need to present traditional boarding and identification documents is eliminated and as there is no pre-registration required, travellers simply step up to the camera for a match against their travel document. Chapman said the feedback from JFK has been overwhelmingly positive to the extent that a rollout at Boston/Logan is in the pipeline. "It has been very well received, not only by the airline, but also the passengers. People are recognising the ease of use with biometrics – so long as the messaging is right. Travellers have the right to opt out – not everybody wants to have their biometrics taken – however the vast majority, and by that I mean 99%, are quite happy."

While the concept of using biometrics is nothing new, COVID-19 is a catalyst for the rollout of the technology in markets around the world. Chapman confirmed that enquiries are growing daily, and gave the example of one airport in Latin America which has a high volume of domestic passengers who travel using a national ID card: "They want to use an image of the passenger and also the ID card, so they will be able to display their records to an agent without having to transfer documents between them. Ideally, [the airport] will want passengers to complete this step via a mobile app provided by the airport before they arrive at the terminal. Different airports in different countries are starting from slightly different ends but all have a collective aim that will achieve the same goal. It will mean passengers are biometrically enabled and can travel through the airport without having to exchange documents with staff."

With the global aviation industry under extreme financial pressure, the thought of making new investments in technology can appear counterintuitive, particularly when there may be disagreements over who foots the bill. In Chapman's view, the solution is based on conversation and dialogue. "At the end of the day, both airlines and airports want the same result – they want people to feel safe when they're flying, and therefore for passengers to use both of their products. It isn't as easy as an airline saying, 'we're going to mandate the use of online check-in', because the relevant facilities aren't in place at every airport. It is about trying to speak with the airport and establishing what can be implemented and explaining that it isn't necessarily a huge cost to do this. I know online boarding passes in some parts of the world are still restricted by government regulations, but for the most part, you can implement this, maybe not in a totally contactless way, but certainly with mobile check-in and boarding passes. At an airport level, you could probably do this with existing technology – it's just using it and discussing with the airport. Use what you've got, just with a different process around it."

Reflecting on his time in the industry, Chapman was quick to highlight two major events which shaped how we travel. "The September 11 [2001] attacks, and Lockerbie before that, had a huge impact – both of them changed processes and procedures, but COVID is going to have a much more dramatic and longer lasting impact on the industry as a whole and on passengers expectations going forward. Some people say that in life in general, people have short-term memories, but I think these changes to our lifestyle are going to have a long-term impact on the way we behave. We know that many of the airport and aviation processes have been unchanged for the last 25 years. COVID-19 is a catalyst to rethink some of those processes – potentially at zero-cost – to approach things from a different mindset."

The message from Chapman is clear. New technologies and the smarter application of existing processes have the potential to provide a much more enjoyable travel experience. It just so happens that these same technologies also facilitate a passenger journey that is virtually free of human-to-human contact – a potentially major win-win in these uncertain times. AW

JetBlue trialled biometric boarding at its New York/JFK hub last year COLLINS AEROSPACE

FAR RIGHT • *Handing your passport to a member of staff will become increasingly uncommon as biometric alternatives are rolled out* COPENHAGEN AIRPORT

FIGHTING FOR SURVIVAL

The aviation industry has been hit on a scale never experienced, with companies scrambling to mitigate against the financial impacts posed by COVID-19. **Richard Brown**, managing director of NAVEO Consultancy, analyses the trends and sets out what could be the 'new normal' in the future

It was the dawn of a new decade, 2020, and terms such as the 'roaring twenties' were already becoming increasingly popular. For the aviation industry, the outlook was optimistic with ten years of consistent global airline profits, the scheduled return of Boeing's 737 MAX and the continued progress in tackling environmental responsibilities. Additionally, it was estimated that the industry would experience record production and aftermarket levels, big data, aircraft health monitoring and predictive maintenance to improve reliability and reduce disruption. However, reality soon struck with the arrival of the COVID-19 coronavirus. Halfway into the new year, and the world has faced lockdowns, social distancing, travel restrictions and economic hardship on an unprecedented scale.

For the industry, the almost sheer drop in demand has plunged it into darkness on a level nobody had prepared for. With operators grounding fleets, capacity in April and May was down 70-80%. Beyond that, forecasters are developing scenarios that suggest coronavirus will be around for at least the next 18 months. Current airline schedule forecasts estimate capacity for this year could be 40% lower than in 2019 while MRO

Capacity was down 70-80% in April and May as carriers across the globe stored jets when demand dropped dramatically AUSTRIAN AIRLINES/ FLORIAN SCHMIDT

(maintenance, repair and overhaul) demand will be similarly impacted.

NAVEO Consultancy estimates it will take between three and five years to exceed 2019 traffic volumes – with 2020 and 2021 capacity likely down approximately 50% and 20%, respectively, on 2019 levels. The actual recovery depends on several factors, namely the availability of a vaccine and effective treatments, along with political and economic components – making the timeline fluid.

Historically, airline passenger traffic has grown strongly and resisted external shocks, doubling since 2005. Prior to COVID-19, demand for air travel remained relatively strong until the second quarter of 2018, when the growth rate slowed a little with jet fuel averaging US$80 per barrel. Currently, it's much lower, at just US$45 per barrel. This is one big difference when comparing today with the 2008 'Great Recession' when fuel costs remained very high. Lower prices have implications for new airframes that are on order because the 15% fuel saving that new aircraft can provide isn't as attractive when fuel is relatively cheap.

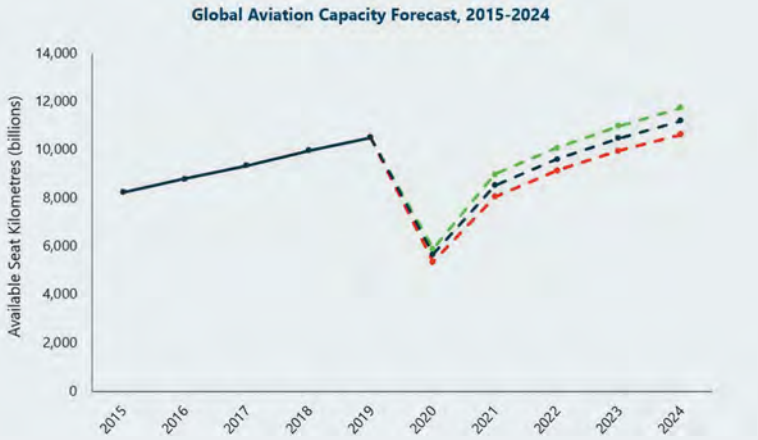
Production Cuts

The aerospace supply chain was already challenged by the halt in 737 MAX production and now it faces more issues, as aftermarket and aircraft deliveries are areas that operators quickly cut back on to make savings while they fight for survival

They are deferring new deliveries and cancelling some, with knock-on cuts to high-margin component original equipment manufacturer (OEM)-provisioning sales. Simply put, carriers have a surplus of aircraft in their fleets in comparison with the level of passenger traffic. More jets will remain stored, while some are retired – all while fewer new airframes are delivered.

In January of this year, we forecasted that approximately 830 aircraft would be retired in 2020 and a further 1,880 new regional, narrowbody and widebody airframes would be delivered. Ultimately, with COVID-19 deliveries, it's likely we'll see up to 1,000 fewer comprising 585

According to Teal Group, manufacturer revenue gained from aircraft deliveries is expected to drop by US$55bn from US$120bn to US$65bn this year
AIRBUS



Global aviation capacity forecast: 2015-20244
NAVEO CONSULTANCY

narrowbodies, 220 widebodies and 163 regional – due to defers/cancellations by airlines and lessors.

From the big two aerospace manufacturers, Airbus production in 2020 will be reduced by at least 33%, with A320 Family jets down to 40 per month, A330s at two per month and A350s to six.

Conversely, Boeing announced production changes after it resumed a low rate of 737 MAX production this year before gradually increasing to 31 examples per month by the start of 2022. For its widebodies, 787 output will be retained at ten per month in 2020, before dropping to six monthly by 2022. The 777/777Xs will be at two per month in 2022. With these figures, aircraft production will be at its lowest rate since 2005.

Plunging Value

Delivery reductions have taken a major hit to the value across the industry. This year alone, an expected US$120bn worth of delivered jets were scheduled, but with slashed production, revenue for manufacturers is expected to drop by US$55bn to around US$65bn. Consequently, this has led to many employees being furloughed, or worse being laid off, as is the case with several highly skilled engineering staff.

Over the 2020-2029 timeframe, forecasted production is US$204bn lower than we had expected pre-COVID. That reduction in demand has caused immense stress throughout the aerospace supply chain from the large aircraft, engine and system manufacturers to the smaller sub-tier, piece-part suppliers and raw-material suppliers.

For the MRO sector, US$90bn was estimated to be spent based on a global fleet of 34,000 airframes this year – instead, it's likely to be down 40-60% depending on the type of MRO activity and the aircraft/engine model in question, meaning the aftermarket won't recover to 2019 levels until 2022 or 2023.

Operators will also bring forward planned aircraft retirements such as the A340 and 747, burn existing inventory, seek improved payment terms, immediate price reductions, cease discretionary spend and, of course, defer maintenance where possible. However, most of these options take time. During the global financial crisis of 2008, carriers took the simpler solution of parking aircraft that required maintenance.

Fleet Evolution

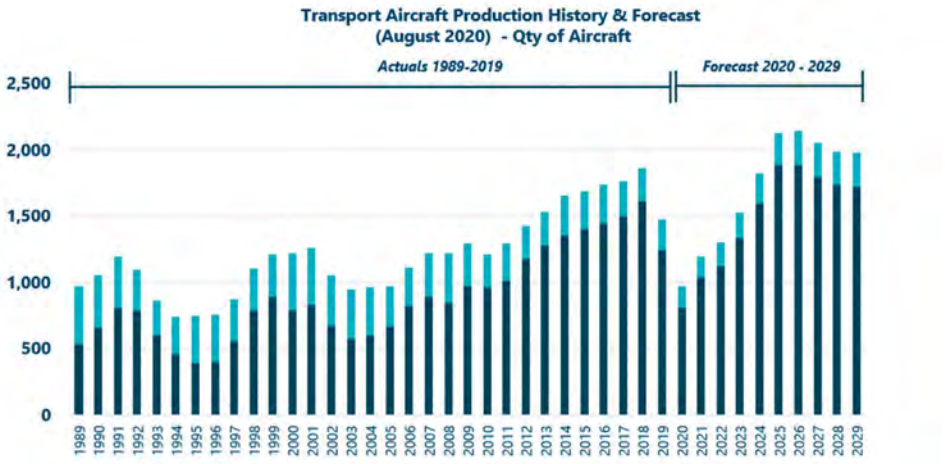
Over the past 20 years, fleet growth and, consequently, aftermarket maintenance has been driven by emerging economies and far less by North America or Western Europe – the combined share of the fleet in these regions has fallen from 71% in

As a result of the pandemic, airlines bosses must strike a fine balance in keeping jets ready ahead of increased passenger demand over costly, older airframes
AIRTEAMIMAGES.COM/ STEPHANE BEILLIARD

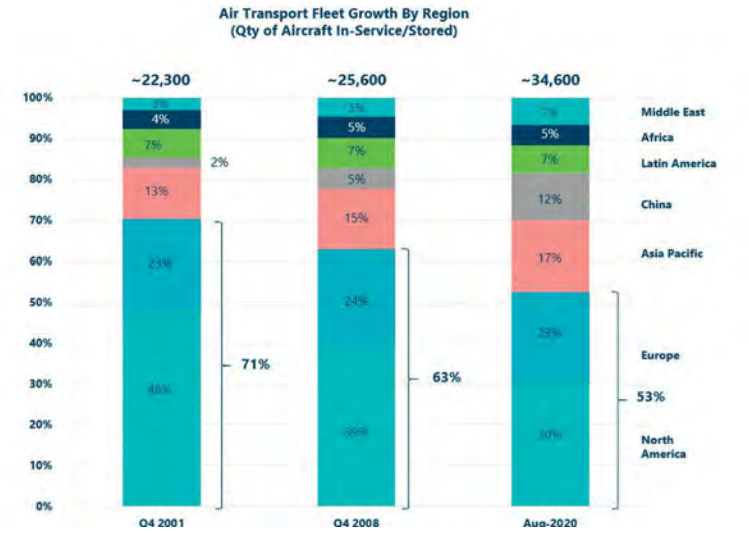
2001 to 53% in 2020. Why does this matter? Because we should pay attention to how airlines and MROs are performing in growth economies and how traffic is returning, since it's these areas that have the most significant backlogs, the biggest fleets, and are driving the aftermarket growth going forward.

The air transport fleet is also heavily slanted towards narrowbody aircraft. The growth in low-cost carriers across the world and demand for short-haul travel has meant these examples, in particular the A320 Family and 737, make up 53%, while a further 14% are regional types. With a 67% coverage of the market, short-haul traffic is expected to return strong. Conversely, passenger demand for long-haul, which largely depends upon widebodies (at least until the A321XLR is introduced), will take longer to return to some normality.

With companies having implemented cash-conserving strategies to mitigate the financial impact from COVID-19, they are constantly evaluating the fast-changing situation. While they need to bolster capacity for when demand does return, there is no need to retain jets which have no intention of being flown or cost significant maintenance expenditure.



Transport aircraft production: history and forecast
TEAL GROUP AUGUST 2020
NAVEO ANALYSIS



Air transport fleet growth by region
AVIATION WEEK FLEET DISCOVERY AUGUST 2020
NAVEO ANALYSIS

It's no surprise that operators return the most efficient and right-sized aircraft for the job, namely narrowbodies and regional types. They are more likely to fly aircraft that don't need high-level maintenance for several years, and newer examples that are under warranty. Those more than 15 years old are vulnerable to long-term storage and early retirement because their maintenance costs become higher as they age, and their efficiency and passenger appeal (such as noise, comfort and Wi-Fi capabilities) are lost. Additionally, mature airframes from the 1990s and 2000s generate most MRO activity (older generation A320ceos and 737NGs). Operators may have to replace interiors, consider fuel-burn or decide to retire aircraft in favour of newer, more efficient and lower-maintenance cost aircraft – such as Air France, which phased out its remaining A380-800s

Retirement is typically a financial decision driven by a desire not to invest in maintenance because newer aircraft are available to substitute. Lessors may experience lower lease rates, which won't make it financially viable to re-lease the airframe given existing maintenance reserves could be banked, engine green time burned-off and aircraft subsequently parted out. Significantly, during the 2008 recession many operators discovered 'used serviceable material', where parts and engines were worth more harvested than flying. Thanks to billions of dollars that flooded into the surplus parts market from private equity in the past decade, many jets were acquired, retired, parted out and their parts and engines sold on.

Future Recovery

Companies across the industry, including airlines, lessors, financiers, OEMs, MROs and parts suppliers, still face unprecedented challenges, the greatest being the high degree of uncertainty over the speed of recovery. As traffic figures rise in some areas, namely Asia, Europe and the Middle East, the spread of COVID-19 across the Americas and other global spikes, give the potential for second waves of the virus.

With enthusiasm low, companies in the industry will have to leverage expertise, best practices and lessons learned. It's vital they develop various scenarios for how their business might be impacted, and to keep these updated by tracking the unfolding situation. It's also crucial to develop ways of mitigating the impact and positioning their company to take advantage of the opportunities when they arise. These factors are vital to helping aviation leadership adjust their production and aftermarket business plans, which COVID-19 has made hopelessly out of date. AW

To learn more about this analysis visit www.naveo.com

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You Can Be My Wingman Any Time

Throughout the COVID-19 pandemic, healthcare professionals have put their own lives at risk to help others most in need. In a show of solidarity, easyJet captain Emma Henderson co-founded Project Wingman at the height of the UK lockdown, to provide support for the National Health Service and boost morale with NHS staff, as **Lee Cross** discovers

ABOVE • ***With aircrew grounded during the pandemic, easyJet Captain, Emma Henderson, along with other like-minded individuals, wanted to use their time to help support medical professionals***
ALL IMAGES VIA AUTHOR UNLESS STATED

BELOW • ***One of the long-term aims of Project Wingman through its recruitment offshoot is to help former aviation personnel find alternative employment opportunities within hospitals and trusts***
FLICKR COMMONS/MATT BROWN

The pandemic has created a crisis never previously seen in the modern world. As passenger demand catastrophically dropped overnight, airline flight crew, including the author, were put onto furlough. During the grounding, one easyJet captain, Emma Henderson, wanted to create an initiative that would benefit the hardworking NHS staff through close support – such as communal rest areas – during these traumatic times. With assistance from fellow furloughed aircrew, Project Wingman was born.

On a Wing and a Prayer

I asked Emma what had prompted the initiative: "When COVID-19 started to really make an appearance in the UK, it was obvious to me that flying was going to be dramatically affected. I remember the last [rotation] I operated at the beginning of March. Although nothing had been confirmed yet I had a strong feeling that this would be my last flight for some time. Turns out I was right and, like every other pilot in the country, I wondered when we would be back in the air again.

"It occurred to me that there would be a large number of grounded aircrew who I thought must be able to help the NHS in some way. I am a peer support mentor [providing colleagues with emotional and social support] and through that know clinical aviation psychologist Professor Rob Bor. Whilst chatting to him he agreed that there must be a way we could help the NHS. At the time we didn't know exactly how, but decided it wasn't too cheeky to use the name 'Wingman', both of us being huge fans of [the Tom Cruise film] *Top Gun*."

So Henderson and Bor approached British Airways captain, David Fielding, who had a similar idea and, between them, they devised a concept of establishing a 'first class lounge' at hospitals, providing tea and empathy to help support NHS staff. Thus, Project Wingman was airborne.

Volunteers Abound

Many people think that working in aviation is all about flying aircraft or serving drinks to passengers, but it's so much more than that. Bor recognised that airline crews have a wealth of experience and competencies, aside from the obvious, that would suit the project, thanks to the peer support skills learned through their training and working in a safety-focused environment.

The team reached out to the airline community and within a week had 700 volunteers. Emma said: "While Professor Bor liaised with the hospitals, I set about networking and a week later our numbers had swelled to 2,000 – we were staggered!"

On April 2, the first lounge opened at Whittington Hospital in North London. "They saw what we were aiming to do and loved it enough to give it their support. That was all it took. One lounge opened and the rest were like dominos," Henderson enthusiastically explained.

At its peak, 73 'first class lounges' were operating in hospitals across the country with more than 6,500 volunteers from 28 different carriers from the UK and beyond, including Qantas and United Airlines as well as the Royal Air Force. "We worked very hard at the beginning to keep the Wingman branding separate from any one specific airline and this has worked really well in providing a sense of identity to our volunteers, even as they have been going through such enormous uncertainty themselves."

Helping Hand

As a member of cabin crew facing redundancy, I can vouch for the incredible effect Project Wingman has had on my own emotional well-being. "It gives crew a sense of purpose," Henderson continued. "A sense of pride and a feeling of unity that they wouldn't have had otherwise during this time."

But of course, it's the heroes of the National Health Service that Project Wingman was set up primarily to help, and the feedback has been phenomenal. "Every day I receive emails or messages from NHS employees or trusts thanking us for what we have given them. In providing this service we have helped place well-being firmly on the agenda for the future and even changed the working culture of some of our [participant] hospitals."

Prior to the arrival of the project, many hospitals lacked any major communal rest areas where staff from all departments could congregate. The initiative, through its first class lounges, has shown how important they have been received, with many planned to be retained long after the demise of COVID-19.

As well as aircrew volunteering their time and skills to the lounges, Wingman has received considerable support and generous donations from a vast number of businesses and organisations, large and small. This in turn has enabled these companies to directly support the NHS frontline staff during the times of greatest need.

Part of the Project Wingman plan is also fundraising and the team has established 'Wingman Workout' which encourages supporters to get sponsorship to complete a distance, a time or even just a number of laps of their garden – similar to that of 100-year-old Sir Captain Tom Moore. The first event, which took place over the weekend of June 14 and 15, raised £2,300 with participants completing more than 2,100 miles between them. There is also an auction coming up, although no date has been confirmed, with some expensive, specialised aviation-related items, including a Boeing 777 antenna, which have been kindly donated to the project. There is also a raffle being run with the main prize being a trial flight lesson.

In it for the Long-haul

As the aviation industry slowly attempts to regain some sort of normality, many of the scheme's volunteers will be heading back to the skies while others will be trying to find other paid employment. Moreover, many of the hospitals now need to make use of the spaces previously occupied by the lounges. So, after such a roaring success, what's next for Project Wingman?

"We have seen that Wingman has a shelf life well beyond the pandemic and to that end we are in the process of establishing five to ten 'legacy' lounges in hospitals across the country which we will commit to for a two- or three-year period," Henderson eagerly explained.

"We know that the hospitals want us to be there and we have a way of doing this which is sustainable for our volunteers. We then hope to build other legacy projects, including a mobile lounge in the form of a double-decker bus that we plan to convert and move around the country bringing Wingman to everyone."

For those airline volunteers who have lost their jobs, the project has also set up a recruitment offshoot, Fly In To Health, which is aimed at linking Wingman recruits with potential opportunities in hospital and trusts, "We have already seen volunteers move into paid employment, which is just wonderful, and has given people a bit of hope."

Project Wingman is now a registered charity and Henderson has taken the helm as chief executive. "I am so excited to see this all move forward and become something that is a silver lining in the dark clouds that COVID-19 has brought." AW

ABOVE LEFT • ***The maiden 'first class' hospital lounge opened in North London. At its peak, 73 were in operation throughout the country supported by more than 6,500 volunteers***

ABOVE • ***Staff from various carriers provided their services to Project Wingman as illustrated by the different crew uniforms***

BELOW • ***Emma Henderson, easyJet Captain and co-founder of the Project Wingman programme***

Aviation's COVID-19 Paradigm Shift

Standard operating procedures (SOPs) are the foundations on which commercial flying is built. Airbus A320 captain **Jeremy Feldman** explains their use and details how the on-going coronavirus pandemic has, in some cases, necessitated their change

Standard operating procedures are an integral part of commercial aviation operations AIRTEAMIMAGES.COM/ 4X6ZK-MONI SHAFIR

LEFT • ***How regularly and how thoroughly an aircraft cabin is cleaned has changed considerably since the outbreak of COVID-19***
VIETNAM AIRLINES

Forming an essential part of a commercial pilot's working day are standard operating procedures (SOPs).

Everything from the walkaround inspection, cockpit set-up and briefings, to take-off, landings and even non-normal situations are governed and regulated using SOPs. They inform almost all aspects of the day-to-day operation, from the seemingly obvious, how to read a checklist, to the more complex management of a multiple hydraulics failure at high altitude.

Operating a complicated aircraft means there can be a lot of information that a pilot has to be able to remember and manage at the same time. In an abnormal situation where a crew is under high pressure, the adherence to SOPs can vastly help to reduce the workload, allowing a pilot more mental headspace to think and enhance their decision-making, leading to a safer outcome.

The SOPs will have been designed on the ground in conjunction with test pilots, aircraft engineers and aircraft manufacturers. These will encompass additional requirements from the safety regulators and will be generally further enhanced by the individual airlines or operators.

Vast amounts of time is invested in designing the SOPs and they usually include solid risk assessments, consideration of commercial viability and a certain amount of legalese in their design.

Aircraft manufacturing and technical durability are now at an incredibly high standard. The likelihood of an aircraft developing a technical malfunction that leads to a significant or catastrophic outcome is incredibly low. Unfortunately, although these still occur, the evidence overwhelmingly shows that the greatest cause of significant outcomes involves some form of human error.

It could be the engineer certifying an individual aircraft as fit to fly, but mistakenly signing off the wrong technical log before a flight. For example, in the case of Air France flight AF447 in 2009, the aircraft was delivering incorrect flight data (technical), but the pilots were slow to recognise the aircraft had entered a stall and to initiate a recovery (human).

As a result of the AF447 tragedy, in which all 228 on board were killed, safety regulators identified that the simulator training that airline pilots were receiving for handling stall recovery was insufficient.

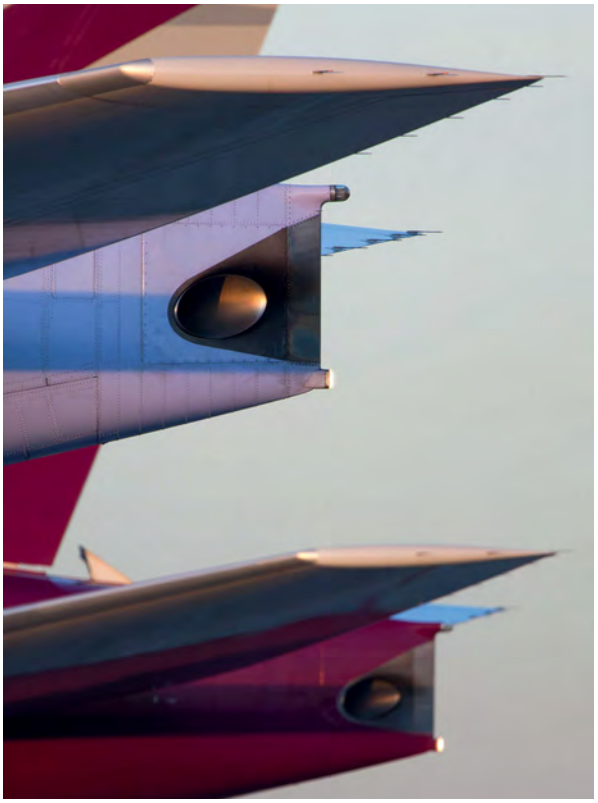
Consequently, many airlines now routinely train their aircrew to practise such procedures and SOPs in the simulator. By practising these stall recovery SOPs, if pilots were ever needed to recover from a stall in the future, they should be able to carry out the safe handling drills promptly and safely.

However, there is an entirely new set of threats and risks that has recently emerged, following the SARS-COV-2 outbreak. What and how have airline SOPs changed to manage this?

One of the big health concerns is that the virus is transmitted via the air. Most modern aircraft use high efficiency particulate air (HEPA) filters, which have a greater than 99.7% filtration rate and can filter out very small particles, including the virus.

In-flight, the Airbus A320 will entirely replace the air in the cabin every two to three minutes via the HEPA filters.

On the ground, air conditioning is typically supplied either with external ground air or via usage of the auxiliary power unit (APU). The APU is a high-performance engine, typically mounted in the tail of the aircraft, which can supply electrical, hydraulic and »



The use of auxiliary power units (APUs) prior to departure has been reconsidered following the coronavirus outbreak
AIRTEAMIMAGES.COM/ TIM DE GROOT

pneumatic power and pressure to the aircraft. The APU is also used on the ground to provide heating and air conditioning during boarding. Due to the relatively high noise level of running an APU (typically 85-90db), many airports have restrictions on how long an airline can run the engine before departure. As a result, airline pilots will typically start the APU no later than ten minutes before pushback. However, the latest advice from the European Union Aviation Safety Agency (EASA), is that air conditioning systems that use a HEPA filtration system should be run when passengers and crew are on board and certainly the APU should be started not more than 15 minutes after the commencement of boarding.

This will, of course, increase the amount of airport noise and also the financial expense on the operator, as an APU can burn around 264lb of fuel per hour.

Interestingly, the International Civil Aviation Organization (ICAO) recommends that in flight, the Environmental Control Systems are operated with packs in NORM mode, rather than in HIGH. The previous advice suggested that operators run the in-flight air conditioning at a high flow rate, but the evidence now suggests that this does not result in a more efficient air exchange between the HEPA filters and that it is more efficient to run the air conditioning on a normal setting.

Most modern airliners are equipped with high efficiency particulate air (HEPA) filters which remove 99.7% of particles from the air
EMIRATES

Cabin air is filtered between 15 and 30 times per hour
AIRTEAMIMAGES.COM/ ANDREW HUNT

The guidance is also to limit the use of passenger individual air supply vents to reduce the amount of air moving up and down the cabin, rather than from ceiling to floor.

Ask any airline pilot how clean their flight deck is, and you will most likely get the same answer and a raised eyebrow expression.

The accumulation over the years of dirt, dust, grime, crumbs and other detritus that typically linger around, on and between the instrument panels is seldom cleaned, if at all. One of the positives to arise from SARS-COV-2 is that airlines now must deep clean their cockpits daily and they have probably never been so hygienic. In addition to daily deep cleans, pilots will thoroughly clean all touch points at the beginning and end of every work shift.

On board, aircrew cannot increase their distance from colleagues – social distancing – as the cockpit seating position is fixed; pilots will have to decide whether to wear a face mask throughout the duty. The decision needs to be carefully considered, as the prolonged discomfort of wearing a face covering can lead to pilots being mentally unfocused and distracted.

Communication is vital in a cockpit working environment, not just among cockpit colleagues, but also with air traffic control (ATC), cabin crew and passengers. Wearing a face mask may inhibit the quality of the communications and lead to repetitions being required and so to distractions. Furthermore, in the event of a rapid decompression, pilots must don an emergency face mask within 15 seconds at high altitude. This can be very disorientating at the best of times; to have to remove a headset, then a paper or lightweight face mask and then don the emergency mask in such a short period of time may lead many pilots to decide that the risks of wearing the mask actually outweigh the risks of not wearing one, and choose not to wear a face covering at all when present in the cockpit.

It is worth noting that cabin crew must wear face masks at all times once on board the aircraft. To deliver 'service with a smile' may be a customer service slogan that might have to be reworded somewhat.

Certainly, one of the most disappointing but unavoidable SOP changes is that the flight deck will be restricted to essential visitors only. This most likely means that ground staff, dispatchers, refuellers and other essential personnel will not be allowed to visit the flight deck and will have to communicate to pilots via the cabin crew instead. Pilots will also be unable to accommodate passenger visitors to the cockpit on the ground for the foreseeable future, which is very disheartening.

Cockpit visits have always been encouraged by aviators; it may have been such a visit or two that inspired some of us to start flying. To be able to pass that on to the next generations is something we are generally only too happy to do. Alas, for the foreseeable future, this experience is unlikely to be allowed.

The impact of coronavirus has extended beyond the usual cockpit SOP changes. Due to the reduced availability of simulator facilities and licensing personnel, the Civil Aviation Authority (CAA) has issued exemptions to the usual licence expiry dates.

Medical licences that were due to expire after March 23, 2020 can be extended until November 22, 2020, assuming the pilot has not experienced a reduction in medical fitness. The extension also applies to operator proficiency checks (OPC) and licence proficiency checks (LPC), which would usually have a validity period of one year and are certified in a simulator, but in this case, can be extended by up to eight months.

To protect pilots from COVID-19, it is more likely that dispatchers, refuellers and other essential ground personnel will communicate with the flight deck via cabin crew
AMERICAN AIRLINES

Previously, major incidents including the loss of Air France flight 447 on June 1, 2009 have been responded to with changes to standard operating procedures
AIRTEAMIMAGES.COM/ PHILIPPE NORET

This may sound like a free pass but means that pilots will have to compensate for their delayed training package by increasing the amount of self-study at home they would usually do, to remain sharp and focused.

The worry and anxiety many pilots will face when returning to the skies will not be insignificant.

A prolonged time away from work means it may take a bit longer to get back into the swing of things. Added to this is the pressure of COVID-19 and its associated SOP changes, not to mention the ever-present uncertainty over the viability of the airline and future employment status.

However, you can take comfort that airline pilots are trained to an exceptionally high standard and will seek to always remain professional.

Despite all the 'background noise', pressure and stress, aircrew are trained to correctly prioritise what is important during all stages of flight.

Ultimately, maintaining safety standards to the highest level will be the main aim of the day. If this means incorporating a new standard of biosafety now, then so be it.

The good news is that most of the COVID-19 changes affect the way things are managed on the ground. Once the cockpit door is closed and engines started, it will most likely be business as usual.

Well, apart from the in-flight service, or lack thereof... AW

DENTIST'S CHAIR OR RIGHT-HAND SEAT?

When considering his career options, Joe Diebolder opted against dentistry – the family profession – and took up flying, becoming an unintentional YouTube sensation in the process. Now flying Boeing 747s for Cargolux, Joe is more at home checking tyres and engines than wisdom teeth or molers. **Chris Frame** caught up with Joe to discuss his cargo-hauling career at 35,000ft

If you have an interest in commercial aviation, the chances are you've probably come across 'Captain Joe' on YouTube. With more than 1.3m subscribers and 130m video views to his name, first officer Joe Diebolder is known far and wide as a fount of aviation knowledge.

Based in Munich, Germany, Joe's YouTube career is relatively new, having established his channel in September 2014, but when not in front of the camera, Joe can be found at the controls of a Cargolux Boeing 747.

A Love of Flight

A passion for aviation has defined Joe's life since childhood. Born in Germany, he spent much of his youth in the United Kingdom, where his enthusiasm for flight was fostered: "My godfather used to be an air traffic controller in the UK. I spent a lot of time with him as I was growing up. He was very much interested in aviation, particularly Concorde, as his dad used to be a mechanic on Concorde," Joe told *Airliner World* in July.

In his teenage years, Joe experienced the joy of flying first hand when given the controls of a biplane belonging to a close family friend. "I was sitting in the front and he was sitting in the back. I had an unobstructed view. It felt like I was all by myself up there. It was really cool, and I got the aviation bug and thought: 'This may be something I could do as a living.'"

Completing his school studies, Joe initially sought to follow in the family tradition of studying dentistry,

Joe's interest in aviation was sparked by his godfather's dad, who worked as an engineer on Aerospatiale/BAC Concordes. His godfather was an air traffic controller
ALL PHOTOS VIA JOE DIEBOLDER UNLESS STATED

but the experience of flying never left him, ultimately leading to him re-evaluating his career choice: "My parents were both dentists. All my family are dentists. But I couldn't really see that career for myself, so I decided to learn to fly and went to a little flight school in Austria," Joe recalls.

"As I was learning to fly, my instructor said to me: 'Look Joe, there's some real potential here. Will you consider doing this as a job?'"

With this early encouragement, Joe decided to abandon his dentistry studies, joining a private flying school in 2006 where he completed his commercial pilot's licence and instrument rating. Having undertaken theory in Germany, Joe made the transatlantic trek to the United States to pursue the flying aspects of his training. He says this was a valuable decision, as he believes the United States' approach to training is worlds apart from that in Europe.

"In Europe, airspace for training and light aircraft is very restricted, but in the United States they have an approach which allows all pilots access to major airports, so you can learn a lot in the US." Joe adds that in the United States, air traffic controllers have accepted the challenge to fit slower aircraft into the already busy airspace, which offers many more opportunities for training pilots.

He elaborates: "I was doing low approaches during rush hour in Miami, just because they said: 'Yeah why not, we can handle it!' You can do touch and goes – fifty at a time if you wanted to – and you don't have to »

pay a single dollar. In Germany you must pay for every single missed approach. It's a totally different system."

Airborne Career

Having finished flight training, Joe returned to Germany to complete a short European conversion course, allowing him to seek work. An economic downturn in Europe limited opportunities for the young aviator, but Joe's open-minded approach has opened many doors to him throughout his career. The first took place in an airport café, where Joe witnessed a conversation that would catapult his career.

"I overheard people one table down from me talking. It was a pilot speaking to another pilot saying: 'How are we going to deal with this summer? I am lacking a pilot. I need more pilots to fly for my business,'" Joe recalls.

"So, I stood up, introduced myself and said: 'I will be your pilot. I've just got my flight training completed and would love to work for you.' I later found out it was a skydiving company. Literally two weeks later I was type-rated on the famous Pilatus PC-6 Porter. I flew the Porter for a year for that company."

Joe says that becoming part of

Joe's videos have been watched more than 130 million times

Captain Joe flew the Pilatus PC-6 B2 Turbo Porter early in his career. The Stans, Switzerland-built STOL aircraft is extremely popular with skydiving companies around the world. This example, OE-EMD (c/n 928), is operated by The Flying Bulls
MARTIN NEEDHAM

During his training to become a commercial pilot, Joe had the opportunity to fly low approaches at Miami Airport – a regular destination for Cargolux
AIRTEAMIMAGES.COM/ STEVEN MARQUEZ

the Porter pilot community opened many doors for him, adding: "There were only 25 of us in Germany at the time – the community helps you find interesting jobs such as flying in Africa or humanitarian flights in Haiti, and all sorts of other opportunities."

With German skydiving shutting down over the winter months, Joe was on the lookout for his next career move. It was on his last day as a skydiving pilot when a new opportunity sought him out: "There was a skydiver sitting near me and monitoring me throughout the entire day. At the barbeque that evening he came over to me and said: 'I am the chief pilot of a little executive company in Northern Germany. And I saw you flying. Mate you can fly! Do you want to come and fly for us?' He offered me a job there and then – I said: 'Sign me up, I'll come next week!'"

At the executive firm, Joe flew the Beechcraft King Air, transitioning from largely VFR flying on the Porter to IFR flying. Such a move tested Joe's theoretical knowledge, improving his skills while offering a diverse career taking in varied destinations throughout Europe. Despite the challenge and diversity of executive flying, Joe's sights became set on progressing to airliners. In 2009, German carrier airberlin was hiring pilots to operate their growing fleet of Airbus A320s. Joe applied and within a month was working for them.

Throughout his eight years at airberlin, he became a confident and skilled A320 pilot, taking the aircraft on flights to so many European destinations that he says it felt like he "knew Europe like the back of [his] hand".

"I really loved the airberlin job," Joe says of his time with the now-defunct German leisure carrier. "We had so much fun [with the Airbus A320]. It's a very automated plane, but you can manipulate it to fly like a little Cessna and so we could do all sorts of visual approaches – such as crosswind landings in the Canary Islands. I just loved it."

It was during his stint at airberlin that Joe started his second career as a YouTuber. Joe says he never intended it to happen: "One day, my Dad called me during a turnaround. He had read an article about the Air France 447 accident, which was related to the pitot tube speed sensors, »

One of Cargolux's Boeing 747-8Fs, LX-VCL (c/n 35823), has been named after former Boeing engineer, Joe Sutter, who was head of the 747's design team and is widely regarded as 'the father of the Boeing 747'

In the belly of the beast: Joe inside the 747's main deck cargo hold

which he couldn't really visualise or understand." This led to Joe offering to take his father on a virtual Facetime walk around his Airbus A320. The experience not only helped his Dad understand the pitot tubes but also included various other aircraft systems that are often out of view of the passengers.

"A few weeks later we were sitting on the terrace having a beer and my Dad said: 'Mate, you've explained this so well, don't you think that passengers would be interested in you showing them? Why don't you start a YouTube channel?'"

Joe followed his father's advice and uploaded his first video in September 2014, noting: "My first video was about the sterile cockpit, which is relatively boring. But the second one was about the reverse thrust. It's something that a passenger can see from the window. That video just skyrocketed – it had something like a million views in a week or two. I could see there was interest in this."

This led to a growing YouTube business that makes 'Captain Joe' one of the most recognisable pilots online. With 1.34m subscribers, his videos have clocked up an impressive 130.8m views. In addition, his Instagram followers number more than 354,000, leading to him often being recognised by airport staff.

"I get a little bit embarrassed because being recognised happens at airports – ramp agents who know me and they come into the cockpit and they're like: 'Oh look it's Captain Joe.' And obviously with me not being a captain, my captain next to me is like 'what the!?' So, it can be a little bit embarrassing."

However, Joe is quick to note that many of the captains he works with have been very supportive and some have even provided historical footage for use in his YouTube videos.

The Captain Joe YouTube channel has amassed 1.3m subscribers since its launch in 2014

As well as appearances on social media, Joe has given talks about commercial aviation

Queen of the Sky

Throughout 2016 and 2017, airberlin faced an increasingly uncertain future. With mounting costs, the airline attempted to restructure, reducing the overall size of the airline and rationalising routes. However, it ultimately failed in October 2017.

"Two years before airberlin went bankrupt, Cargolux started hiring pilots from airberlin," Joe explains. "Airberlin had too many pilots and Cargolux needed pilots. The agreement was to fly with Cargolux for a few years, and then go back to airberlin and maintain your seniority. I applied. But airberlin pulled the plug, saying they had too many pilots going across to Cargolux and needed me to stay.

"But on the day airberlin ceased operations, the lady from Cargolux recruitment called me and said: 'Joe, would you still want to work for us?' I said: 'Are you kidding me!' I was hired on the spot and moved across to Cargolux. The luck I've had is incredible."

Before making the jump to Cargolux, Captain Joe spent eight years flying Airbus A320s for airberlin
MARTIN NEEDHAM

Cargolux celebrated its 50th anniversary this year

Joe was part of the crew which transported a pair of beluga whales from Shanghai, China to an Icelandic open water sanctuary. Cargolux marked the occasion by painting Boeing 747-400ERF, LX-ECV (c/n 37303), in this special livery
AIRTEAMIMAGES.COM/
JAN SEVERIJNS

At Cargolux, Joe flies the Boeing 747, which is no Airbus A320... As one of the largest commercial airliners ever built, Cargolux utilises the Boeing 747-400 and 747-8, both of which Joe says "carry the equivalent weight of an A320 in their fuel tanks alone".

Having flown the A320 for eight years, Joe was both confident and familiar with the Airbus cockpit and the A320's flight characteristics. Moving on to the 747 was – in some ways – a reset. Joe now had to gain experience with his new aircraft – one which originates from the 1960s. Of the change Joe says: "The A320's cockpit design is better planned out than the Boeing 747. It's a much easier cockpit environment and the layout is well planned. The A320's overhead panel is well planned out, compared to the 747's which is a mess, in my opinion."

He explains that much of the instrument clutter in the 747's cockpit originates in the aircraft's many upgrades. With each upgraded version, the cockpit was tweaked and adapted. This included a significant transition from three- to two-person flight deck with the 747-400 as well as an improvement in avionics with the 747-8. However, he is quick to add: "From a pilot's flying perspective, the 747 is the best plane I have flown so far!

"The 747's forced feedback yoke [tells] you what the aircraft is doing. You feel the aircraft so much more with the yoke than you do with the sidestick, as there's no feedback on the sidestick," Joe says. "On the Airbus, with the side stick, the plane is flying you. On the Boeing you fly the plane. And the 747 really does handle like a little Cessna. I know people think: 'How can that be?' but it's true!"

Throughout his four-month type-rating programme, Joe became accustomed with the systems aboard the 747, as well learning the nuances that come from the three different engine types – the GE Aviation GEnx, CF6 and Rolls-Royce RB211 – used across the Cargolux 747 fleet. He remains impressed with the capability of the Boeing aircraft, as well as the multiple redundancies built into its design.

"Coming across to the 747, it has four engines and [isn't fly by wire], and yet there are even more backup systems than the A320 – there is so much redundancy – and I knew if there was a backup on the A320 there would be one on the 747 because of all its built in redundancy," he explains.

And the sheer size of the 747 means it requires particular skill and attention, especially when performing an approach. Joe elaborates: "You have to fly the aircraft carefully. You must be ahead of the game, compared to the A320. Speed reduction for example takes much longer on a 747 than it does on the A320, because of the weight, but at the same time the 747 is very forgiving and it really wants »

to work with you, but you as the pilot have to be on point."

And despite the similarities between the two models of 747 that Cargolux utilises, Joe has a special place in his heart for the veteran -400 aircraft. "I love the -400 because of the sound, and it feels a bit more stable, as its wing is older and not as aerodynamically advanced, so you feel a bit more stability – and it's a very old lady so it's nice to fly."

Unusual Passengers

Flying for a cargo airline can be a solitary affair. While pilots of passenger airliners head up a team of cabin crew and travel between busy airport hubs, cargo pilots are often a two-person job. However, Joe says the diversity of cargo flying is enough to overcome the solitude, with flights taking him to unique destinations across the world.

"We have take-offs at 40°C in Dubai and then land, just a few hours later, at -20°C in Novosibirsk, [Siberia]" Joe says of his cargo career, adding: "A pilot really needs to know the plane, and we're constantly in the books, going through the right procedures, having the right checklists on hand. You can't lack in knowledge. You must be at the top of your game. It is more adventurous and I feel more like a pilot now." The variety of the flying is matched by the diversity in what the aircraft transports. Some of Joe's more interesting manifests have included Formula 1 cars, medical equipment and even test vehicles.

However, perhaps the most remarkable passengers Joe has ever flown are two Beluga whales, which he transported from Shanghai to Iceland. This required specialised equipment to be constructed and loaded aboard, as well as a team dedicated to care for the animals in flight.

"A special tank was built specifically for the transport of each whale. We had two additional water tanks that acted like a reservoir," Joe explains, adding: "The water levels were kept at a state where the whales could float inside the container and during take-off and landing, the water levels had to be lowered, due to the pitch, so a mechanic flew with us to pump the water between tanks. We also had two vets and two caretakers aboard for the flight. It has to be one of the most interesting flights."

As a cargo pilot, Joe's favourite airports include Quito – with an elevation of 7,800ft that presents technical challenges for pilots, as well as Hong Kong, which Joe says, is the most interesting airport to depart from: "Hong Kong is an airport on an island that they've specifically built for the airport.

"When you depart, you take off over the city and do your first bank, and you just see houses. The density of the houses is amazing and how big the city really is."

"When looking for a job, rather than just doing the [application] online assessments, be open-minded to meeting people, building relationships and be open-minded to any kind of pilot job that is out there..."

Joe Diebolder

Looking Ahead

This has been a difficult year for aviators across the globe, yet cargo and freight carriers have so far weathered the storm. With most passenger airliners grounded throughout the pandemic, it is only now that we're seeing some flights resuming across Europe, Asia and the United States.

"It has become relatively silent since COVID-19. The only other airlines you hear out there are cargo airlines," Joe

TOP LEFT • ***Since COVID-19 impacted the world, cargo airlines have dominated the airspace, but Joe Diebolder says the virus has also created personal opportunities for unique and interesting piloting experiences***

says, noting that the quieter airspace does allow for some unique and interesting piloting experiences.

"Usually when flying into Hong Kong you're number 25 in the sequence. You reduce to final approach speed miles out. Now, because we are all by ourselves, we can do steeper descents and dive into the airport. We have a lot of fun flying the plane and the [air traffic] controllers have their fair share of fun as well, which has been good."

But despite the downturn, Joe sees a future for aspiring pilots, particularly those who are willing to go the extra mile and seek out opportunities:

Joe Diebolder joined the Luxembourgish freighter operator in 2017 following the collapse of airberlin

"When looking for a job, rather than just doing the [application] online assessments, be open-minded to meeting people, building relationships and be open-minded to any kind of pilot job that is out there. Get your hours, get your time in and fly anything you can get your hands on.

"When I applied at airberlin, there were ten candidates and they hired two. Of the ten candidates, eight of them were just out of flying school, while me and the other successful candidate both came to the interview with a two-year gap between flying school and an airline job, and we were the ones with experience in flying over 500 hours, and we got the job."

And as for Joe, despite a lifelong love of the Concorde, his next aspiration is to fly the iconic Spitfire, noting: "It is by far the most amazing plane. I have read books and books on it. The Spitfire is a pilot's plane and something I would really love to fly!"

There is little doubt that when Joe realises this dream, it will be documented on his YouTube channel. Until then, when next you receive a parcel via airfreight, it may have flown in the hold of a Cargolux 747 flown by 'Captain Joe'. AM

Airliner Deliveries

The latest commercial aircraft deliveries from manufacturers and lessors.

Animawings – a newly established Romanian carrier – has pressed its maiden aircraft into service. The former Aegean Airlines Airbus A320ceo, YR-AGA (c/n 3162), was delivered on July 18
AIRTEAMIMAGES.COM/LOREDANA CIOCLEI

Air Arabia Abu Dhabi [3L/ADY]

A6-AUA	A320ceo	5017	ex A6-ANI, dd 23.07.20
A6-AUB	A320ceo	5423	ex A6-ANN, dd 13.07.20

Etihad Airways [EY/ETD 'ETIHAD']

A6-EYE	A330-200	688	ferried TEV-AUH 01.07.20 for continued storage
A6-EYM	A330-200	824	ferried TEV-AUH 29.07.20 for continued storage
A6-EYT	A330-200	1486	ferried TEV-AUH 16.07.20 for continued storage

Qatar Airways [QR/QTR 'QATARI']

A7-BCT	787-8	38338	ferried VCV-DOH 02.07.20 after work

China Express Airlines [G5/HXA 'CHINA EXPRESS']

B-30F5	A320neo	10044	ex F-WWDO, dd 23.06.20, lsd fr ABC Financial Leasing

China Southern Airlines [CZ/CSN 'CHINA SOUTHERN']

B-30EZ	A320neo	9535	ex B-000V, dd 22.06.20
B-30F8	A320neo	9579	ex B-007L, dd 24.06.20

Colorful Guizhou Airlines [GY/CGZ 'COLORFUL']

B-30DY	A320neo	9543	dd 20.03.20, ferried TLS-KWE 29.07.20

LongJiang Airlines [LT/SNG 'SNOW EAGLE']

B-2381	A320ceo	3485	ex F-WWIG, dd 22.07.20, lsd fr DAE Capital

SF Airlines [O3/CSS 'SHUN FENG']

B-20EF	757-200(F)	29943	ex N233SA, ferried CTU-SZX 19.07.20
N202DP	757-200	33099	ex G-OOBD, ferried GYR-ICN 17-18.07.20
N233SA	767-300ER	30847	ex 2-POWD

Shandong Airlines [SC/CDG 'SHANDONG']

B-5516	737-800	39389	ex N1787B, dd 09.07.20, lsd fr Aviation Capital Group

Air Canada [AC/ACA 'AIR CANADA']

C-GJXW	A220-300	55082	dd 15.05.20, reg'd 24.06.20
C-GJYA	A220-300	55088	dd 26.06.20, fleet #107
C-GJYC	A220-300	55090	dd 30.07.20, fleet #108

Air Transat [TS/TSC 'TRANSAT']

C-GOIK	A321LR	9419	ex D-AVXF, dd 30.06.20, lsd fr AerCap, fleet #705

Air Tunilik [-/-]

C-FJGV	DHC-2	977	ex CF-JGV, reg'd 14.07.20
C-FSVP	DHC-3T	28	ex 3673 RCAF, reg'd 09.07.20

Kississing Lake Lodge (Wings Over Kississing)

C-GSMG	DHC-3T	363	ex 9405 RCAF, reg'd 06.07.20

Nolinor Aviation [N5/NRL 'NOLINOR']

C-GGWX	737-400	24804	painted into OWG colours

Ross Air (Emo Investments) [-/-]

CF-FHC	DHC-2	12	reg'd 21.07.20

Sky Airline [H2/SKU 'AEROSKY']

CC-AZT	A320neo	9344	ex D-AUAU, dd 30.06.20, lsd fr Alafco

TAP Air Portugal [TP/TAP 'AIR PORTUGAL']

CS-TXE	A321LR	9120	ex D-AVZH, dd 19.06.20

Lufthansa [LH/DLH 'LUFTHANSA']

D-AIKR	A330-300E	1314	ferried BOD-FRA 28.04.20 after storage, in service 11.05.20
D-AILE	A319ceo	0629	ferried SNN-FRA 25.06.20, in service same day
D-AIUA	A320ceo	5935	ferried SNN-MUC 09.07.20 after storage, in service 12.07.20
D-AIUB	A320ceo	5972	ferried SNN-MUC 09.07.20 after storage
D-AIWG	A320ceo	8902	ferried FCN-FRA 19.06.20 after storage, in service same day
D-AIWH	A320ceo	8911	ferried FCN-FRA 24.06.20 after storage, in service 25.06.20
D-AIWI	A320ceo	8951	ferried FCN-FRA 19.06.20 after storage, in service 20.06.20
D-AIWK	A320ceo	9058	ferried FCN-FRA 24.06.20 after storage, in service 25.06.20

TAAG Angola Airlines [DT/DTA 'DTA']

D2-TFA	DHC 8-400	4616	ex C-GKXM, (C-GKXM canx 17.07.20)

Air Nostrum [YW/ANU 'NOSTRUM AIR']

ZP-CRN	CRJ200	7866	ret fr Paranair lease & ferried Asuncion-Valencia 24-25.07.20

Canaryfly [PM/CNF 'CANARY']

EC-IZO	ATR 72-500	711	cnvrtd to ATR 72-500F 07.20

EVELOP [E9/EVE 'EVELOP']

EC-NGY	A350-900	400	dd 31.03.20, ferried TLS-MAD 31.07.20

Iberia [IB/IBE 'IBERIA']

EC-NIS	A350-900	406	ex F-WZNC, dd 05.06.20; *Talento a Bordo*
EC-NJM	A350-900	419	ex F-WZNM, dd 18.06.20, ferried TLS-MAD 19.06.20; *Flamenco*

Iberia Express [I2/IBS 'IBEREXPRES']

EC-NGP	A321neo	9478	ex D-AVXZ, dd 25.06.20

Volotea [V7/VOE 'VOLOTEA']

EC-NHP	A319ceo	2870	ex OE-IIN, dd 01.07.20, lsd fr DVB Bank; *Volotean Rhapsody*

Vueling [VY/VLG 'VUELING']

EC-NIX	A320neo	10024	ex F-WWBP, dd 08.06.20, ferried TLS-BCN 16.06.20
EC-NIY	A320neo	10052	ex F-WWBU, dd 09.06.20, ferried TLS-BCN 16.06.20

Wamos Air [EB/PLM 'PULLMAN']

EC-MAJ	A330-200	992	ex A9C-KJ, dd 17.07.20 Perpignan – Barcelona, lsd fr AerCap
EC-NHM	A330-300E	935	ex OE-IEA, dd 03.07.20, lsd fr CBD Aviation, ferried HHN-CQM for temp storage

Nyxair [NYX 'NYX AIR']

ES-NSG	Saab 340B(F)	340B-223	ex G-LGNU, dd 07.20, lsd fr Jetstream Aviation Capital

Sky KG Airlines [Y3/KGK 'KYRGYZ SKY']

9U-BBA	747-400(F)	24311	ex OM-ACG, dd 13.06.20, lsd fr Aquiline International

Air France [AF/AFR 'AIR FRANCE']

F-HTYF	A350-900	422	ex F-WZNB, dd 30.06.20, ferried TLS-CDG 10.07.20; *Marseille*

ASL Airlines France [5O/FPO 'FRENCH POST']

F-HIQB	737-800	33641	ex TC-CPO, reg'd 23.07.20, ferried SAW-TNA 14-16.07.20

Corsair [SS/CRL 'CORSAIR']

F-HROK	A330-300E	1103	ex VQ-BEL, reg'd 16.07.20, lsd fr AerCap

Air Caraibes [TX/FWI 'FRENCH WEST']

F-HPUJ	A330-300	1727	ferried CHR-ORY 02.07.20 after storage

British Airways [BA/BAW 'SPEEDBIRD']

G-NEOY	A321neo	9209	ex D-AVZW, dd 15.06.20
G-ZBLA	787-10	60637	dd 26.06.20
G-ZBLB	787-10	60638	dd 29.06.20

Eastern Airways [T3/EZE 'EASTFLIGHT']

G-MAJK	Jetstream 41	41070	ret to service 27.07.20 after storage

easyJet Airline [U2/EZY 'EASY']

G-EZGI	A319ceo	4693	ex OE-LKA, reg'd 27.07.20
G-EZGO	A319ceo	4785	ex OE-LSZ, reg'd 22.07.20
G-UZMI	A321neo	9422	ex D-AVZD, dd 16.06.20

Wizz Air UK [W9/WUK 'WIZZ GO']

G-WUKC	A321ceo	8169	ferried DSA-LTN 15.06.20 after storage, in service 16.06.20
G-WUKH	A321ceo	8600	ferried DSA-LTN 30.06.20 after storage, in service 03.07.20
G-WUKI	A321ceo	8625	ferried DSA-LTN 30.06.20 after storage, in service 01.07.20
G-WUKJ	A321ceo	8879	ferried DSA-LTN 30.06.20 after storage, in service 02.07.20
G-WUKL	A321ceo	8791	ferried DSA-LTN 16.06.20 after storage, in service 18.06.20

Fleet Air International [-/FRF 'FAIRFLEET']

HA-KAO	ATR 72-200(F)	183	ex LZ-FAD. dd 13.07.20

Wizz Air [W6/WZZ 'WIZZ AIR']

HA-LJE	A320neo	10046	ex F-WWIN, dd 26.06.20
HA-LVI	A321neo	9333	ex D-AVYJ, dd 30.06.20, lsd fr BOC Aviation

Edelweiss Air [WK/EDW 'EDELWEISS']

HB-IJU	A320ceo	1951	ferried Dübendorf-ZRH 09.06.20 after storage, in service 17.06.20
HB-IJW	A320ceo	2134	ferried Dübendorf-ZRH 09.06.20 after storage, in service 19.06.20

Key to Abbreviations

a/c	aircraft
als	airlines
awys	airways
bf	bought from
b/u	broken up/scrapped
canx	cancelled
cls	colours
cn	manufacturer's construction/serial number
cnvrtd	converted
dbf	destroyed by fire
dbr	damaged beyond repair
dd	delivery date
ex	previous reg'n
ff	first flight
frtr	freighter
lrf	last revenue flight
lsd fr	leased from
lsd to	leased to
msn	see cn
ntu	not taken up
oo	on order
op	operated
pax	passenger
pwfu	permanently withdrawn from use
reg'd	registered
reg'n	registration
ret fr	returned from
ret to	returned to
rr	re-registered
rts	return to service
sb	sold by
scr	scrapped/broken up
st	sold to
std	stored
tba	to be advised
unk	unknown
wfu	withdrawn from use
w/o	written off/destroyed

Thanks to Dave Richardson and LAASI Aviation for the above

We welcome any feedback on this listing.

(The listing is alphabetical with reference to the registration of the country of origin. Columns indicate the registration, type, construction number and notes.)

HB-JJK	A320ceo	1692	ferried Dübendorf-ZRH 17.06.20 after storage, in service 04.07.20
HB-JJM	A320ceo	2627	ferried Dübendorf-ZRH 15.06.20 after storage, in service 01.07.20
HB-JJN	A320ceo	4187	ferried Dübendorf-ZRH 17.06.20 after storage, in service 27.06.20
Helvetic [2L/OAW 'HELVETIC']			
HB-AZE	E190-E2	19020038	ex PR-EDE, dd 02.07.20
Swiss [LX/SWR 'SWISS']			
HB-IJD	A320ceo	0553	ferried Dübendorf-ZRH 15.06.20 after storage, in service 01.07.20
HB-IJE	A320ceo	0559	ferried Dübendorf-ZRH 15.06.20 after storage, in service 02.07.20
HB-IJI	A320ceo	0577	ferried Dübendorf-ZRH 17.06.20 after storage, in service 27.06.20
HB-IJJ	A320ceo	0585	ferried Dübendorf-ZRH 15.06.20 after storage, in service 01.07.20
HB-IJO	A320ceo	0673	ferried Dübendorf-ZRH 16.06.20 after storage, in service 09.07.20
HB-IJP	A320ceo	0681	ferried Dübendorf-ZRH 17.06.20 after storage for ret to service
HB-IOC	A321ceo	0520	ferried Dübendorf-ZRH 16.06.20 after storage, in service 30.06.20
HB-IOD	A321ceo	0522	ferried Dübendorf-ZRH 15.06.20 after storage, in service 11.07.20
HB-IOF	A321ceo	0541	ferried Dübendorf-ZRH 15.06.20 after storage, in service 11.07.20
HB-JDB	A320neo	9379	ex D-AUAO, dd 30.06.20; Riederalp
Pan Air Cargo (Cargo Three) [3J/CTW 'THIRD CARGO']			
HP-1755CTW	A300B4-200(F)	227	ex XA-FPP, seen MEX 23.07.20 prior to delivery
flynas [XY/KNE 'NAS EXPRESS']			
HZ-NS28	A320neo	9428	dd 17.04.20, ferried XFW-RUH 03.07.20
Avion Express [X9/NVD 'NORDVIND']			
LY-NVZ	A320ceo	0921	ferried CHR-KUN 04.07.20 after storage
LY-VEA	A321ceo	2234	ferried VNO-CGN 03.07.20, lsd to/op for Holiday Europe
Holiday Europe [5Q/HES 'HOLIDAY EUROPE']			
LY-VEA	A321ceo	2234	ex OE-IGB, dd 07.07.20 CGN-LEJ, lsd fr/op by Avion Express
Tayaran Jet [E8/TJB 'ALADIN']			
LZ-SIA	737-300	28399	ferried MXP-SOF 30.07.20 after temp storage
Air Transport International [8C/ATN 'AIR TRANSPORT']			
N457AZ	767-300ER(F)	25448	ex N379AA, dd 05.07.20, sub-lsd fr Amazon, op for Prime Air
Allegiant Air [G4/AAY 'ALLEGIANT']			
N284NV	A320ceo	5045	ex RP-C3237, reg'd 16.07.20, std Lake City
American Airlines [AA/AAL 'AMERICAN']			
N418AN	A321neo	9550	ex F-WZMW, dd 26.06.20, fleet #418
Cape Air (Hyannis Air Service) [9K/KAP 'CAIR']			
N969CA	Tecnam P2012	018/US	reg'd 02.07.20 to Hyannis Air Service
Contour Airlines (Corporate Flight Management) [LF/VTE 'VOLUNTEER']			
N12552	ERJ145	145883	ferried Kingman – Smyrna 29.07.18 after storage
Eastern Airlines [2D/EAL 'EASTERN']			
N879BC	767-300	27309	ex B-2563, dd 21.07.20, lsd fr Alta Airlines Holdings
Envoy Air (American Eagle) [MQ/ENY 'ENVOY']			
N200NN	E175	17000456	ferried AVW-ABI 13.07.20 for entry into service
N201NN	E175	17000461	ferried AVW-ABI 10.07.20 for entry into service
N202NN	E175	17000467	ferried AVW-ABI 08.07.20 for entry into service
FedEx Express [FX/FDX 'FEDEX']			
N185FE	767-300F	63116	dd 19.06.20 & reg'd 07.07.20; *Christine*
N271FE	767-300F	66250	dd 30.06.20 & reg'd 22.07.20; *Jeremiah*
N845FD	777F	66255	dd 05.06.20 & reg'd 10.06.20; *Juliette*
Frontier Airlines [F9/FFT 'FRONTIER FLIGHT']			
N368FR	A320neo	9549	dd 29.07.20, lsd fr CDB Aviation; *Cortez the Green Turtle*
N369FR	A320neo	10031	dd 29.07.20, lsd fr CDB Aviation; *Chinook the Gray Wolf*
Kalitta Charters II [-/KII 'DRAGSTER']			
N311GT	737-400(F)	26316	ex N499SA, dd 16.06.20, lsd fr/op for DHL
National Airlines [N8/NCR 'NATIONAL CARGO']			
N756CA	747-400(BCF)	26547	ferried Marana – San Antonio SAT 27.07.20 for paint
Spirit Airlines [NK/NKS 'SPIRIT WING']			
N932NK	A320neo	10008	ex F-WZMZ, dd 18.06.20
Sun Country Airlines [SY/SCX 'SUN COUNTRY']			
N445CC	737-800(BCF)	32577	ex HS-DBE, dd 28.05.20 sub-lsd fr Amazon.com Services, op for Prime Air; *Bias for Altitude*
N451CC	737-800(BCF)	32607	ex B-5138, dd 29.05.20 sub-lsd fr Amazon.com Services, op for Prime Air
N542RL	737-800(BCF)	32579	rr N5209A 06.07.20
N545RL	737-800(BCF)	32601	rr N5683A 22.07.20
N547RL	737-800(BCF)	32348	rr N5261A 22.07.20
United Airlines [UA/UAL 'UNITED']			
N874UA	A319ceo	2008	ferried SFO-GYR 23.07.20 prior to entry into service
N7711N	737-700	32657	ex N240AT, ferried PAE-ROW 09.07.20
UPS – United Parcel Service [5X/UPS 'UPS']			
N621UP	747-8F	65785	dd 22.06.20
Western Global Airlines [KD/WGN 'WESTERN GLOBAL']			
N497MC	747-400F	29258	dd 06.05.20
Lauda (LaudaMotion) [OE/LDM 'EXPERT']			
OE-LMH	A320ceo	5015	ex F-WXAS, dd 10.07.20, lsd fr Avolon
OE-LMP	A320ceo	3616	ex VT-WAH, dd 10.07.20, lsd fr GECAS
Atlantic Airways [RC/FLI 'FAROELINE']			
OY-RCL	A320neo	10006	ex F-WWII, dd 18.06.20, lsd fr Air Lease Corp
Dabi Air Nusantata [-/-]			
PK-DPT	Cessna 208B/EX	208B5025	ex PK-DLS, reg'd 17.01.19
Dirgantara Air Service (Jayawijaya Dirgantara) [-/DIR 'DIRGANTARA']			
PK-JRB	737-300(F)	23499	ex PK-BBC, reg'd 24.12.19
Pelita Air Service [-/PAS 'PELITA']			
PK-PAT	ATR 72-500	705	ex OY-YAE, dd 16.07.20, lsd fr Nordic Aviation Capital
Premiair (Ekspres Transportasi Antarbenua) [-/-]			
PK-RJI	ERJ145	14501040	ex N152EC, reg'd 11.10.19
PK-RJM	ERJ145	14501022	ex N193EC, reg'd 19.09.19
SAM Air (Semuwa Aviasi Mandiri) [-/-]			
PK-SMW	Cessna 208	20800609	ex PK-SNH, reg'd 14.08.19
Smart Cakrawala Aviation [-/-]			
PK-SNK	Cessna 208	20800658	ex N872NT, reg'd 28.08.19
PK-SNM	Cessna 208	20800655	ex N865QQ, reg'd 29.05.19
PK-SNP	Cessna 208B/EX	208B5495	ex N2068G, reg'd 15.02.19
PK-SNR	Cessna 208B	208B2290	ex HL8120, reg'd 25.09.19
LATAM Airlines Brasil [JJ/TAM 'TAM']			
A4O-OVA	A320ceo	3035	rr PR-MHI 07.20, ferried CNF-QSC 17.07.20 for ret to service
Aviastar-Tu [4B/TUP 'Tupolevair']			
VQ-BGG	757-200(F)	27051	ex N699AN, dd 15.07.20
Pobeda [DP/PBD 'POBEDA']			
VP-BGQ	737-800	41227	dd 23.07.20, lsd fr Avia Capital Solutions
VP-BGR	737-800	41228	ex N1787B, dd 22.07.20, lsd fr Avia Capital Solutions
VP-BOD	737-800	41238	dd 21.07.20, lsd fr Avia Capital Solutions
VP-BOH	737-800	41244	ex N1786B, dd 22.07.20, lsd fr Avia Capital Solutions
Red Wings Airlines [WZ/RWZ 'REMONT AIR']			
VP-BRQ	A321ceo	2793	ferried TLL-DME 01.07.20 after temp storage
CEBU Pacific Air [5J/CEB 'CEBU AIR']			
RP-C4123	A321neo	9150	ex D-AZAM, dd 16.06.20
Air Leap (Air Large European Aviation Project) [FL/LPA 'LEAP']			

British Airways received its much-anticipated maiden Boeing 787-10 Dreamliner on June 26. A second example, G-ZBLB (c/n 60638), arrived at the carrier's Heathrow base just three days later on June 29
JOE G WALKER

Airliner Deliveries

The latest commercial aircraft deliveries from manufacturers and lessors.

Air Atlanta Icelandic has recently acquired two Boeing 747-400Fs, including TF-AMB (c/n 28263). The 1996-built jet has previously flown for Singapore Airlines, Great Wall Airlines and China Cargo Airlines VIIMAGES.COM/ ROBERT EIKELENBOOM

SE-MDA	ATR 72-500	778	ex EI-REN, dd 10.07.20, lsd fr Erik Thun
SAS Scandinavian Airlines [SK/SAS 'SCANDINAVIAN']			
SE-RSD	A350-900	418	ex F-WZFM, dd 30.06.20; *Halvard Viking*
SE-RUA	A320neo	9520	ex D-AXAC, dd 26.06.20, lsd fr Avolon; *Asfried Viking*
Egyptair [MS/MSR 'EGYPTAIR']			
SU-GFG	A220-300	55081	ex C-FOVX, dd 31.07.20
SU-GFH	A220-300	55087	ex C-FOVH, dd 30.07.20
SU-GFN	A320neo	10013	ex F-WWDQ, dd 30.06.20, lsd fr AerCap
Aegean Airlines [A3/AEE 'AEGEAN']			
SX-NED	A320neo	10047	ex F-WWIG, dd 18.06.20, lsd fr ICBC Leasing
Olympus Airways [-/OLY 'OLY AIR']			
SX-EMJ	A320ceo	1637	ex G-OZBX, dd 21.07.20, lsd fr Ellinair
Pegasus Airlines [PC/PGT 'SUNTURK']			
TC-RBE	A321neo	9462	ex D-AZAW, dd 24.06.20; *Arin Erva*
Turkish Airlines [TK/THY 'TURKISH']			
TC-LSS	A321neo	9157	ex D-AZAE, dd 30.06.20, lsd fr SMBC Aviation Capital; *Bandırma*
TC-LST	A321neo	9326	ex D-AVZI, dd 30.06.20, lsd fr SMBC Aviation Capital
Air Atlanta Icelandic [CC/ABD 'ATLANTA']			
TF-AMB	747-400F	28263	ex B-2428, dd 06.20
TF-AMC	747-400F	26563	ferried SNN-LEJ 27.05.20 after paint, lsd fr AviaAM Leasing
FlyBosnia [6W/FBS 'BOSNIA AIR']			
LY-COD	A319ceo	2774	ex EI-GOG, dd 05.07.20, lsd fr/op by GetJet Airlines
Azur Air Ukraine [QU/UTN 'UT UKRAINE']			
UR-AZP	757-300	30178	ex 4X-BAU, dd 06.07.20
Fly Sky Airlines [-/-]			
UR-FSD	Il-76TD	1023411368	ex UP-I7660, reg'd 18.06.20
UR-CRN	Il-76TD	1023412399	ex ER-IAZ, reg'd 24.02.20, rr UR-FSC 18.06.20
Meridian [-/POV 'AIR POLTAVA']			
UR-CTJ	An-12BK	9346508	ex EY-405, reg'd 07.07.20
Windrose Airlines [7W/WRC 'WIND ROSE']			
UR-RWA	ATR 72-600	1178	ex 2-MFID, lsd fr Nordic Aviation Capital
UR-RWB	ATR 72-600	1262	ex 2-MFIG, dd 16.07.20, lsd fr Nordic Aviation Capital
ZetAvia [ZK/ZAV 'ZETAVIA']			
UR-CTO	Il-76TD	1013409295	ex UP-I7601, reg'd 15.06.20
Longtail Aviation [-/LGT 'LONGTAIL']			
VQ-BWS	747-400F	27503	ex N875KW, dd 21.05.20, lsd fr Aquiline International
Estafeta Carga Aerea [E7/ESF]			
XA-EST	737-400(F)	28661	ex N477VX, dd 07.20, lsd fr Vx Capital Partners, ferried San Bernardino – San Luis Potosi 30.07.20, (N477VX canx 22.07.20)
MasAir Cargo [M7/MAA 'MAS CARGA']			
N363CM	767-300ER(F)	24853	ex VH-OGF, dd 22.07.20, lsd fr Cargo Aircraft Management
MCS Aerocargo de México [T8/MCS 'CARMEX']			
XA-	CRJ200(PF)	7236	ex N830AS, dd 07.20, lsd fr Avmax Aircraft Leasing,
Viva Aerobus [VB/VIV]			
XA-VBA	A321neo	9487	ex D-AVYP, dd 26.06.20, ferried XFW-MTY 30.06.20
Volaris [Y4/VOI 'VOLARIS']			
N504VL	A319ceo	3590	ret fr Volaris Costa Rica lease 07.07.20
XA-VRN	A320neo	10093	ex F-WWDX, dd 30.06.20
Al-Haya Aviation [HA/HYA 'ALHAYA']			
SX-AMJ	757-200(F)	25294	ex N660AM, dd 20.06.20, lsd fr/op by Olympus Airways
Animawings [AWG 'ANIMA WINGS']			
YR-AGA	A320ceo	3162	ex SX-DGI, dd 07.20, lsd fr FPG Group
Blue Air [0B/BLA 'BLUE AIR']			
YR-BMQ	737-800	35101	ex B-5359, dd 01.07.20, lsd fr Air Lease Corp
Avior Airlines [9V/ROI 'AVIOR']			
YV643T	A340-300	199	ex YV3292, dd 25.07.20, lsd fr Aircraft Engine Lease Finance
Air Sénégal [HC/SZN 'SENSA']			
6V-	A321ceo	1881	ex F-WTAJ, lsd fr Carlyle Aviation Partners
Croatia Airlines [OU/CTN 'CROATIA']			
9A-CTN	A319ceo	5085	ex 2-WTBB, dd 03.06.20, lsd fr World Star Aviation,
Corendon Airlines Europe [XR/CXI 'TOURISTIC']			
9H-CXA	737-800	42804	ex OE-IGF, dd 14.07.20, lsd fr Jade Aviation; *Max Morlock*
9H-CXB	737-800	42799	ex OE-ILA, dd 24.07.20, lsd fr Avolon
Airhub Airlines [-/-]			
9H-EMU	A320ceo	1087	ex LY-FOX, dd 16.07.20
Maleth Aero [DB/MLT 'MALETH']			
9H-PPE	A340-600	787	ex 2-EALL, reg'd 07.19, lsd fr European Aviation
Malta MedAir [MM/MMO 'MALIT']			
9H-AEO	A320ceo	2768	ex F-WWDK, dd 01.08.20, lsd fr AerCap

Key to Abbreviations

a/c	aircraft
als	airlines
awys	airways
bf	bought from
b/u	broken up/scrapped
canx	cancelled
cls	colours
cn	manufacturer's construction/serial number
cnvrtd	converted
dbf	destroyed by fire
dbr	damaged beyond repair
dd	delivery date
ex	previous reg'n
ff	first flight
frtr	freighter
lrf	last revenue flight
lsd fr	leased from
lsd to	leased to
msn	see cn
ntu	not taken up
oo	on order
op	operated
pax	passenger
pwfu	permanently withdrawn from use
reg'd	registered
reg'n	registration
ret fr	returned from
ret to	returned to
rr	re-registered
rts	return to service
sb	sold by
scr	scrapped/broken up
st	sold to
std	stored
tba	to be advised
unk	unknown
wfu	withdrawn from use
w/o	written off/destroyed

Thanks to Dave Richardson and LAASI Aviation for the above

Spanish low-cost carrier Vueling received two Airbus A320neos in as many days during early June, the first of which, EC-NIX (c/n 10024), was handed over on June 8. The pair of Pratt & Whitney PW1100G-powered single-aisle jets were ferried to the company's Barcelona base a week later JAVIER RODRIGUEZ

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The latest news from maintenance, repair and overhaul providers

Etihad and Boeing **Sign Supply Chain Deal**

Boeing has agreed a ten-year minimum agreement to provide a supply chain for Etihad Airways' 787 Dreamliner fleet.

Announced on July 22, the deal includes Boeing's Component Services and Landing Gear Exchange programmes, as well as Quick Engine Change (QEC) kit purchases. The agreement is designed to help the airline simplify its asset and maintenance management, as well as improving availability and reducing costs of spare parts.

Etihad Airways chief operating officer, Mohammad Al Bulooki, said: "By partnering with Boeing as the original equipment manufacturer [OEM] of Etihad's [contingent of] 787s, we ensure that the fleet receives the highest levels of maintenance support to increase reliability and efficiency. These agreements continue to demonstrate the strength of Etihad Aviation Group's partnership."

Etihad said the new contracts will continue the strategic partnership the airline announced with the US manufacturer at the Dubai Airshow in November 2019, which is designed to share knowledge, resources and experience to continuously improve the 787 and reduce emissions.

Al Bulooki added: "This is an important demonstration of Etihad's ongoing focus toward the post-COVID world and the airline's endeavours to set the benchmark for operational excellence in both product and sustainability, as well as technical performance and efficiency."

Etihad Airways is based in Abu Dhabi and currently operates a mixed fleet of 38 787-9 and -10 airframes.
(Photo Etihad Aviation Group)

APOC Aviation Acquires a Further A320

Netherlands-based aircraft part-out company APOC Aviation announced on August 11 that it has acquired an additional Airbus A320 Family airliner for teardown. The company has not identified the specific airframe, but said it was built in 2000 and last operated in Europe.

The aircraft represents the fifth narrowbody acquisition for the firm this year and its purchase has been funded through private placement. APOC anticipates that the first serviceable parts, including the landing gears, will be parted out at its facility in Spain in the fourth quarter of 2021. The airliner's engines are not included in the spares recovery process.

Once teardown is complete, the company said the parts will be shipped to its repair stations around the world for repair and overhaul, prior to being returned to APOC's warehouse in Rotterdam.

APOC Aviation's vice president of airframe acquisition and trading, Jasper van den Boogaard, said: "APOC Aviation were quick to seize this opportunity and we had secure financing in place to close the deal. Even in these difficult times, I am pleased to say that, despite the constraints of COVID-19, APOC is able to source and finalise deals for our target aircraft."

Van den Boogaard said that while the firm would look at other aircraft that come up for sale, it was focused on the youngest assets available at an affordable price: "As airlines worldwide slowly rebuild their operations, narrowbodies and regional jets will be the first to fly again. Our proactive teardown programme is designed to increase our stock of high-quality commercial parts, not just replenish. We will support our customers through the sale of parts, but also exchange, loan and consignment – whatever is best for them."

GKN Aerospace Opens **Global Technology Centre**

GKN Aerospace has announced the completion of its 110,000sq ft Global Technology Centre (GTC) in Bristol, UK, which is expected to reach full capacity in the second half of 2021. The company received the keys to the new facility from property developers St Francis Group on July 23.

The GTC is jointly funded by GKN (£17m) and the UK government (£15m), through the Aerospace Technology Institute and will become GKN's UK technology hub once it becomes fully operational. First announced in December 2018 as part of the UK government's Aerospace Sector Deal, the facility will focus on additive manufacturing, advanced composites assembly and Industry 4.0 processes.

John Pritchard, GKN Aerospace president of Civil Airframe Business, said: "This is a real milestone. We are proud to have taken the next step in the UK GTC development with this handover and we look forward to completing the building and making it a great place to work. We have dozens of committed industry partners already set to join us at the centre, as together we shape a more sustainable future of flight."

The site will eventually house around 300 engineers and GKN has secured more than 25 partners for the facility.
(Photo GKN Aerospace)

MRO News by Nigel Pittaway.

EasyJet **Renews AJW Group** Supply Chain

AJW Group announced on July 28 that it has been selected by easyJet as its supply chain management provider for a further seven years. The new contract follows an existing agreement that has been in place since 2016 to deliver the airline's demand and supply requirements on a 24/7 basis. It covers full component repair and overhaul services across easyJet's network, as well as the provision, storage and distribution of rotable, consumable and expendable material.

A further initiative of the new contract is the introduction of an EU hub in Malpensa, Italy, which will supplement the existing hub in the UK. In addition, AJW said it is developing and investing in process re-engineering and automation tools, and that AJW Technique, the group's MRO facility, will continue to play a significant role in component repairs.

AJW Group president and CEO Christopher Whiteside said: "This contract renewal strengthens AJW's position as the world's leading independent provider of component support programmes, and the contract length demonstrates the confidence that leading airlines, like easyJet, place in our ability to go above and beyond to deliver at every step."
(Photo Nigel Pittaway)

Heston MRO Partners with Wellcamp for Storage

Queensland, Australia-based Heston MRO announced on August 11 that is has partnered with Toowoomba Wellcamp Airport in south-east Queensland to provide one-stop aircraft parking and storage. Services on offer include short and long-term aircraft parking, storage induction, ongoing maintenance, support, reactivation support and logistics. Toowoomba Wellcamp is a privately-owned complex with a 9,416ft runway, capable of accommodating aircraft sizes up to Airbus A380s, with parking for up to 70 jets available immediately.

Heston MRO chief executive Asta Zirlyte said: "Toowoomba Wellcamp Airport is ideally located to capture excess aircraft capacity from [the] Australasian and South East Asian region. [We can give] aircraft owners and operators peace of mind on asset preservation before [airliners are] returned to operations and scheduled for end of life recycling."

Heston MRO is an Australian Civil Aviation Safety Authority-approved Part 145 organisation headquartered

in Brisbane, Queensland with line stations and warehouses at all major airports in the country.
(Photo Toowoomba Wellcamp Airport)

StandardAero Launches **New Business Unit**

A new division to provide business aviation operators with Engine Trading Solutions (ETSs) to help with lifecycle extension of legacy aircraft engines was announced by StandardAero on August 3.

The firm offers OEM-aligned ETSs on platforms for which it already performs MRO services and other major engine platforms, due to "overwhelming market interest." This includes aircraft engine sales, lease, exchange and consignment options for major powerplant models.

Consignment options also include buying, selling and leasing options for third parties, along with original equipment manufacturer engine parts, accessories and serviceable materials.

Marc Drobny, president of StandardAero's Business Aviation division, said: "We are listening to the marketplace and we look forward to more efficiently serving the unmet needs of today's business aviation operators. StandardAero is taking the lead in this space to help our customers maximise and control aircraft cost of ownership."

Lufthansa Technik **Extends Agreement** with Norwegian

Norwegian Air Shuttle and Lufthansa Technik announced on August 13, that the two companies have extended their Total Base Maintenance Support (TBS) contract for the carrier's Boeing 737NG fleet for a further five years.

The services will continue to be performed at Lufthansa Technik's facility in Budapest, Hungary, with the first maintenance event expected in September. Norwegian has been a Lufthansa Technik customer since 2007 and the MRO has provided overhaul services for its 737NG fleet since 2012. In addition, Norwegian has access to Lufthansa Technik's overhaul network for any additional or unplanned maintenance.

Norwegian's head of technical procurement, Paul Salwik, commented: "Lufthansa Technik [has won] this contract in a large, extensive global tendering process. The quality and reliability of past services has convinced us to continue to place our trust in our German partner for the overhaul of our Boeing 737NG fleet."
(Photo Norwegian Air Shuttle)

Prince Repaint Imminent at Speke

Despite ongoing challenges posed by the coronavirus pandemic, Speke Aerodrome Heritage Group (SAHG) in Liverpool has continued to maintain British Aerospace Jetstream 41, G-JMAC (c/n 41004), and Percival Prince 3E, G-AMLZ (c/n P50-46).

The two aircraft are located to the rear of the Crowne Plaza Liverpool John Lennon Airport hotel and share the former Speke Airport apron with Hawker Siddeley HS 748, G-BEJD (c/n 1543), Gloster Meteor WH291 (c/n AW.5052) and Bristol Britannia 308, G-ANCF (c/n 12922).

The undercarriage of the 1951-built Prince is currently receiving attention and is due to be refitted later this year ahead of being repainted. It is understood it will remain in the colours it wore between November 1951 and July 1954 while part of a five-strong fleet of Prince 3Es operated by Shell Refining and Marketing. During this time, Shell's aircraft division, which also included examples of the Percival Proctor and Miles Gemini, was overseen by RAF Battle of Britain ace, Gp Capt Sir Douglas Bader.

Prior to the Alvis Leonides-powered executive transport's arrival at Speke in 2008, the aircraft had spent time in the collections of John Coggins' Coventry Airport-based Aircraft Radio Museum, Airworld Aviation Museum at Caernarfon and most recently the RAF Millom Aviation & Military Museum in Cumbria. However, it is no stranger to the airfield, having been maintained by British Eagle International Airlines in the company's hangar at Liverpool/Speke between 1964 and the carrier's collapse in 1968.

While the smaller types have received most of the limited attention the group has been able to provide recently, fundraising efforts to restore former Aerolíneas Argentinas and Dan-Air Hawker Siddeley HS 748 are ongoing. The aircraft – the only complete example of its kind in preservation in Europe – has almost been repainted in the Dan-Air London colours worn when it entered service with the London/Gatwick-based company in 1976. Once this has been completed, attention will be turned to maintaining its present condition in anticipation of securing funds to raise the aircraft so that its landing gear can be lowered.

The Liverpudlian organisation has recently received £2,000 from Speke Up, a pilot programme run by Merseyside Police, South Liverpool Homes and Onward Homes, which distributes money seized from criminals under the Proceeds of Crime Act to community groups. SAHG has invested the money in new equipment to improve its Jetstream 41 simulator – a major source of income which was closed after social distancing guidelines were rolled out across the UK earlier this year. The simulator – which has been installed on the flight deck of SAHG's pre-production example – is particularly popular with enthusiasts and other members of the public, but has also garnered a great deal of interest from prospective Eastern Airways pilots wanting to familiarise themselves with the John Larroucau-designed turboprop's cockpit ahead of potentially joining the Humberside-based airline; currently the world's largest operator of the Prestwick-built 29-seater.

While aircraft at Bruntingthorpe in Leicestershire and other locations across the UK face uncertain futures, it is unlikely that this ambiguity will extend to those at Speke – the vast expanse of tarmac to the south of the iconic, 1938-built art deco terminal building is itself listed.

Airliner World plans to report on the Britannia Aircraft Preservation Trust's work to restore Bristol Britannia 308, G-ANCF, in a forthcoming issue.

(Photos Martin Needham)

The latest training aids available for the aviation professional

BAA Training Barcelona Bound

Lithuania-based BAA Training has revealed plans to open a new facility near Barcelona's El Prat gateway. Set for opening during the first quarter of 2021, the 57,048sq ft training centre is scheduled to house both the Airbus A320ceo/neo and Boeing 737NG full-flight simulators (FFS).

Additionally, in a first for the firm, pilots at the Spanish facility will be able to train on an L3Harris Technologies-manufactured 737 MAX 8 simulator. The decision by bosses at BAA Training to add the type comes amid Boeing recertifying the jet, which in turn, generates a greater need for crew to be trained during 2021. In total, the centre will have six FFS in operation during its opening year.

Egle Vaitkeviciute, CEO of BAA Training, commented: "Considering fragility of the future prospects and following rigorous market analysis, we have decided to move forward with BAA Training expansion, adjusting it to the actual and future airline needs. Our main goal is to support our customers with the right equipment and cost-saving solutions that will secure them with currently much needed flexibility and availability for required pilot training."

With the introduction of the Barcelona complex, the firm has stated it wants to create a "Spanish aviation training hub". Already, it has a pair of ab initio bases in the country – located at Lleida-Alguaire and Castellon Airports. Following investment in the nation, students will eventually have what it calls a "full scope of pilot training needs" on offer. These include: cadet programmes, MPL (multi-crew pilot licence) training, type rating and recurrent courses.
(Photos BAA Training)

From Cabin to **Air Crew**

Low-cost firm Wizz Air has launched a programme aimed at its flight attendants who aspire to become airline pilots. Called 'Cabin Crew to Captain', the initiative is open to staff based in Bulgaria, Hungary, Poland and Romania who have minimal or no flight experience.

This is a first for the industry and will help cabin crew members who want to learn to fly by providing financial help, travel and accommodation support, as well offering a bespoke work and study schedule.

Darwin Triggs, head of flight operations and chief pilot at Wizz Air, commented: "It's a great opportunity for [candidates] to develop their career and grow within the company, as the airline continues expanding its fleet and route network. We believe that this programme will also support gender equality in aviation and its sustainable growth."

Students would enrol on to a 40-month programme, consisting of 22 and 18 months of ab initio ground training and flight training, respectively in Nyíregyháza, located in northeast Hungary.

After passing all relevant tests and requirements, successful cadets will gain a commercial pilot licence (CPL) and eventually become a first officer for the carrier.

Wizz currently fields a fleet of 124 Airbus A320 Family aircraft comprising both current and next-generation examples.

Electric Order for Skyborne

British flight training school, Skyborne Airline Academy, has placed an order for ten Bye Aerospace eFlyers. Following its commitment – comprising six, two-seater eFlyer 2s and four, four-seat eFlyer 4s – the aircraft are scheduled to arrive in 2022 and 2023, respectively. It's hoped that the all-electric types will help the training provider to reduce emissions.

Lee Woodward, chief executive at Skyborne, said: "The eFlyers are great for the environment, economical to operate and have the right blend of avionic technology and handling characteristics required to train our future airline pilots.

"A significant reduction in global carbon emissions is the goal for most socially responsible organisations in our industry, and with the help of Bye Aerospace we aim to lead the way in the UK. It's vital for the next generation that we invest in measures to make flying more sustainable. Electric is the future of aviation."

According to the eFlyer's manufacturer, Bye Aerospace, the type will contribute to reducing "five million metric tons of CO_2" annually from airline pilot training across the globe.

Skyborne is based at Gloucestershire Airport which houses a 13,000sq ft training centre. Facilities include a portfolio of simulators, classrooms and assessment suites.
(Photo Skyborne Airline Academy)

Letters to the Editor

Monarch Crew Memories

Dear Editor,
I just wanted to share my joy with you and thank you for the article on Monarch Airlines in the August edition (pictured). It was a complete surprise when I opened the magazine and saw this section. I used to fly as cabin crew with Monarch in the noughties and it brought back so many wonderful memories. Apart from the leased 737, I worked on all of Monarch's aircraft types and had some wonderful week-long stop overs in the Maldives, USA, Caribbean and the Far East. We were all very lucky back then as stop-overs like those don't exist anymore. Monarch is where my aviation career started and I still have life-long friendships today. It still makes me smile when I see pictures of the carrier and reminds me how wonderful those years were.
Such a great airline, definitely missed by passengers and staff alike.
This edition will definitely go in my *Airliner World* folder!
Marc Hopkins

Events

Enthusiast shows and events worldwide may be listed here – FREE. Organisers are invited to send correspondence to the editorial department (email: airlinerworld@keypublishing.com). Alternatively, visit our website at: www.key.aero

CANCELLED: Oct 3
Airline Collectibles Show
Delta Flight Museum, 1060 Delta Boulevard, Atlanta, USA
www.deltamuseum.org

CANCELLED: Oct 18
Midland Air Museum (Coventry) Aviation Fair,
Coventry Airport CV3 4FR
Carl McQuaide, 07903 848726,
email: speedbird707@aol.com
www.aircraftenthusiastfair.co.uk

Nov 22
Heathrow Aircraft Enthusiasts Fair, Kempton Park Racecourse, Sunbury-on-Thames TW16 5AQ
Carl McQuaide, 07903 848726,
email: speedbird707@aol.com
www.aircraftenthusiastfair.co.uk

Events are subject to short-notice cancellation or postponement due to the ongoing COVID-19 outbreak. Readers are strongly advised to follow any advice issued by local authorities in relation to mass gatherings and travel.

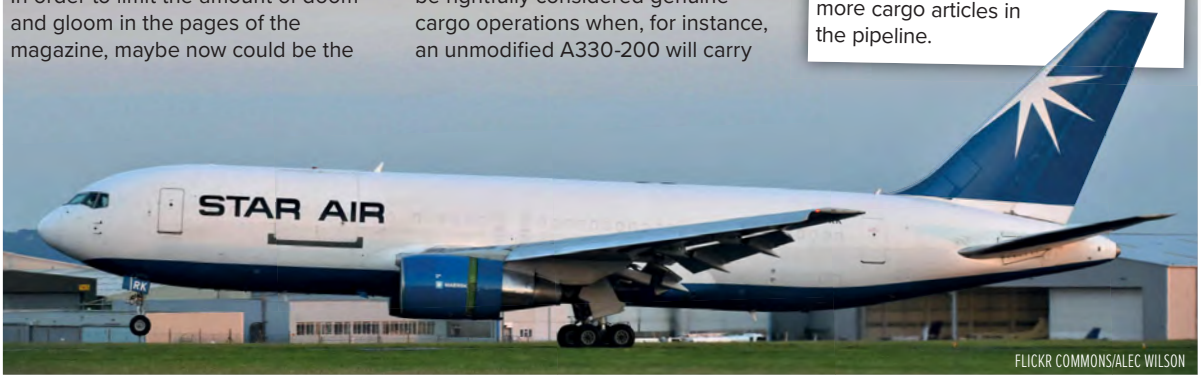
Sea Change for Airlines?

Dear Editor,
I have purchased and subscribed to *Airliner World* since the first edition was published, I would like to congratulate the team for providing an excellent editorial which, although not involved in the airline industry, I thoroughly enjoy as someone interested in aviation since a young age.
I read with interest your article in the July 2020 issue of the magazine: *'Two Thirds of Travellers Won't Fly with Quarantine Rules'.*
IATA has stated that 69% of travellers would not consider flying if it involved 14 days' quarantine.
As someone who has travelled long-haul and short-haul for many years on holidays and endured the sardine-like seating on aircraft, I believe that it is time both aircraft manufacturers and airlines need to reconsider the seating configuration on the aircraft and number of passengers carried in economy class.
To reach the UK, COVID-19 was transported on a ship or aircraft. Cruise lines are reducing the number of passengers on the ships and other safety measures to encompass social distancing. Is there any reason why this cannot be done on the aircraft?
Passengers need to be convinced that travelling in an aircraft can be COVID-19 safe as much as possible, not stressful, and not to be subject to quarantine upon arrival.
I understand this would have other consequences, but I don't think passengers wearing a mask on a flight in a confined area is the long-term solution to help stop the spread of the virus.
Colin Booth

Extra Capacity for **Cargo?**

Dear Editor,
Thank you for another superb issue of the magazine. Understandably, in these difficult times for commercial aviation, both the news section and feature articles can make for slightly depressing reading, with a near-constant stream of airline failures and associated layoffs for the worst affected, and temporary (but forced) unpaid leave for the 'luckier' ones.
While long-haul flying in particular is a case in point, intra-regional short-haul and a lot of domestic flying seems to show resilience as of late, especially in Europe.
In order to limit the amount of doom and gloom in the pages of the magazine, maybe now could be the time to highlight a sector which has, by and large, done fairly well during the pandemic, and has literally proved a lifeline for many: air cargo.
Indeed, when most short- and long-haul passenger flights where grounded, a large amount of belly freight which *had* to travel found its way on full freighters and as a result, freight rates increased substantially.
As such, many passenger airlines started freight operations using passenger aircraft, sometimes carried (as shown in *Airliner World*) in the passenger cabin. However, for the 'freight dogs' among us, these cannot be rightfully considered genuine cargo operations when, for instance, an unmodified A330-200 will carry around 26 tonnes of freight versus 60 tonnes for the A330-200F full-freighter version.
JP Rokacz

Ed: We've been trying really hard to keep a mixture of historical and more upbeat features, alongside those covering the ongoing challenges in the industry. It would be remiss of us to overlook the biggest crisis the sector has ever faced, but I agree it is all about striking a balance. I hope you enjoyed our recent interviews with Emirates SkyCargo and Pilot Eva who flies 747Fs? Rest assured we've more cargo articles in the pipeline.



FLICKR COMMONS/ALEC WILSON

More of **the Sim?**

Dear Editor,
As an avid flight simmer I used to enjoy the small section on a new flight sim release that would pop up and would like to suggest a small feature on the upcoming Flight Simulator 2020 which promises to be a game changer with regards to computer-based flight simulation.
I think this could be a good article especially at a time when people are being encouraged to stay at home, depending on where they are in the world.
Scott Griffiths

Ed: Thanks for the feedback Scott. We know from our colleagues on *PC Pilot* magazine that the new release is hotly anticipated.
While we aren't able to dedicate a regular page to flight sim news, I'm delighted to confirm that our very own Thomas Haynes will have a review of Flight Simulator 2020 in the next edition of *Airliner World*.

Back to the **Balkans**

Dear Editor,
Balkan Bulgarian Airlines was – if I say rightly – once the ninth largest carrier in Europe in the late 1970s.
I personally believe it would be very interesting to have an article about the fall and demise of the company.
I hope you and your team can take the idea into consideration as I am sure it would be a very good read!
Ivan Brosnan

Ed: I agree we're long overdue a retrospective on this fascinating carrier. I'll put some feelers out and see what we can do. If any readers have stories, memorabilia, or other interest in Balkan Bulgarian, we'd love to hear from you via **airlinerworld@keypublishing.com.**

FLICKR COMMONS/AERO ICARUS

Reports and details of recent incidents.

Take-off Close Call due to Performance Miscalculation

An easyJet Airbus A320ceo almost suffered a runway excursion on departure from Lisbon/Portela after its crew miscalculated the aircraft's take-off performance, the UK's Air Accidents Investigation Branch (AAIB) has learned. In preparing to return to Manchester Airport, the pilots believed they had selected the shortest runway length available to them in their calculations but had in fact used the full length of the runway.

The airliner, G-EZWE (c/n 5289), was cleared for departure from taxiway U5. While this was not the shortest amount of runway available to the crew, it was 4,577ft shorter than the full length of Runway 21. The aircraft became airborne with just 361ft of runway remaining. The crew did not recognise that the take-off performance calculation was incorrect until a late stage in the take-off run, reflecting previous AAIB investigations into incidents of this nature.

The Farnborough, Hampshire-based industry organisation stated that "humans are not physiologically adapted to identify different acceleration rates, and often do not realise something is wrong until the end of the runway comes into view".

The AAIB advised in its finding that "during pre-flight preparations both flight deck crew members were subjected to numerous interruptions. These included details of a sick passenger at the back of the aircraft, a change in fuel requirements, a mix-up over passengers released from the terminal and a late change to the loading figures".

The crew's electronic flight bag (EFB) – a tablet computer used for flight planning and to provide aeronautical information – was also an issue for the crew. The captain had no access to the EFB once the aircraft began taxiing due to an inoperative cradle – used to hold the EFB. The device's battery condition had also deteriorated to an extent that the EFB was not useable for long without being charged by the cradle. Owing to this, the United Kingdom's Civil Aviation Authority has chosen to revise its EFB compliance checklist to emphasise the requirement for a periodic battery replacement programme.

In its report, the AAIB detailed that easyJet "had two similar incidents at Lisbon which occurred within 14 days of each other earlier in 2019". It noted that "in all three cases the pilots were confused by the EFB intersection selections as they did not use the actual taxiway names".

The report continued: "As a result of these incidents the aircraft operator took action to try and prevent a further occurrence, including issuing a notice to crews, as part of the NOTAMs [notices to airmen] for Lisbon, to clarify the available take-off points on Runway 21. They issued a full description of the events to all crew to raise awareness of the risks of using the wrong intersection and distance for take-off." The investigative branch also stated that the carrier had "began work with the electronic flight bag data supplier to change the nomenclature of the take-off points for Runway 21 in the performance software".

EasyJet has since moved to electronic flight bag software for performance calculations which gives a pictorial representation of the runway.

Following the two earlier incidents, ANA Aeroportos de Portugal, which operates Lisbon Airport, re-designated seven taxiways in December 2019 to eliminate this issue. In January, the AAIB recommended that the operator discontinues the use of take-off positions at the site to minimise confusion.

(Photo Flickr Commons/Manfred M.)

DATE	REG'N	C/N	TYPE	OPERATOR	FATALITIES	LOCATION	NOTES
Jul 17	C-FSKQ	BB-99	Beechcraft King Air 200	Skyjet Aviation	0	Canada	Landing gear collapse
Jul 19	RA-71276	1G207-47	Antonov An-2	Phoenix	-	Russia	Missing
Jul 22	ET-ARH	42031	Boeing 777F	Ethiopian Airlines	0	China	Fire in cargo hold while on turnaround
July 22	N425BJ	RJ-25	Beechcraft Beechjet 400A	N425BJ LLC	0	United States	Landing gear failed to extend
Jul 25	XA-FTG	208B2311	Cessna 208B Grand Caravan	AX Transporter	0	Mexico	Runway excursion
Aug 3	RA-74044	36547097936	Antonov An-72	UTair Cargo	0	Mali	Runway excursion
Aug 7	VT-AXH	36323	Boeing 737-800	Air India Express	19	India	Runway excursion
Aug 13	9S-GEN	892325	Aircraft Industries (Let) L-410	Doren Air Cargo	4	Democratic Republic of Congo	Crashed en route

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France's first foray into manufacturing jet airliners, the Sud Aviation SE.210 Caravelle, may not have been a resounding commercial success, but that didn't stop it from blazing a trail in the aviation world, as **Stephen Skinner** details

SAS Scandinavian Airlines operated 29 examples of the Toulouse-built twinjet VIA AUTHOR

The Caravelle established the French aircraft industry as a major force in airliner manufacturing. It was France's first turbine-powered production aircraft and the first jet-powered short- to medium-haul airliner. The jet's strong performance sparked collaboration between its manufacturer and other European aviation industries – first on Concorde and then with Airbus, now one of the two predominant airliner manufacturers in the world.

The French government regarded aviation as a symbol of national prestige and its commercial aviation department drew up a specification in October 1951 for a 55 to 65-seat jet airliner for sectors of up to 1,250 miles. A design competition drew 40 entries from seven French aircraft companies, but was narrowed down to a twin-jet design from state-owned SNCASO (Société Nationale de Constructions Aéronautiques du Sud-Ouest) and a tri-jet design by SNCASE (Société Nationale de Constructions Aéronautiques du Sud-Est) both using Snecma Atar turbojets.

The commercial aviation department chose a version of the Sud-Est design but equipped with more powerful and fuel-efficient Rolls-Royce Avons. In 1956, Sud-Est Aviation merged with Sud-Ouest Aviation to form Sud Aviation.

In January 1952, the commercial aviation department ordered two prototypes and two test specimens. During that year, Sud salesmen visited major European and Latin American airlines who responded positively to the aircraft.

Technical Description

The Caravelle was an innovative design with its twin Rolls-Royce Avons mounted on the rear fuselage. This arrangement meant that in the event of engine failure there was low asymmetric thrust, engine noise was at the rear and a clean wing was ideal for high-lift devices. Having only two engines when four were the norm for airliners was another innovation. The fuselage was wide enough for comfortable five-abreast seating with large pear-shaped passenger windows. However, the circular fuselage was too narrow to provide sufficient space for belly cargo. »

As an added convenience, ventral airstairs were mounted in the tail. The first prototype possessed a large main deck freight door, but this was only replicated on the six late-build SE.210 11Rs. All production Caravelles, up to and including the 10R, had a fuselage of 105ft, 18in longer than the two prototypes, F-WHHH (c/n 01) and F-WHHI (c/n 02).

The 112ft 6in wing was swept back 20° and flaps covered 60% of its trailing edge. The first prototype had drooped leading edges, but these were deleted from subsequent aircraft and replaced by a fixed leading edge to save weight. There were airbrakes similar to those found on the de Havilland Comet – the first commercial aircraft to have them. The Caravelle had a swept cruciform tail and, unusually, an optional braking parachute in the tail cone. The latter was a convenient facility as the early Avons did not have thrust reversers and it shortened the aircraft's landing run by 500ft on a dry runway.

The two prototypes were powered by Rolls-Royce Avon 521 engines with 10,000lb thrust while the first 33 production aircraft designated as Caravelle Is received the more powerful Avon 522, offering an additional 500lb thrust. However, the 19th SE.210 built, F-WJAQ (c/n 167), which flew on December 30, 1959, was the first Caravelle III fitted with Avon 527s with 11,400lb thrust. The series III became the standard model, 80 examples were produced while all bar one SE.210 Is were brought up to Caravelle III standard, receiving the more powerful engine.

The twin nosewheel undercarriage retracted forwards, the four-wheel bogie main units retracting into the wing centre-section. Initially, Sud Aviation viewed the Caravelle as complementing the de Havilland Comet, so it adopted its nose design, cockpit layout and fully powered hydraulic controls. So much so that the noses of the first two prototypes were manufactured by de Havilland. Subsequently, Sud paid de Havilland a royalty to use the nose style. The SE.210 was designed for operation by twin flight crew, though most airlines' unions insisted on three.

Sud had regarded the Comet as the benchmark, but fortunately their designers did not slavishly follow de Havilland's construction practices and used thicker fuselage skins and greater structural reinforcement. Because of this, there was no reason for Sud Aviation to redesign the twinjet as de Havilland had to with the Comet after the British type suffered several crashes in 1953 and 1954.

First Flight

The first prototype, F-WHHH, was rolled out at Toulouse/Blagnac on April 21, 1955 and made its maiden flight five weeks later, on May 27.

Despite some initial problems with flap lowering, it soon made more flights and its first appearance at that year's Paris Air Show. The jet then embarked on an intensive flight test programme to study the detailed characteristics of the aircraft. Included in these tests were general handling and more than 100 stalls were carried out in every configuration, with the aircraft always recovering safely.

Other tests included measuring engine out performance, cruise, payload/range assessments, landing and take-off distance measurements, icing at altitude and parachute deployment.

On November 16, 1955 Air France ordered 12 Caravelles and options on a dozen more were taken out in the following year. Despite these orders, no more came until 18 months later – which was surprising, as it had no jet competition.

The type received its certificate of airworthiness on May 23, 1956, but the authorities required 1,500 hours of route-proving before the aircraft could enter service. Freshly repainted in Air France colours, F-WHHH engaged in many demonstration flights to potential customers and made the first visit of the type to the UK in July 1956, when it flew to Rolls-Royce's Hucknall airfield to collect an Avon engine.

The second prototype F-WHHI flew on May 6, 1956 and immediately joined the first machine on the test programme. On April 18, 1958 it set out on a 67-day sales tour, first to South America then criss-crossing the USA, becoming the first production jet airliner to land at New York/Idlewild (now JFK). Both the Comet and Boeing 707 were banned at the time - being deemed too noisy.

Disappointingly, Sud earned no immediate orders from its extensive American tour, but in July 1958 SAS Scandinavian Airlines ordered six aircraft and Air France firmed up its 12 options to double its commitment to 24 Caravelles. Orders then swept in from Brazil's VARIG, Finnair, Air Algerie and Royal Air Maroc.

The flight deck of Le Club Caravelle's former SAS Scandinavian Airlines SE.210 III, SE-DAI (c/n 210), which is preserved at Stockholm Arlanda Airport
AIRTEAMIMAGES.COM/EUROPIX

The Sud Aviation SE.210 Caravelle made its first flight on May 27, 1955. Prototype, F-BHHH (c/n 1), made its last flight in 1966 and was placed on display at Paris/Orly later the same year. It was scrapped on site in 1986
VIA AUTHOR

By the end of 1958, Sud Aviation had 49 orders plus 18 options. With these commitments, plans were set in motion to build 75 aircraft reaching a rate of four per month by April 1960.

Air France Service

Air France, the country's state-owned carrier, pressed its indigenously built airliners into service on May 6, 1959. It departed Paris/Orly for Rome/Ciampino before continuing onto Athens and finally Istanbul. Previously, these services had been operated by 68-seat Lockheed Constellations.

The Caravelles were configured with 20 four-abreast first-class seats and 55 five-abreast tourist seats. Other routes quickly followed, including a daily Paris-London-Nice-London-Paris schedule. They proved extremely popular and suffered fewer technical delays than earlier aircraft in its fleet.

By the end of 1960, Air France was in possession of all 24 jets from its initial order and had also introduced its Boeing 707s into service.

This modern jet fleet gave the carrier a substantial and then unrivalled »

LTU was the only German airline to purchase the Blagnac-built type new from the manufacturer. Many of the Dusseldorf-based carrier's aircraft were later acquired by SAT (later Germania) and were eventually permanently withdrawn
AIRTEAMIMAGES.COM/ WOLFGANG MENDORF

Special Air Transport, which later became Germania, flew several former-LTU jets in this striking yellow and green livery
AIRTEAMIMAGES.COM/ WOLFGANG MENDORF

competitive edge and it continued to grow its SE.210 fleet.

Until the reunification of Germany in 1990 only British, French or US airlines could fly German internal services into West Berlin. However, deploying the Caravelle on links to the West German capital proved challenging: the jets were unable to operate from Tempelhof – the most convenient of the city's airports – owing to its short runways, and had to use Tegel which was poorly placed. Pan Am introduced 727s on the Frankfurt-West Berlin route in 1966, and Air France's passenger share dropped to 4%. In 1969, Air France arranged a shared operation with British European Airways (BEA) using its BAC One-Eleven 500s.

The carrier's Caravelle fleet peaked in mid-1967 when 41 examples flew almost half of all the airline's routes linking Paris to 56 destinations. Air France had a financial interest in Air Inter – the semi-public French domestic airline – and in the airlines of former French colonies, such as Royal Air Maroc, Tunisair and Air Algerie. All became early Caravelle operators with Air Algerie flying seven SE.210s between 1959 and 1976.

On May 19, 1960 one of the North African carrier's examples, F-OBNI, (c/n 28), was descending through 2,000ft on approach to Paris/Orly when a Stampe-Vertongen SV.4 biplane was in collision with it, tearing a 33ft gash in F-OBNI's roof, killing one passenger and injuring others.

Both Avons failed owing to debris ingestion, but were quickly restarted and the crew managed to land safely, a tribute to the aircraft's structural integrity.

European Operators

In 1956, BEA ordered 135-seat Vickers Vanguards as it intended to continue with turboprops on European links, but with the increasing competition from the Caravelle in Europe in mid-1957 it ordered 14 Comet 4Bs with their four Avons and 99-seat capacity.

The quad-jet entered service in April 1960, although many industry experts believed the twin-Avon Caravelles would have been cheaper to operate. In March 1957, BEA had requested a quote and draft contract from Sud Aviation for ten SE.210s for delivery between December 1960 and mid-1961. However, in July 1959, BEA informed Sud that it would not be progressing with the purchase and ordered rear-engined Hawker Siddeley HS.121 Tridents, which entered service in 1964.

SAS, the second customer for the type, became the one of the largest Caravelle operators with a total of 29 aircraft, though eight were leased to Swissair.

An initial order for six was marked by Sud repainting F-WHHH in SAS livery, in which it appeared at the 1959 Paris Air Show.

Air France gave up six manufacture line positions to expedite deliveries so the third and fourth production SE.210s were delivered to SAS in April 1959, with services beginning the following month. By that summer, the jets were serving 22 cities in 17 countries with the remaining four

Three Spanish airlines operated the type. This example, EC-BRJ (c/n 250), was used by Transeuropa Compañía de Aviación between 1970 and 1980
AIRTEAMIMAGES.COM/ CARL FORD

Tunis Air was one of four North African airlines to operate the type
KEN FIELDING

Kingdom of Libya Airlines operated three Caravelle 6Rs including 5A-DAE (c/n 221), pictured on turnaround at Tripoli in March 1969. The carrier was renamed Libyan Arab Airlines following the Colonel Muammar Gaddafi-led coup of September 1969.
KEN FIELDING

aircraft from the initial order arriving by the end of the year.

The carrier had originally intended to keep its Caravelles until 1979-80, but in 1966 SAS ordered 99-107-seat Douglas DC-9-40s and the final flight of the Toulouse-built type with the airline was on September 27, 1974.

Two SAS jets, SE-DAG (c/n 172) and SE-DAI (c/n 210), joined the Swedish Air Force and became 85172/17 and 85210/21, respectively. They were heavily modified with numerous aerials and sensors to take over signals intelligence (SIGINT) and electronic intelligence (ELINT) roles from an English Electric Canberra and a Vickers Varsity. They remained in service until 1998.

Swissair's Caravelles were technically identical to SAS except they had twin-crew flightdecks.

The type was inducted on May 21, 1960 with a flight from Zurich to London and the fleet soon grew to eight. In 1964, Douglas DC-9-15s were ordered to replace the Caravelles, which were phased out in March 1971.

Finnair was also an early adopter of the Caravelle and the company's series III jets were fitted with braking parachutes as standard as the variant lacked thrust reversers. Satisfied with the Blagnac-built trijets, Finnair later committed to the series VI and the Pratt & Whitney JT8D-powered Super Caravelle 10B3.

Enthusiasm for the French-built type soon grew as it was regarded as stylish and proved faster than turboprops and piston-engined types operated by many airlines. VARIG was the Caravelle's third customer. Scheduled routes began on December 19, 1959 replacing a Lockheed Super Constellation on its flagship Porto Alegre-São Paulo-Rio de Janeiro-Port of Spain-Nassau-New York route in a 48-seat all first-class layout. In acquiring the type, the Brazilian flag carrier became the first operator of a medium-range jet airliner in the Western Hemisphere.

As the airline was operating the jet over large stretches of water and uninhabited areas where there are few navigational aids, VARIG had five flight crew on some routes, with a radio operator and navigator in addition to the pilots and flight engineer.

The Caravelles served with the Rio-based airline for just three years and were, surprisingly, replaced by turboprop Lockheed L-188 Electras.

The Caravelle 6N and 6R

In 1959, Sud announced the Caravelle VI N powered by the uprated Avon 529, which offered 12,125lb of thrust. This gave the variant an increased maximum take-off weight (MTOW) of 103,615lb and payload of 16,755lb »

or 80 passengers with baggage. Sud re-engined the Caravelle III prototype, F-WJAQ (c/n 167), with the higher-powered jets and it flew as the Caravelle VI N prototype on September 10, 1960.

Orders soon followed and Sabena Belgian World Airlines became the ninth customer for the airliner, purchasing four with options to double that number in December 1959. The first two were handed over on February 8, 1961 with options for two more exercised. By the summer of '61, Sabena Caravelles were connecting Brussels with 22 destinations having replaced Douglas DC-6s. More orders came from Alitalia, which had four SE.210 IIIs converted to VI Ns, and received 17 newly built examples. Other VI N operators were Aerolineas Argentinas, Jugoslav Air Transport, Lebanon's Middle East Airlines and India Airways.

TOP • ***The final Caravelle variant – the 12 – was designed for the charter market. Its fuselage was lengthened by 10ft 9in, enabling it to carry up to 140 passengers over a reduced range***
AIRTEAMIMAGES.COM/CAZ

ABOVE RIGHT • ***A Royal Air Maroc example arrives on stand at Paris/Orly in June 1963***
MELVYN MORLEY

ABOVE LEFT • ***The Caravelle was popular with Taiwanese carriers, finding use with Far Eastern Air Transport and China Airlines***
AIRTEAMIMAGES.COM/THE SAMBA COLLECTION

To promote the Caravelle in North America, Sud entered into an agreement with Douglas Aircraft.

It would become the sales agent in the Western Hemisphere and, if sales developed, licence production by Douglas could take place at Long Beach, California.

Partly because of this agreement United Airlines – one of the then 'Big Four' US carriers – ordered 20 Caravelle VI Rs in February 1960.

The Chicago-based carrier insisted on major improvements to the aircraft and the VI R was the result. It had Avon 531s with thrust reversers, a complete redesign and widening of the flight deck side and front windows, lift dumpers were fitted, the brakes improved and the tail parachute was removed.

The VI R proved to be the second most popular version after the series III and 56 examples were built, four more than the VI N.

The prototype VI R, registered F-WJAP (c/n 62), first flew on February 6, 1961. N1001U (c/n 86), the first VI R for United Airlines, entered service on July 14 that year, flying between New York/Idlewild and Chicago/O'Hare. The Caravelle proved exceedingly popular with the airline's passengers, but United had really ordered the aircraft as a stopgap before receiving Boeing 727s and did not exercise any of the 20 options it held.

Additional carriers' orders soon flowed in for the VI R: first from Iberia, which eventually operated 13 and later received Caravelle 10s. Iberia's passengers had previously flown on DC-4s and Convair Metropolitans so they were really impressed with the new aircraft. In Latin America, Panair do Brasil, Cruzeiro do Sul and LAN Chile all became customers, while in Europe, Austrian Airlines, TAP Air Portugal and Luxair boasted modest fleets, as did Libyan Arab Airlines.

A further development in the efforts of Sud to penetrate the US market in co-operation with Douglas was the series VII. A Caravelle III, N420GE (c/n 42), was re-engined with two 16,095lb thrust General Electric CJ805-23Cs – which powered the Convair CV-880 and CV-990 Coronado – and flew as a testbed at Edwards AFB, California, on December 29, 1960. TWA's order for 20 Caravelle 10As – rooted in the series VII, fell through as airlines were looking for later designs such as the Boeing 727 and the BAC One-Eleven. The tie-up with Douglas achieved little and expired at the end of 1961. The Caravelle testbed was sold back to Sud and reverted to its original configuration.

Air Inter operated nine examples of the Caravelle 12, including the last of the type to be produced
KEN FIELDING

Aero Lloyd was one of three German carriers to deploy the Toulouse/Blagnac built type. The others being Special Air Transport – later Germania – and LTU
AIRTEAMIMAGES.COM/ RALF MEYERMANN

Super Caravelles

Sud Aviation persevered to maintain the potential of the aircraft in a strongly competitive market, but could not increase the fuselage diameter so that it could accommodate six abreast or make it fly faster. The Super Caravelle came in four versions: the 10 B3, 10R, 11R and the 12.

The 10 B3 was powered by Pratt & Whitney JT8Ds and fitted with an auxiliary power unit (APU). The fuselage was lengthened 4ft 7in to provide room for 105 passengers and the window line was raised 4in It also had wing root leading-edge extensions and flap refinements. »

The installation of the new engine and thrust reversers caused many problems and delayed service entry with launch customer, Finnair – an established operator of earlier variants. Deliveries of its eight Caravelle 10s began in August 1963, replacing its series IIIs.

Just 14 other SE.210 10 B3s were built and flew with France's Union de Transports Aériens (UTA) and Syrian Arab Airlines. The latter carrier operated the type for almost 29 years – longer than any other airline.

The next two versions of the Super Caravelle were the 10 R and the 11 R employing the standard-length airframe with 14,000lb thrust Pratt & Whitney JT8Ds and certain elements of the B3 version, giving them an impressive power-to-weight ratio. Customers for the 20 Caravelle 10 Rs produced were Alia (later Royal Jordanian Airlines), Spain's Aviaco and Iberia, Düsseldorf-based LTU, SATA Air Azores and UTA, which added two 10 Rs to its sole B3. The first prototype, F-WHHH, had been fitted with a main deck cargo door and the concept was reinstated on the 11R, a version of 10R featuring the cargo door. Ironically for an aircraft designed in the early 1950s for mixed-traffic operations, the 11R failed to find a market and only six were built. Its customers were Air Afrique, Air Congo and Spanish charter carrier Transeuropa Compañía de Aviación.

Just a dozen Caravelle 12s – the final iteration of the design – were built. Delivered to France's Air Inter and Danish charter outfit Sterling Airlines, the series 12 had its fuselage lengthened by 10ft 9in by the insertion of two plugs, fore and aft of the wing offering all-tourist accommodation for 128 passengers and uprated JT8Ds producing 14,500lb thrust. The last example was delivered to Air Inter on April 7, 1973. Unfortunately, Sud Aviation needed to sell at least 15 Caravelle 12s to defray development costs, so lost money on this final offering. Sterling became the second largest operator of the SE.210 with a total of 34 flying for the Copenhagen-based airline, though its active fleet only ever peaked at 25, some of which had previously flown with United Airlines. While the Danish carrier predominantly offered links to destinations in Europe and further afield, it also employed its last three Caravelle 10 B3s – which had additional fuel tankage – on 50 transatlantic charters between 1970 and 1971.

Secondhand Market

Naturally as Caravelles became surplus to the requirements of first-tier airlines, they were sold on to other operators and in Africa several became presidential transports. One example became an engine testbed for SNECMA while another was jointly operated by France's Direction générale de l'armement and Centre national d'études spatiales (the country's national centre for space studies) for parabolic microgravity flying. For these trials, the former Luxair jet, 234/CQ (c/n 234), entered a 50° climb at 25,000ft and then at 29,000ft nosed down 50° creating zero gravity conditions for 20-25 seconds, giving those on board a brief experience of weightlessness. The last SE.210 in commercial service, a series 10 B3 registered 9Q-CPI (c/n 169), was withdrawn from use in July 2005 having flown for Waltair in the Democratic Republic of Congo. Further developments of the Caravelle

Sabena Belgian World Airlines was the first airline to place the Caravelle VIN into service, doing so in January 1961
AIRTEAMIMAGES.COM/THE SAMBA COLLECTION

A Societa Aerea Mediterranea (SAM) Caravelle VIN heads a line-up of Caledonian Airways and British United Airways (BUA) BAC One-Elevens and a BUA Vickers VC10 at Gatwick in June 1972
AIRTEAMIMAGES.COM/ CAZ CASWELL

Syrian Arab Airlines operated the type for almost 29 years – longer than any other carrier
AIRTEAMIMAGES.COM/ CARL FORD

Danish carrier Sterling Airways used the Caravelle 10 B3's increased fuel load to offer transatlantic charters in 1970-71
AIRTEAMIMAGES.COM/ RALF MEYERMANN

Corse Air Caravelle VIN, F-BVSF (c/n 241), is flanked by a Britannia Airways Boeing 737-200 while on turnaround in the cul-de-sac at Manchester Airport in May 1982
AIRTEAMIMAGES.COM/ THE SAMBA COLLECTION

led to a supersonic 'Super Caravelle' and nuclear-powered variant research that metamorphosed into the Anglo-French Aérospatiale/BAC Concorde project.

Sales of the Innovator

Initially derided by some, the Caravelle set a trend with its choice of engine position, soon copied by manufacturers in the USA, UK and the Soviet Union. By European standards, with its two prototypes and 280 production aircraft, it sold well and was taken on by many of the major European airlines. The SE.210 outsold the BAC One-Eleven (244 built) and the Hawker Siddeley Trident (117), if not the BAE 146/Avro RJ (390). It also surpassed the combined 210 sales of the turboprop Vickers Vanguard and the Lockheed Electra.

By the time efforts were made to sell it in the USA in 1959/60, American airlines were considering newer designs, such as the faster Boeing 727 launched in December 1960. The American market is a very tough challenge for foreign airliners and by then airlines expected their aircraft »

to have large underfloor cargo volume which the narrow-fuselage Caravelle did not possess. While the type sold well in its early years when it had the market to itself, later Super Caravelle variants failed to make much of an impact against newer competitors.

Had Sud managed to cut the 47 months it took to proceed from maiden flight to service entry it would certainly have made more sales.

Caravelles in Preservation

Given the fortunes of other early jet airliners, the Sud Aviation Caravelle has fared incredibly well in retirement. Of the 282 produced between 1955 and 1972, 20 complete examples survive in various states of preservation worldwide. The most notable include Le Caravelle Club's Stockholm/Arlanda-based III, SE-DAI (c/n 210), the sole example that can taxi under its own power, while Musée Aeroscopia recently repainted its Caravelle 12, F-BTOE (c/n 280). It's now on external display at the Toulouse attraction alongside former Air France Concorde F-BVFC (c/n 209) and Airbus Military A400M prototype F-WWMT (c/n 001).

As well as those listed (right), there are several surviving nose and forward fuselage sections, including at the Musée de l'Air et de l'Espace in Paris and the Aviodrome near Lelystad Airport in the Netherlands. AW

CARAVELLE SURVIVORS

Reg'n	Type	C/n	Location
F-BHRA	Caravelle III	01	PS Aero, Baarlo, the Netherlands
F-BHRY	Caravelle III	61	Musée de l'Épopée de l'Industrie et de l'Aéronautique, Albert, France
F-BOHA	Caravelle VII	242	Aéroclub Vauclusien, Avignon/Caumont Airport
F-BTOE	Caravelle 12	280	Musée Aeroscopia, Toulouse/Blagnac, France
F-BYCY	Caravelle VI-N	233	Nuites Insolites, Moyenpay, France
F-GCVK	Caravelle 12	276	Merville/Calonne Airport, France
F-GCVL	Caravelle 12	273	Musée de l'Air et de l'Espace, Le Bourget, France
F-GHMU	Caravelle 10-B3	249	Ailes Anciennes Toulouse
F-ZACE	Caravelle 10-B3	116	Musée Européen de l'Aviation de Chasse, Montélimar, France
F-ZACQ	Caravelle VI-R	234	Conservatoire de l'Air et de l'Espace d'Aquitaine, Bordeaux, France
LN-KLH	Caravelle III	03	Norsk Teknisk Museum, Oslo, Norway
N1001U	Caravelle VI-R	86	Pima Air & Space Museum, Tucson, Arizona
OO-SRA	Caravelle VI-N	64	Musées Royaux d'Art et d'Histoire, Brussels, Belgium
OY-KRD	Caravelle III	47	Danmarks Tekniske Museum, Helsingør, Denmark
SE-DAI	Caravelle III	210	Le Caravelle Club, Stockholm/Arlanda Airport, Sweden
TC-ABA	Caravelle 10R	253	İstanbul Havacılık Müzesi, İstanbul, Turkey
YU-AHB	Caravelle VI-N	135	Muzej Vazduhoplovstva-Beograd, Belgrade, Serbia
851	Caravelle III	172	Flygvapenmuseum, Linköping, Sweden
10506	Caravelle 10-B3	211	Parque Aviacuatico los Manantiales, San Juan Tuxtepec, Mexico
10507	Caravelle 10-B3	232	Parque Aviacuatico los Manantiales, San Juan Tuxtepec, Mexico

Two SAS Scandinavian Airlines examples were later used by the Swedish Air Force on signals intelligence missions. Both have been preserved, at Stockholm/Arlanda and Linköping, respectively
FLICKR COMMONS
JOHNNY COMSTEDT

This Sabena VI-N, OO-SRA (c/n 64), is on display in Brussels
AIRTEAMIMAGES.COM/RUI ALVES

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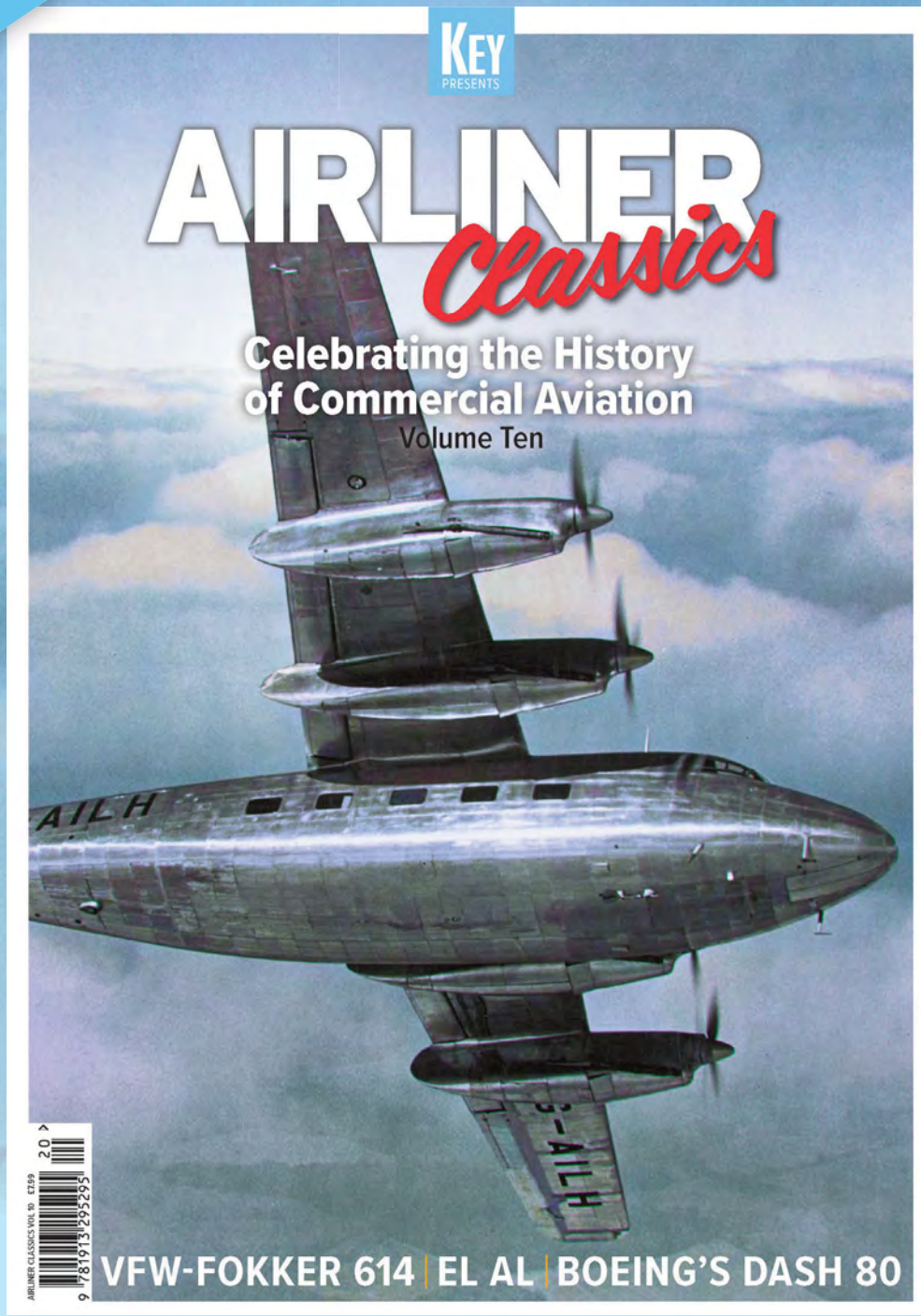

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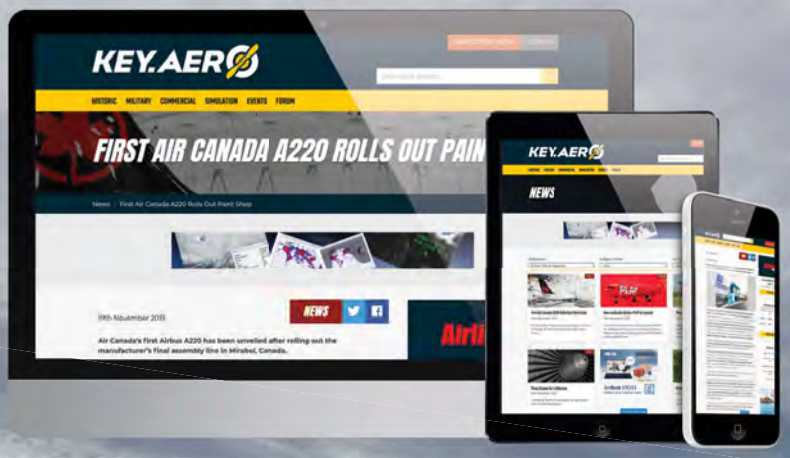

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