

HARRIER TRIBUTE



AVIATION

AVIATION

NEWS

JETS

KEY

THE PAST, PRESENT AND FUTURE OF FLIGHT Incorporating

UK £4.60 | February 2017 | www.aviation-news.co.uk

HARRIER TRIBUTE

- RAF Germany Cold War Ops
- Cherry Point 'Bulldogs'
- UK Harriers - from Land and Sea
- Restoring an Icon

FALCON 8X

Dassault's Flagship Bizjet

FRENCH POSTAL TRANSALLS

Getting the Mail Through

RETURN OF THE 489th BOMB GROUP

B-1B Lancer Reserve Unit

AIR BALTIC'S NEW RECRUIT



First CS300 Customer



The Brooklands Concorde



KEEPING THE CONCORDE DREAM ALIVE

FLY THE CONCORDE SIMULATOR
LUNCH WITH A CONCORDE PILOT
CHAMPAGNE ONBOARD CONCORDE



ENHANCED TECHNICAL TOURS
CONCORDE AFTERNOON TEA
WEDDINGS ON CONCORDE

BROOKLANDS
MUSEUM

Web: www.brooklandsmuseum.com/concorde

Mail: flyconcorde@brooklandsmuseum.com

Tel: +44 (0)1932 857 381 ext. 237

CONTENTS



p62

FEATURES

18 Bombardier CS300 Enters Service

Barry Woods-Turner reports from the handover ceremony of the first CS300, while John Pagni experiences a flight on the new jetliner.

22 Return of the 489th Bomb Group

Scott Dworkin reports on the 489th Bomb Group which flies B-1B Lancers from Dyess AFB.

30 French Postal Transalls – Getting the Mail Through

Frédéric Marsaly lifts the lid on a little-known aspect of the C-160's history.

HARRIER TRIBUTE

36 Harrier GR.3s on the Frontline – RAF Germany Cold War Ops

Air Chief Marshal (Ret'd) Sir Richard Johns recalls his time as OC of 3(F) Sqn to Doug Gordon.

42 Cherry Point's 'Bulldogs'

Tom Kaminski reports on VMA-223 'Bulldogs', a US Marine Corps AV-8B Harrier II squadron.

48 UK Harriers – from Land and Sea

Dr Kevin Wright looks back at the development and operation of the UK's Harriers and Sea Harriers.

58 A Harrier GR.3 Brought Back to Life

Chris Wilson of Jet Art Aviation recalls the rollercoaster of challenges getting an RAF Harrier GR.3 back to ground-running condition.

62 French Fancy

James Ronayne examines Dassault Aviation's Falcon 8X.

66 Luftwaffe Precision Bombing in WW2

Chris Goss describes Luftwaffe precision bombing technology.

80 Emirates Aviation Experience

Spencer Bennett visited this unique London attraction which gives an insight into modern commercial aviation.

p04



p06



p30



p42



Cover photos (main image): An RAF Harrier GR.7 of IV(AC) Sqn. Geoff Lee. Inset (top): A Harrier GR.9 of 1(F) Sqn. Peter Foster. AirBaltic's first Bombardier CS300. Martin Tietz

REGULARS

04 Headlines

06 Civil News

10 Military News

14 Preservation News

70 Flight Bag

71 Register Review

75 Air Base Movements

76 Airport Movements

FREE DVD!

Claim your
FREE
Extreme
Airports or
A-4 Skyhawk
Cockpit DVD
worth £12.49
when you
subscribe to
Aviation News.

See pages 28
and 29 for details.



Copies of Aviation News incorporating Jets can be obtained each month by placing a standing order with your newsagent. In case of difficulty, contact our Circulation Manager. Readers in the USA may place subscriptions by visiting www.aviation-news.co.uk or by calling toll free 800-428-3003 or fax 757-428-6253 or by writing to Aviation News incorporating Jets, 3300 Pacific Ave, Ste 500, Virginia Beach, VA 23451-9828. **POSTMASTER:** Send address changes to Aviation News incorporating Jets, Key Publishing Ltd C/o Mail Right International Inc, 1637 Stelton Road B4 Piscataway NJ 08854. Aviation News incorporating Jets (ISSN: 2047-7198), is published monthly by Key Publishing Ltd, PO Box 100, Stamford, Lincs, PE9 1XQ, UK and distributed in the USA by Mail Right Int., 1637 Stelton Road B4, Piscataway, NJ 08854. Periodicals Postage Paid at Piscataway, NJ and additional mailing offices.

Printed in England by Warners (Midland) plc, Bourne, Lincolnshire. (ISSN 2047-7198). The entire contents of AVIATION NEWS INCORPORATING JETS is a copyright of Key Publishing Ltd, and can not be reproduced in any form without permission.

Boeing T-X Completes Maiden Flight



The Boeing and Saab developed T-X aircraft performed its maiden flight from St Louis, Missouri on December 20.

The aircraft is being developed as an entry into the USAF's T-X contest for the contract to build 350 new Advanced Pilot Training (APT) aircraft.

Boeing's lead T-X test pilot Steven Schmidt and the USAF's Chief Pilot for Air Force Programs Dan Draeger were at the controls for the 55-minute sortie. Both pilots prepared for the flight using the complete Boeing T-X system, which includes ground-based training and simulation.

"I've been a part of this team since the beginning, and it was really exciting to be the first to train and fly," Schmidt said. "The aircraft met all expectations. It's well

The prototype Boeing T-X lifts off from St Louis, Missouri on December 20 at the start of its maiden flight. Boeing

designed and offers superior handling characteristics. The cockpit is intuitive, spacious and adjustable, so everything is within easy reach."

"It was a smooth flight and a successful test mission," Draeger added. "I had a great all-round view throughout the flight from the instructor's seat, which is critical during training."

Boeing and Saab revealed the T-X aircraft in September 2016 and a second aircraft is currently in ground testing and expected to fly in the first quarter of 2017.

It has one General Electric F404 afterburning engine, twin tails, tandem

seating and an advanced cockpit. The aircraft has been designed to compete for the USAF's T-X contract to replace the ageing Northrop T-38 Talon. Initial operating capability is planned for 2024.

Five competitors are currently lined up for the T-X requirement, comprising Boeing-Saab, Lockheed Martin, Northrop Grumman, Raytheon and Sierra Nevada Corporation (SNC). Boeing-Saab, Northrop Grumman and SNC are proposing clean-sheet designs, while the remaining two contenders are derivative designs – Lockheed Martin is offering the T-50A variant of KAI's T-50A Golden Eagle, while Raytheon is using the Leonardo-Alenia Aermacchi M-346 Master as the basis for its T-100 proposal.

Leonardo Flies Prototype M-345 HET

Leonardo-Finmeccanica completed the maiden flight of the prototype Aermacchi M-345HET (High Efficiency Trainer) two-seat basic jet trainer on December 29. The first sortie took place from Venegono Superiore in Varese, Italy with Quirino Bucci and Giacomo Iannelli at the controls.

Speaking at the end of the 30-minute

test flight Mr Bucci, Leonardo Aircraft Division's Project Test Pilot Trainers, said: "The aircraft conducted itself perfectly, meeting the expectations of the design parameters while showing excellent performance. The engine in particular demonstrated a great capacity to react to regime changes, which is a fundamental

characteristic for a basic training aircraft."

The M-345 is based on the company's M-311 and Leonardo says the aircraft will provide a significant reduction in acquisition and life-cycle costs compared with those of powerful turboprop trainer aircraft. The test campaign will be completed within 2017. No photographs have yet been released of the prototype.

Lufthansa's First A350 Delivered

Lufthansa – Airbus' largest airline customer and operator – took delivery of its first A350 XWB when flight 'LH9921' arrived in Munich on December 21.

The aircraft is the first of 25 A350-900s that the carrier has on order and the initial examples will be deployed on long-haul routes from Munich to Delhi and Boston. Ten of the type will be based at Munich.

Powered by Rolls-Royce engines, these A350 XWBs will feature a three-class cabin layout with 48 seats in Business, 21 seats in Premium Economy and 224 seats in Economy. The airliner is equipped with Lufthansa's latest cabin products including new seats, an all-new inflight entertainment experience and, a first for the carrier, inflight connectivity.

Airbus says: "The A350 XWB features



Lufthansa's first A350 wore the French test registration F-WZNC but has since taken up the registration D-AIXA. Airbus

the latest aerodynamic design, carbon fibre fuselage and wings, plus new fuel-efficient Rolls-Royce engines. Together, these latest technologies translate into unrivalled

levels of operational efficiency."

As this issue closed for print, Airbus says it has recorded 810 firm orders for the A350 XWB from 43 customers worldwide.

Production Scorpion Takes to the Air

The first production conforming Textron AirLand Scorpion performed its maiden flight on December 22.

The aircraft took off from McConnell AFB, Wichita, and conducted a range of manoeuvres in the hands of test pilots Don Parker and Dave Sitz during the 102-minute flight.

This latest version of the Scorpion incorporates several improvements based on target customer feedback as well as results from the extensive flight test programme, which has now exceeded 800 hours in both test and real-world operational settings.

Compared with the prototype, this second airframe features new avionics as well as 4° of sweep to the wings, an enhanced aft horizontal stabiliser for improved high-speed performance, a simplified landing gear design, a next-generation Head-Up Display (HUD) and hands-on throttle and stick



The production conforming Scorpion takes off on its maiden flight at McConnell AFB. It will now start a flight-test programme, working closely with the USAF on an airworthiness assessment – the first of its kind – of a non-Department of Defense military aircraft design. Textron

(HOTAS) controls.

Textron also announced Garmin as the avionics provider for the enhanced Scorpion. The avionics fit is based on the advanced G3000 integrated flight deck and is optimised for military operations. The specially configured system features a large,

high-definition display complemented by two high-definition touch-screen controllers, and provides more mission capability in the forward cockpit position, additional navigation capability in the rear cockpit position and overall weight savings for improved performance as a multi-mission aircraft.

USAF Phantom Finale

The USAF's last McDonnell Douglas F-4 Phantom IIs flew their final sorties on December 21, 2016 – concluding a 53-year long career.

The first Phantom II for the USAF entered service in 1963. It was also the only aircraft to be flown by both the USAF Thunderbirds and the US Navy Blue Angels display teams, and it served in the fighter-bomber, reconnaissance and 'Wild Weasel' roles until being retired from operations in 1997.

Even then the Phantom continued to serve, with a large number of surplus aircraft renamed as QF-4s to fly as manned and unmanned aerial targets from both Tyndall AFB, Florida and Holloman AFB, New Mexico. The last unmanned sortie took



A formation of QF-4 Phantoms flies over hundreds of spectators during the QF-4 'Phinal Phlight' event at Holloman AFB. USAF/Master Sgt Matthew McGovern

place from the latter base on August 17 last year.

The F-16 Fighting Falcon, re-designated as the QF-16 in this role, is the successor target aircraft.

To mark the end of the iconic jet's USAF career a special 'Phinal Phlight' event was held at Holloman AFB on December 21. The day included a flypast by the last four

Phantoms, a formal retirement ceremony and a so-called 'pet-the-jet' section where visitors could get up-close to a QF-4.

The QF-4s were operated by the 82nd Aerial Target Squadron part of the 53rd Weapons Evaluation Group, 53rd Wing. It was the unit's Det. 1 at Holloman AFB that had the honour of flying the last examples in service.



A computer-generated image of a Qantas 787-9 with which the airline plans to fly the first non-stop Perth-London service. Qantas

Qantas aims to introduce a non-stop Perth-London service in March 2018. The new sector will be the first ever regular direct scheduled passenger service between Australia and Europe and will use the airline's latest Boeing 787-9 Dreamliner fleet. The first example for the airline will arrive in October this year.

In a statement made in late December Qantas Chief Executive Alan Joyce described the 17-hour, 9,009 mile (14,498km) Perth-London service as a "game-changing route flown by a game-

added: "It's great news for travellers because it will make it easier to get to London. It's great news for Western Australia because it will bring jobs and tourism. And it's great news for the nation, because it will bring us closer to one of our biggest trade partners and sources of visitors."

The services will be flown from Perth Airport's Terminal 3, which is being upgraded to be able to handle international flights. The Government of Western Australia is contributing Au\$14m towards

Qantas Plans Direct Perth-London Dreamliner Service

changing aircraft?" Mr Joyce

the cost of reconfiguring the terminal's customs and border processing facilities.

Currently, Qantas operates daily Airbus A380 flights from both Melbourne and Sydney to London via Dubai. Qantas hopes that passengers from across Australia will fly domestically to Perth to connect to the new non-stop London service.

The distance involved is at the extreme of the Dreamliner's range so at certain times of the year the prevailing winds will mean the aircraft cannot carry a full load of passengers but the airline is confident the economics will make the sector viable. Tickets will go on sale from April 2017.

Caribbean Simplicity



Air Caraïbes Simply ATR 72-600, F-WWEV (c/n 1384), on a pre-delivery test flight at the manufacturer's Toulouse facility. The aircraft is the first for the new regional offshoot. Eurospot

Kazakhstan Off EU Blacklist

The European Commission (EC) has removed Kazakhstan from a blacklist that had previously banned airlines registered there from operating services to Europe.

Kazakhstani operators have been unable to fly to Europe since a blanket ban was imposed by the EC in 2009 after it found failings with the country's aviation authorities. The sole exception was flag carrier Air Astana, which was allowed

to continue flights albeit with partial restrictions (although these were lifted in December 2015).

Speaking on December 8, European Commissioner for Transport Violeta Bulc said: "The EU Air Safety List is one of our main instruments to continuously offer the highest level of air safety to Europeans. I am particularly glad that after years of work and European technical assistance,

we are today able to clear all Kazakh air carriers. This is also a positive signal for all the countries that remain on the list. It shows that work and co-operation pay off."

The latest revision of the list prohibits a total of 193 carriers from flying in EU skies, 190 of which are subject to blanket bans due to a lack of oversight by the aviation authorities of their respective nations.

E175 E2 Certification Deferred

Embraer has deferred its projected certification and entry-into-service date for the E175 E2 airliner from 2020 to 2021. In a statement the company said this was partly based on the continued interest in its current-generation aircraft, particularly from the North American market. Embraer also said its decision reflects negotiations between US airlines and pilot unions to keep the scope clause in labour contracts that restricts aircraft heavier than 86,000lb (39,009kg) and with more than 76 seats from being flown on regional routes. This may be reviewed in 2019.

The manufacturer confirmed its other E2 variants, the E190 E2 and E195 E2, remain on schedule with service entry expected in the first half of 2018 and 2019 respectively.

First Air France Dreamliner Delivered



Air France received its first Boeing 787 Dreamliner (F-HBRA) at its Paris/Charles de Gaulle (CDG) base on December 2. The airframe is the 50th example to be delivered to Dutch lessor AerCap, from which Air France is leasing the jet.

Jean-Marc Janailiac, CEO of parent Air France-KLM, commented: "It is with great pride and honour that Air France is taking delivery of its first Boeing 787, the ninth for the group. As our first e-enabled aircraft, the Dreamliner marks a new stage in the modernisation of our fleet. It will offer our customers the best of Air France's products and services."

The first Air France Boeing 787-9 Dreamliner departs Everett, Washington at the start of its ferry flight to Paris. Boeing

The group has total commitments for 25 Dreamliners, comprising 18 787-9s and seven of the longer -10s. A further 12 examples will be supplied by AerCap, which is the biggest customer for the type with 83 examples either in service or on order.

The aircraft made its debut on Air France's Charles de Gaulle to Cairo service on January 9 following several weeks of crew training and two days of special "welcome flights" around the French capital.

Merger Gets Approval

The proposed merger between Alaska Airlines and Virgin America has now been approved by the Antitrust Division of the US Department of Justice (DOJ). The clearance comes on condition that Alaska implements "limited" changes to its codeshare agreement with American Airlines – but the airline is not required to divest any assets.

Brad Tilden, Alaska Air Group Chairman and CEO, said: "We're thrilled to bring these two companies together and start delivering our low fares and great service to an even larger group of customers."

In a statement following the approval on December 6, 2016, the airline's parent, Alaska Air Group, plans to close the



This 737-900ER was painted in a mixed Alaska Airlines/Virgin America scheme. Alaska Airlines

transaction "in the very near future, taking into account the lawsuit filed by private plaintiffs in US District Court in San

Francisco". It says the plaintiffs' claims are without merit and plans to defend its Virgin America acquisition accordingly.

Iran Air Orders Both Boeing and Airbus

As part of its fleet modernisation programme Iran Air has reached agreements with both Airbus and Boeing to buy 180 new airliners.

The Tehran-based carrier has signed a contract for 50 Boeing 737 MAX 8s, 15 Boeing 777-300ERs and 15 Boeing 777-9s, valued at \$16.6bn at list prices. A memorandum of agreement (MOA) was

signed in June 2016 but the sale was only recently approved by the US Government.

On December 22 the airline also confirmed an order for 100 Airbus airliners, which had originally been proposed in January 2016. Deliveries will begin early this year after US Government Office of Foreign Assets Control (OFAC) export

licences were granted in September and November 2016.

The agreement, signed by Farhad Parvaresh, Iran Air Chairman and CEO and Fabrice Brégier, Airbus President and CEO, covers 46 Airbus A320 Family, 38 Airbus A330 Family and 16 Airbus A350 XWB aircraft.



IrAero Superjet

According to Swiss airline intelligence provider *ch-aviation*, Irkutsk-based IrAero has reached an agreement to take four Sukhoi Superjet 100s (SSJ100) on lease from Russia's State Transport Leasing Company (GTLK). These are in addition to the four SSJ100s already in service with the carrier and the first is due for delivery during the first quarter of this year.

Alexander Mishin/Transport-Photo Images

Firefighting Buffalo

Well-known Canadian carrier Buffalo Airways has been awarded a five-year contract by the Government of the Northwest Territories (GNWT) to operate and maintain its new Air Tractor AT-802A Fire Boss amphibious water bomber fleet.

The Northwest Territories is replacing its four Canadair CL-215 waterbombers with eight Fire Boss aircraft, which will be operational for the 2017 wildland fire season.

The new contract covers the 2017/2018 to 2020/2021 wildland fire seasons with an option to extend it for an additional five years. Yellowknife-based Buffalo was one of three companies to submit proposals for the contract, which also covers the supply and operation of 'Bird Dog' aircraft, pilots and engineers for the Fire Boss fleet.

Transatlantic Approval for NAI

Ireland-based Norwegian Air International's (NAI's) foreign air carrier permit has been approved by the US Department of Transportation (DOT), paving the way for it to begin transatlantic services. The decision, announced on December 2, comes six months after tentative approval from the authority, and more than three years after NAI originally applied for the permit. The DOT

attributed the delay to concerns raised by rival US carriers. Writing in its final order, the authority said: "Regardless of our appreciation of the public policy arguments raised by opponents, we have been advised that the law and our bilateral obligations leave us no avenue to reject this application."

Norwegian CEO Bjørn Kjos said: "We welcome the long-overdue news

that [NAI] has finally been awarded a foreign air carrier permit by the US DOT. The decision paves the way for greater competition, more flights and more jobs on both sides of the Atlantic. Above all, it is a victory for millions of passengers who will benefit from more choice and lower fares. We now look forward to continuing our global expansion, delivering new routes, more jobs and economic boosts."

Boeing Delivers 500th 787 Dreamliner

Boeing delivered the 500th 787 Dreamliner on December 22. The aircraft, a 787-8, was handed over to Avianca, marking another milestone in the programme's history.

Since entering service in 2011, the Dreamliner fleet has grown to include 48 operators, who have collectively flown 696,000 revenue flights, carrying 133 million passengers over 1.7 billion revenue miles. The 787 family is now flying more than 530 routes, with airlines opening more than 120 new non-stop routes around the world.

"Achieving 500 deliveries – the fastest to 500 for twin-aisles – is a great accomplishment, made possible by the hard work and dedication of our employees and global suppliers," said Mark Jenks, Vice President and General Manager, 787 Program, Boeing Commercial Airplanes.

Gulfstream Flies G600 Prototype



Gulfstream's latest business jet, the G600, took off from Savannah/Hilton Head Airport in Georgia on December 17 for a maiden flight lasting 2hrs 53mins.

The aircraft (N600GA) is the prototype of the stretched version of the G500, which itself is now undergoing certification and will replace the G450 in the company's product line.

The 19-seat G600 has a range of 7,135 miles (11,482km) at Mach 0.85 and a top speed of Mach 0.925. It features a

The prototype Gulfstream G600 takes off from Savannah/Hilton Head Airport in Georgia at 13:50hrs on December 17 at the start of its maiden flight. Gulfstream

touchscreen 'Symmetry' flight deck and side-stick controls and its cabin is both wider and taller than the G450.

Two further test aircraft are due to fly early this year with a fourth flying later in 2017. Certification is planned for 2018, with entry into service at the end of that year.

Rod Simpson

First A330-300 For South African



The first of five Airbus A330-300s (ZS-SXI) being leased by South African Airways (SAA) arrived at Johannesburg on December 1. It was joined by a second example (ZS-SXJ) five days later. SAA's A330-300s are the 242-tonne maximum take-off weight (MTOW) variant, which can cover distances of up to 6,350nm (11,750km) with a duration of 15 hours. The jets are configured in a two-class layout with 46 Business Class seats and 203 in Economy. Airbus

World's Shortest A380 Sector

Emirates recently launched the world's shortest Airbus A380 flight when it introduced its flagship aircraft on its Dubai-Doha service. The double-decker airliner started on the service from December 1. The journey from the UAE to Qatar is just 235½ miles (379km) and takes 1hr 20mins. Flight EK841 leaves Dubai at 07:45hrs arriving in Doha at 08:05hrs with the return journey, EK842, departing the Qatari capital at 09:50hrs and landing back in the UAE at 12:00hrs (all times local).

Trent 1000 TEN Takes to the Skies

The latest version of the successful Rolls-Royce Trent engine has performed its maiden flight beneath the wing of a Boeing 787-8 flight test aircraft.

The Trent 1000 TEN (Trust, Efficiency and New technology) draws on technologies developed for the Trent XWB and Advanced engine programmes, and delivers thrust and efficiency improvements. It has been selected to power the Boeing 787-10 when it takes to the air later this year.

CIVIL ORDERS

Airline	Aircraft	Number	Order Placed	Notes
Aircalin	Airbus A320neo	2	November 29	For use on regional Pacific routes
Aircalin	Airbus A330-900	2	November 29	For use on new routes to Japan and China
Air Tanzania	Boeing 787-9	1	December 13	Previously listed as "unidentified customer"
Air Tanzania	Bombardier CS300	2	December 2	Acquired by Tanzanian Government Flight Agency
Air Tanzania	Bombardier Q400	1	December 2	Acquired by Tanzanian Government Flight Agency
Hawaii Island Air	Bombardier Q400	3	December 20	Leased via Elix Aviation Capital
Iran Air	Airbus A320	46	December 22	Order approved by US Government
Iran Air	Airbus A330	38	December 22	Order approved by US Government
Iran Air	Airbus A350 XWB	15	December 22	Order approved by US Government
Iran Air	Boeing 737 MAX 8	50	December 11	Order approved by US Government
Iran Air	Boeing 777-300ER	15	December 11	Order approved by US Government
Iran Air	Boeing 777-9	15	December 11	Order approved by US Government
IrAero	Sukhoi Superjet SSJ100	4	November 23	Lease from Russia's State Transport Leasing Company
Jet2	Boeing 737-800	4	December 23	Takes total order to 34 (8 of which have been delivered)
Philippine Airlines	Bombardier Q400	5	December 8	Also includes 7 options
Undisclosed	Airbus ACJ320neo	1	December 5	The type's 8th order since launch

Inaugural Wingo Service



Wingo Boeing 737-7V3 HP-1524CMP receives a water-cannon salute at Medellín's José María Córdova Airport after flying the low-cost carrier's inaugural service from Panama on December 1. Felipe Betancur Montoya

Boeing Converted Freighter Contractor Selected

Taiwan's Evergreen Aviation Technologies (EGAT) has been selected by Boeing to undertake 767-300 modifications under the Boeing Converted Freighter (BCF) programme. The first aircraft to undergo the process will be delivered to EGAT's Taoyuan facility this year, with redelivery anticipated in 2018.

EGAT has carried out complex airframe conversions in the past, including building a fleet of four Boeing Dreamlifters – converted 747s used in support of the 787 programme – as well as modifying a 747-400 as a propulsion test platform for GE Aviation.

Boeing has so far received 27 firm orders from customers for its 767-300BCF model and is forecasting a requirement for 400 widebody conversions over the next 20 years. The company said there is strong demand for the 767 freighter conversions due to growth in e-commerce.

The aircraft will have the same cargo capacity as the 767-300 production freighter with approximately 50 tonnes structural payload being carried over ranges of 3,000nm (5,556km). There are 24 pallet positions on the main deck.

Stratos Progress



The Stratos 714 undertaking taxi trials in November, just prior to its maiden flight. Stratos Aircraft

The prototype Stratos 714, N403KT, Very Light Personal Jet (VLPJ) performed its maiden flight on November 21 from the manufacturer's base at Redmond, Oregon.

The type, which was originally announced in 2008, is powered by a single 2,900lb/thrust Pratt & Whitney JT15D-5 turbofan mounted in the lower rear

fuselage with air intakes in the wing roots. The Stratos 714 has a touchscreen Garmin G3X avionics suite. The manufacturer lists a service ceiling of 41,000ft, an NBAA IFR range with four occupants of 1,500nm (2,779km) and max cruise speed at 30,000ft of 415kts (769km/h). **Rod Simpson**

IN BRIEF

Des Moines International Airport's authority board has approved a plan to build a new terminal to the east of the current facility. The \$500m structure, with 19 gates and larger waiting areas, will be the most expensive public building in Iowa, replacing the existing terminal, which opened in 1948. Construction is likely to start in 2022.

Air Calédonie has taken delivery of its first two ATR 72-600s the carrier has on order from the Franco/Italian turboprop manufacturer. The aircraft, F-OZIP (c/n 1355) and F-OZLI (c/n 1380), are configured in 68-seat, all-Economy layout and are being used on the carrier's domestic network. The airline, which started operating ATR 42s in 1986, will gradually replace its existing fleet with the latest-generation ATR 72-600.

Cathay Pacific has announced a boost to UK connectivity with additional flights to Gatwick and Manchester. On the back of strengthening demand for flights between Hong Kong and the UK, the carrier will increase its four-times-weekly services to Gatwick to a daily operation from June 1. While Manchester will receive one additional flight per week from Hong Kong starting on June 2. At the same time, the Airbus A350-900 will replace Boeing 777-300ERs on all flights to the northern UK hub.

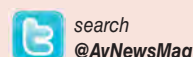
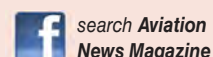
Arctic Aviation Assets (AAA) has received its first Airbus A320neo, which has been immediately leased to Hong-Kong-based budget carrier HK Express. The jet, B-LCL, is the first of 70 A320neos on order for AAA parent company Norwegian Group and the next 11 will also be leased to HK Express.

Leonardo Helicopters has been contracted to provide an additional 30 Emergency Medical Service (EMS) helicopters to the largest EMS programme in China. The deal will see AW139 and AW169 types joining Sino-US, which already has 25 AW119Kx helicopters on order. The 30 helicopters will be operated by parent company Kingwing General Aviation.

S7 Airlines ordered 17 pre-owned Embraer E170 and E175 airlines on December 22, just weeks after the airliner received Russian Type Certificates. The Moscow-based carrier has signed an agreement with GE Capital Aviation Services (GECAS) to lease the jets, therefore not impacting Embraer's order backlog. The airline will start to receive the aircraft in the first half of this year.

Hawaiian Airlines is purchasing another Airbus A330-200 and leasing two more A321neos, enabling it to phase out its remaining Boeing 767s by the end of 2018 – earlier than planned. Hawaiian has already announced plans to acquire 16 A321neos, with first deliveries starting early next year. The two additional jets will arrive in early 2018 and take the fleet to 18. quarter of this year.

For the latest news and updates from the Editorial team, why not find us on your favourite social media platform?



First Sea Lion Takes to the Sky



Airbus Helicopters' test pilots flew the first German Navy NH90 Sea Lion on its maiden flight on December 8. The new naval multi-role helicopter, which carries the test serial 98+51, performed the flight from the manufacturer's facility in Donauwörth, Germany.

This German variant has an increased

The first German Navy NH90 Sea Lion on its maiden flight from Airbus Helicopters' facility at Donauwörth, Germany. Airbus Helicopters/Christian Keller

number of sensors and improved navigation and communications equipment. The military identification friend or foe (IFF) system has also been updated to the latest standards.

The Navy will use the helicopter for a range of roles, including search and rescue (SAR) missions, maritime reconnaissance and special forces operations, as well as personnel and cargo transport. The Bundeswehr (German Armed Forces) has ordered 18 Sea Lions in total, the last of which is due to enter service in 2022.

New Aerial Refuelling Capability for Advanced Hawkeye

Northrop Grumman has successfully completed the first flight of an E-2D Advanced Hawkeye equipped with an aerial refuelling (AR) capability. The US Naval Air Systems Command awarded the company an engineering, manufacturing and development (EMD) contract in September 2013 to create the sub-system upgrades necessary to

enable the E-2D to undertake aerial refuelling.

The modifications include a refuelling probe and associated piping, electrical and lighting upgrades, plus long-endurance seats that will enhance the field of view in the cockpit and reduce fatigue over longer missions.

The first aircraft to be converted (BuNo

166501) will be followed by two other test examples. Once flight testing is completed in 2018 this new capability will enable the Advanced Hawkeye to provide longer on-station times at greater ranges, extending its mission time.

Production cut-in and retrofit plans are also scheduled to begin in 2018.

Centenary Tail for 206(R) Sqn Hercules



Lockheed Martin C-130J Hercules ZH866 had its tail painted into a special scheme in November to mark the 100th anniversary of the RAF's 206 Sqn. The unit formed at Boscombe Down, Wiltshire, on December 31, 1916 and is best remembered as a Nimrod operator. It achieved battle honours in both world wars as well as the South Atlantic (1982), the Gulf (1991) and Iraq (2003). Today as 206(R) Sqn it serves as the Heavy Aircraft Test & Evaluation Squadron. Matt Varley

Stratotanker Base Renamed

Phoenix Sky Harbor Air National Guard (ANG) Base in Arizona has been officially renamed Goldwater Air National Guard Base to honour one of the unit's founding members.

The base, which is home to the Boeing KC-135R/T Stratotankers of the 191st Air Refueling Squadron 'Copperheads'/161st Air Refueling Wing was renamed by Arizona Governor Doug Ducey during a ceremony on December 9.

In 1946, now-deceased Senator Barry M Goldwater was one of the original members of Arizona's first Air Guard squadron, which later became today's 161st ARW. After serving in the USAAC during World War Two, Goldwater returned to Arizona and became the first federally recognised National Guard pilot in the state. He dedicated 37 years of his life to military service in the Army, Air Force Reserve and Arizona ANG; eventually retiring as a Major General.

Italian Air Force P-72As Handed Over

The first two P-72A maritime patrol aircraft were delivered to the Aeronautica Militare Italiana's (AMI, Italian Air Force) 41° Stormo at Sigonella by Leonardo-Finmeccanica on December 13.

The aircraft, which are based on the ATR 72-600 airliner, incorporate the latest version of the Leonardo-Finmeccanica Airborne Tactical Observation and Surveillance (ATOS) mission system and will replace the Breguet Atlantic in AMI service.

The contract for four aircraft was originally signed for an aircraft based on the ATR 72-500. However, following development of the new ATR 72-600, the deal was modified in 2014 to cover supply of four P-72As based on the latest variant.

Deliveries of the remaining two will be



One of the first two Italian Air Force P-72As, which were delivered in December. Leonardo-Finmeccanica

completed during the course of 2017 and, in addition to maritime patrol missions, the aircraft can also be used

to combat drug trafficking, piracy and smuggling or to provide support in the event of ecological disasters.

Marine Corps F-35Bs to Operate from HMS Queen Elizabeth

The US Marine Corps (USMC) and UK Ministry of Defence (MOD) have signed a formal agreement that will permit USMC Lockheed Martin F-35B Lightning IIs to fly from Britain's new Queen Elizabeth-class aircraft carrier.

Planning will now be advanced to

enable US jets to deploy alongside the UK's own F-35Bs on HMS *Queen Elizabeth* (R 08) during her planned first operational deployment in 2021. In turn, this will enable UK and US personnel to work even closer together on operations, exercises and training, developing

the skills they need for carrier strike operations.

British pilots, engineers and deck handlers are currently operating from US Navy carriers, already working on these skills, which will be important for when Britain comes to deploy its new ships.

German Army Retires Bo.105



German Army Aviation retired the Bo.105 helicopter on December 13 after 37 years' service. This example, s/n 87+62, was specially painted to mark the occasion and here it makes the type's final landing, at Celle at 14:12hrs. Rene Köhler

RCAF Rebranding

The first Royal Canadian Air Force (RCAF) aircraft to be rebranded with the service's new roundel and bilingual titles was unveiled in November.

Beechcraft King Air 350 C-GPDC, a leased aircraft allocated to 8 Wing at CFB Trenton, Ontario, has gained the new markings, which include RCAF titles applied to the left of the roundel and ARC (for L'Aviation Royale Canadienne) titles on the right-hand side.

Other RCAF aircraft will begin to adopt the revised titles when they come up for routine scheduled maintenance. The entire fleet rebranding is expected to take up to five years.

CAEW Gulfstream Arrives

The first Gulfstream G550 Conformal Airborne Early Warning & Control System (CAEW) aircraft was handed over to the Aeronautica Militare Italiana (AMI, Italian Air Force) on December 19.

The CAEW installed on the G550 was developed by ELTA systems, an Israel Aerospace Industries (IAI) subsidiary and the aircraft was handed over in a ceremony held at IAI's facilities in Tel Aviv, Israel.

The standard G550 business jet has been modified by ELTA to feature an

Advanced AESA (Active Electronically Scanned Array) four-dimensional radar with 360° detection, identification and tracking of airborne and surface targets.

Other equipment includes a 360° Electronic Surveillance Measures (ESM) system and a NATO-compatible communications system. A Self-Protection System (SPS) also provides 360° coverage and includes active and passive sensors. Countermeasures are provided to defend against incoming missiles.

The aircraft has been designated the E-550A by the AMI and has the serial MM62293 and been coded 14-11. It will be allocated to 14° Stormo at Pratica di Mare, replacing the G222VS currently flown by the unit's 8° Gruppo Volo.

A second example is expected to be delivered during this year as part of a reciprocal agreement under which 30 M-346 Masters were purchased from Italy as new training aircraft for the Israeli Air Force.

Saudi Advanced Eagle Deliveries Begin

The first four Boeing F-15SA Advanced Eagles for the Royal Saudi Air Force (RSAF) were delivered in mid-December 2016.

The jets arrived at RAF Lakenheath, Suffolk, on December 10 after a transatlantic ferry flight supported by a USAF KC-10A Extender tanker. The Eagles (s/ns 93-0857, 93-0899, 12-1006 and 12-1010) departed on the 13th to continue their journey to Saudi Arabia, where they are expected to join the F-15SA Formal Training Unit, 55 Squadron, at Khamis Mushayt Air Base.

The air arm RSAF is buying 84 new-build F-15SAs and upgrading 70 existing F-15S aircraft to F-15SA standard. Aircraft 93-



RSAF F-15SA Advanced Eagle 93-0899 lands at RAF Lakenheath in heavy rain shortly before dusk on December 10 during its delivery flight to Saudi Arabia. Matt Varley

0857 and 93-0899 are existing RSAF F-15S aircraft that have been upgraded to F-15SA

standard, while the remaining two are new production aircraft.

MILITARY AIRCRAFT ORDERS

Customer	Manufacturer and Type	Number	Contract Date	Notes
Chilean Air Force	Sikorsky S-70i Black Hawk	6	December 7	Delivery by end of 2018
Costa Rican Government	PZL Mielec C-145A Combat Coyote	2	August 15	Ex-USAF, part of Excess Defense Articles programme
Estonian Air Force	PZL Mielec C-145A Combat Coyote	1	August 15	Ex-USAF, part of Excess Defense Articles programme
French Air Force	Lockheed Martin C-130J Hercules	2	December 1	Delivery by August 2020
German Bundespolizei	Airbus Helicopters H215 Super Puma	3	December 7	For Federal Police use
Hellenic Army	Bell OH-58D Kiowa Warrior	70	October 27	Ex-US Army, part of Excess Defense Articles programme
Iraqi Air Force	Lockheed C-130H Hercules	1	July 8	Ex-USAF, part of Excess Defense Articles programme
Italian Guardia di Finanza	Leonardo-Finmeccanica AW139	6	December 13	Customs and Border Protection Service
Kenyan Air Force	PZL Mielec C-145A Combat Coyote	3	August 15	Ex-USAF, part of Excess Defense Articles programme
Nepalese Air Force	PZL Mielec C-145A Combat Coyote	2	August 15	Ex-USAF, part of Excess Defense Articles programme
Niger Air Force	Lockheed WC-130H Hercules	1	October 27	Ex-USAF, part of Excess Defense Articles programme
Royal Canadian Air Force	Airbus C295W	16	December 8	for search and rescue
Royal Saudi Land Forces Aviation Command	Bell Boeing CH-47F Chinook	48	December 7	Ex-US Army airframes
Royal Thai Air Force	Sukhoi Superjet 100-95LR	1	December 15	Takes total order to three aircraft
Serbian Air Force	Mikoyan Gurevich MiG-29 Fulcrum	6	December 15	Ex-Russian Air Force examples donated by Russia
TacAir	Northrop F-5 Tiger II	21	October 10	Ex-Royal Jordanian Air Force
Turkish Air Force	Aeromot TG-14A motor glider	2	October 27	Ex-USAF, part of Excess Defense Articles programme
Turkish Air Force	LET TG-10D Peregrine glider	4	October 27	Ex-USAF, part of Excess Defense Articles programme
US Navy	Bell 407 GPX	4	November 29	For conversion to MQ-8C Fire Scouts
US Navy	Beechcraft King Air 350C Cargo Slick	1	December 21	For conversion to C-12W
US Navy	Bell Boeing CMV-22 Osprey	6	December 28	COD variant for delivery by December 2017

Jordanian Tiger IIs Bound for the US

All 21 surviving Royal Jordanian Air Force (RJAF) Northrop F-5E/F Tiger II jets have been sold to the USA for use in support of US Navy and US Air Force adversary contracts.

The aircraft have been acquired by Reno, Nevada-based Tactical Air Support (TacAir), which received US State Department approval for the contract to purchase the aircraft, together with all remaining spares, support equipment and engines in October.

The company already operates a fleet of five ex-Canadian CF-5Ds and the addition of the RJAF F-5E/Fs will give TacAir the largest private fleet of the type in the world.

Latterly used in the lead-in fighter trainer (LIFT) role, the last RJAF F-5s were retired in December 2015 at H5/Prince Hassan Air Base, where they had been flown by 17 Squadron until they were replaced by BAe Hawk Mk 63s acquired from the UAE.

The RJAF has been progressively disposing of its F-5E/Fs for some years and has previously sold aircraft to the Brazilian, Kenyan and Singapore air forces.

Dogfighting Flanker and F-16 Near Groom Lake

This rare photograph shows a Sukhoi Su-27 *Flanker* dogfighting with a Lockheed Martin F-16 Fighting Falcon near Groom Lake, Nevada, on November 8. The image is intriguing despite its poor quality due to the aircrafts' distance from the photographer. The jets were engaged in dissimilar air combat manoeuvres over Tikaboo Valley, 20 miles (32km) east of the so-called Area 51 base at a height of around 20,000ft. The *Flanker* is thought to be one of a pair of single-seater examples obtained from Belarus around 1996.

Phil Drake





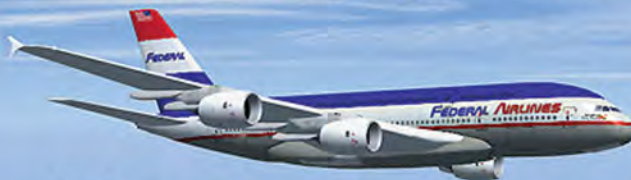
TOUR AVAILABILITY 2017:

US Storage Yards / Freight Hubs /	
Kentucky Derby	22nd April - 8th May
Kazakhstan-Revisited [Air Astana]	13th May - 20th May
Ireland Tour	25th May - 2nd June
Paris Airshow	2 & 6 days tours
Poland Week	22nd July - 29th July
Romania-Bulgaria-Serbia-Poland	22nd July - 6th Aug
Romania - Bulgaria - Serbia	29th July - 6th Aug
Frankfurt - Dusseldorf [BH]	25th Aug - 28th Aug
NBAA - Las Vegas - Teterboro	7th Oct - 15th Oct
Dubai Airshow / Abu Dhabi	11th Nov- 16th Nov

**WE OFFER EXCEPTIONAL
VALUE AND QUALITY FOR YOUR MONEY
SO WHY PAY MORE UNNECESSARILY?**

**14 KENILWORTH DRIVE, BOYATT WOOD,
EASTLEIGH, HANTS. SO50 4PT
INFO@AEROPRINTS.COM
02380 610230**

Not happy with the airlines of today? Convinced you could build an aviation empire if you had control over aircraft, schedules, pricing, meal service, frequent flyer, seating & advertising?



airlinesimulation.com



AIRLINE includes 7000+ airports & 700 aircraft variants with historical data, charter & cargo contracts, alliances with hotels & car rental companies, create a frequent flyer program, set ground and inflight service levels, schedule flights and set airfares.

Customise your scenarios with the Scenario Editor!

This is a detailed PC based management simulation for the serious aviation enthusiast. All the decisions relating to the operation of your airline are in your control. The simulation can be set to start anytime from the late 1940's, you can transition from prop aircraft to the dawn of the jetage, modernise your fleet or start in the present day.

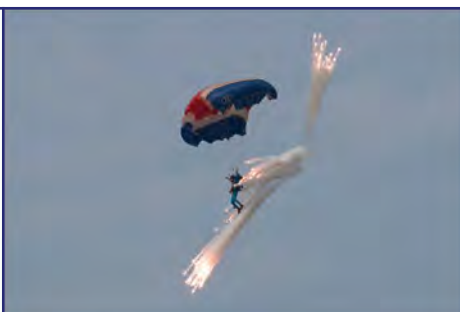


Now also play online against players from around the world!

www.theairlinegame.com



www.airlinesimulation.com



23-24 September, 2017

**Antonov An-2 / Antonov An-24 / Antonov An-148 / Ilyushin IL-18 / Ilyushin IL-62 /
Ilyushin IL-76 / MD-500 / Mig-15 / Mig-21 / Mil Mi-8 / Sukhoi Su-25 / Tupolev TU-134 /
Tupolev TU-154 / Yak-18**

www.wonsanairfestival.com

Swiss Storch Flies Again



Fieseler Storch A-97 (SP-YRX) flying from Krosno, Poland.
Pawel Zawisza via Stefan Schmoll

Former Swiss Air Force Fieseler Storch A-97 returned to the skies on November 4 following a year-long restoration by Aero-Kros in Poland. Krzysztof Galus and Jerzy Piekarczyk were at the controls for the maiden flight from Krosno, Poland.

The Storch had previously been suspended from the ceiling at the Verkehrshaus der Schweiz (Swiss Transport Museum) in

Lucerne, but was removed and sent to Poland for renovation by its new owners – the Switzerland-based Friends of the Fieseler Storch. The organisation already has three flyable Morane-Saulnier Criquets (the French licence-built version of the Storch).

A-97 is one of two Fieselers that participated in a rescue mission to the Gauli Glacier in the Bernese Alps, Switzerland,

in November 1946, following the crash of Douglas C-53 Skytrooper 42-68846. All 12 occupants of the latter were rescued and airlifted to safety.

The Storch has been given the provisional civil registration SP-YRX for the test-flight programme, but is expected to fly as HB-EHJ when transferred to its owners.

Stefan Schmoll

Sopwith Pups Return to the Skies

Sopwith Pup N6161 flew again from Duxford in the hands of 'Dodge' Bailey on October 17. The Great War-era fighter was captured intact by the Germans in 1917, and some of its original parts have been incorporated into the rebuild, which was undertaken by Retrotec, the restoration arm of the Historic Aircraft

Collection in Rye, Sussex.

Meanwhile, across the Atlantic, Larry Howard's replica Sopwith Pup has recently completed its test-flight programme, after making a successful first flight in the hands of Antique Aero's Chuck Wentworth in Paso Robles, California, in June.

The Pup took ten years to build and is now flying from Howard's base in Spokane, Washington. It is finished in the colours of 'N6475', which flew with RNAS 11 Squadron from Hondschoote, near France's border with Belgium, in July 1917. **'N6475' story from John Boyle**

Skyhawk Reassembled at Yankee Air Museum



The Skyhawk on display at the Yankee Air Museum in December. YAM

Douglas A-4C Skyhawk 148543 was reassembled for display at the Yankee Air Museum in Belleville, Michigan, on December 2 following a move from the now defunct Virginia Aviation Museum in Richmond.

The relocation was supported by the US Navy and funded by a donor. The jet served

aboard USS *Forrestal* in the late 1960s, but has been painted to represent 148442/NP694 of the US Navy's VA-216 'Black Diamonds'.

The colour scheme is a tribute to Vietnam War veteran Paul Galanti, who was shot down and captured on June 17, 1966, after completing more than 95 missions from USS *Hancock*.

Argentine Mitchell Taking Shape

Renovation work on a North American B-25 Mitchell continues in Argentina with attention now focusing on the wings and turrets.

North American TB-25J Mitchell LV-GXH *Huaira Bajo* belongs to Buenos Aires-based Gustavo Passano and formerly served with the USAAF as 44-31173. In 1958 the aircraft was sold to Enrique Decurneux and it flew as both LV-POP and LV-GXH in the cargo-carrying role.

It had changed hands by the time it was seized by Argentine authorities in August 1969. It had allegedly been used in the smuggling of cigarettes and whisky from Paraguay. It was subsequently assigned to the Santiago del Estero Aeronautic Directorate for aerial survey work and finally retired in 1974. **Esteban Brea**

Extra Funding for Hendon and More Aircraft for Cosford



Westland Lysander III R9125 arrives at Cosford in November. The aircraft flew with 225 Squadron in 1940 as a coastal patrol and photo-reconnaissance aircraft, covering the south coast of England. It took on a Special Duties role with 161 Squadron in 1944 and was operational for a further two years. Courtesy RAFM

Northrop Grumman has entered into a sponsor partnership with the Royal Air Force Museum to support the museum's RAF Centenary Programme that will transform its Hendon, London, site as part of the service's centenary celebrations in 2018.

The company will be a themed sponsor in the new 'Now & the Future' exhibition area with a particular emphasis on air intelligence, surveillance and reconnaissance, and unmanned aircraft systems.

The Heritage Lottery Fund (HLF) also granted the RAF Museum £1,783,700

in December 2016 for Phase 2b of its redevelopment programme.

Phase 2b is dubbed 'Historic Hendon' and focuses on sharing the historical significance of the site as the London Aerodrome in the early 20th century and later RAF Hendon.

The landscape at the heart of the site will be transformed to create a "sense of place" linked to that heritage, thanks to National Lottery players.

The project will also deliver inspiring outdoor play and picnic spaces, creating a new village green for both the museum's local communities and other visitors to the area.

Meanwhile, three more historic aircraft have been relocated from Hendon to the Royal Air Force Museum Cosford, Shropshire, to create space for the changes.

Boulton Paul Defiant I N1671, Gloster Gladiator I K8042 and Westland Lysander III R9125 were all safely transported by road in late November and are currently being prepared for display at Cosford. They join Messerschmitt Bf 109G-2 *Black 6* and de Havilland Tiger Moth T-6296, both of which arrived early in the month.

The Defiant and Gladiator were scheduled to go on public display in the museum's War in the Air hangar in January. The Lysander is heading to the museum's Michael Beetham Conservation Centre for an assessment, before work over the next few years to replace its fragile linen outer skin.

Six Spartans Purchased

Six Alenia Aeritalia C-27A Spartans have been acquired from the US State Department by the Russell Military Museum in Zion, Illinois.

Three of the aircraft have already been flown to John H Batten Airport in Racine,

Wisconsin, with the other three expected to follow after receiving permits for the ferry flights. The museum plans to maintain one in flying condition and use the others for spares.

Museum engineers are also working hard

to return Grumman OV-1D Mohawk N906KM to airworthiness. The machine was broken into and vandalised a few years ago and has now been transferred to Racine for repair and refurbishment. **Nate Leong**

Wessex Goes on Display

A team at The Helicopter Museum (THM), Weston-Super-Mare, Somerset, led by engineering volunteer Eric Butt, has completed a seven-year project to restore a 66-year-old Westland Wessex helicopter.

Wessex XM328 began life as an early Mk.1 before being converted to a Mk.3 for its varied service career, which included a six-month deployment in Northern Ireland in early 1978 to support anti-terrorism activities; service in 1981 on fishing protection duties with HMS *Antrim* during the Icelandic 'Cod War' dispute over fishing rights; and a deployment on the same ship to the Falklands in 1982.

On January 19, 1984, XM328 and another example carried out the last official flight of a Wessex Mk.3 before later being sent by road to RNAS Culdrose, Cornwall, to help train aircraft handlers in the skills of moving



The newly completed Wessex on display at The Helicopter Museum. THM

helicopters around a dummy deck of an aircraft carrier.

By 2004, when it was acquired by the museum, the helicopter was beginning to

suffer from external and internal corrosion. Pressure on THM's restoration facilities meant that it was another three years before the aircraft could be brought into the engineering hangar for serious restoration to begin

Two camping sites became unlikely parts sources. The owner of a Wessex being converted to a holiday home in Ditchling, East Sussex, donated a rescue winch and various avionics boxes, while the much-sought-after sonar equipment came from a Sea King at a 'glamping' campsite in Stirling, Scotland.

With the restoration complete the helicopter is now on display within THM's main display hangar. The team will now begin work on either the museum's former-Queen's Flight Westland Whirlwind Mk.12 or another version of the Wessex held by the collection.

Super Connie Bound for Australia

The Qantas Founders Museum's Lockheed Super Constellation project reached a major milestone in December 2016 with the aircraft moving from the Manila International Airport to the Manila International Container Terminal in preparation for shipping to Australia.

In the early hours of December 12 the disassembled airliner was lifted from its airport storage site, which had been provided by Cebu Pacific Air, and transported by seven low-bed and 'super low-bed' trailers to the International Container Terminal Services Inc (ICTSI) site at the Manila seaport.

It took four-and-a-half hours to cover the nine miles (14km) and the operation included the lifting of power lines and the partial closing one of Manila's main highways, so that the trailers could travel on the incorrect side of the road.

In September 2014, the museum was



Lockheed Super Constellation N4247K leaves Manila International Airport on December 12.
Qantas Founders Museum

the successful bidder for Lockheed Super Constellation N4247K, in an auction held by the Manila International Airport Authority. The aircraft, which had been grounded in Manila for 25 years, had been used by World Fish and Agriculture to transport fish cargo and had been previously operated by the US Navy.

The group's goal is to restore the aircraft to appear as a Qantas Super Constellation that operated the Qantas Kangaroo Route air services between Sydney and London in the 1950s.

Qantas Founders Museum (QFM) Chairman John Vincent said the museum was extremely excited to see the project complete this stage safely and efficiently. "Moving a 60-plus-year-old disassembled, very large aircraft is no easy feat so we are delighted

that this stage of the project has been completed and the aircraft is one step closer to its final home of Longreach. QFM has spent more than two years fundraising and working on this project and we look forward to having this iconic aircraft in our museum collection soon."

The next stage of the project will be the transportation of the aircraft by sea to Australia. This is expected to start in mid-2017.

Vietnam Vet' Huey to Fly Again

A Bell UH-1H 'Huey' that served with the 170th Assault Helicopter Company (AHC) in the Vietnam War is being restored to fly by the Liberty Warbird Association (LWA) at Lancaster Airport, Lititz, Pennsylvania. Huey 66-16823 made its last operational flight with the Oklahoma Army National Guard in the late 1990s and since being acquired by LWA 18 months ago has been the recipient of a full inspection and refurbishment.

During the Huey's time with the 170th AHC in Pleiku it was flown by Russ Mowry who also painted its distinctive '*Bikini Blue - The Flying Dragons*' nose art. During May 2016 he visited the project and spent two days recreating his work of 50 years ago. **Stephan Chapis**

New Collection at Omaka

The Omaka Aviation Heritage Centre's new Dangerous Skies collection opened to the public on November 1. Located on the outskirts of Blenheim, New Zealand, the centre's new exhibition presents several World War Two aircraft – some of which are airworthy – in dramatic dioramas. The machines on display include the airworthy Avro Anson I K6183 and Supermarine Spitfire Mk.XIV NH799 as well as several replicas including a Hawker Hurricane and Junkers Ju 87 Stuka – the latter two suspended from the ceiling in dramatic poses.

The centre is also home to the Knights of the Sky exhibition, which includes Sir Peter Jackson's collection of Great War-era machines and artefacts. **with thanks to Kathy Lee**

Yakovlev UT-2 Flown in Russia

Yakovlev UT-2B RA-2724G flew for the first time on October 13, 2016. The two-seat monoplane trainer lifted off from Daryino airfield, about 60 miles (96km) north of Moscow, Russia in the hands of Aleksander Kovalyov, following five years of work. The rebuilding of the UT-2 was completed by Rusavia, which had previously worked on two Polikarpov Po-2 biplanes. The Yakovlev project was based on original 1936-era plans and engineering documents received from its manufacturer. It has been modified with a more powerful Shvetsov M-11FR engine, along with various safety upgrades. **Mikhail Maslov via Gennady Sloutskiy**

F-16 Roundabout Guardian



Royal Netherlands Air Force F-16A Fighting Falcon J-246 was positioned on a roundabout near Völkel, in the Netherlands, on December 2. It is painted in the markings of 312 Squadron, a Völkel-based unit, but the 1981-built jet actually flew with 323 Squadron from Leeuwarden. **Roger Soupart**

AVIATION^{NEWS}

THE PAST, PRESENT AND FUTURE OF FLIGHT

RE-PRINTS

Custom re-prints of features available for use as:

- Press Pack Inserts ● Sales Promotions
- Company Reports and more...

Tailored to your specific needs, re-prints can showcase your company, products or services in association with the leading civil aviation magazine.

For further information call Andy Mason:

Tel. + 44 (0) 1780 755131

E-mail: andrew.mason@keypublishing.com

 **AirwaySim**
ONLINE AIRLINE SIMULATION

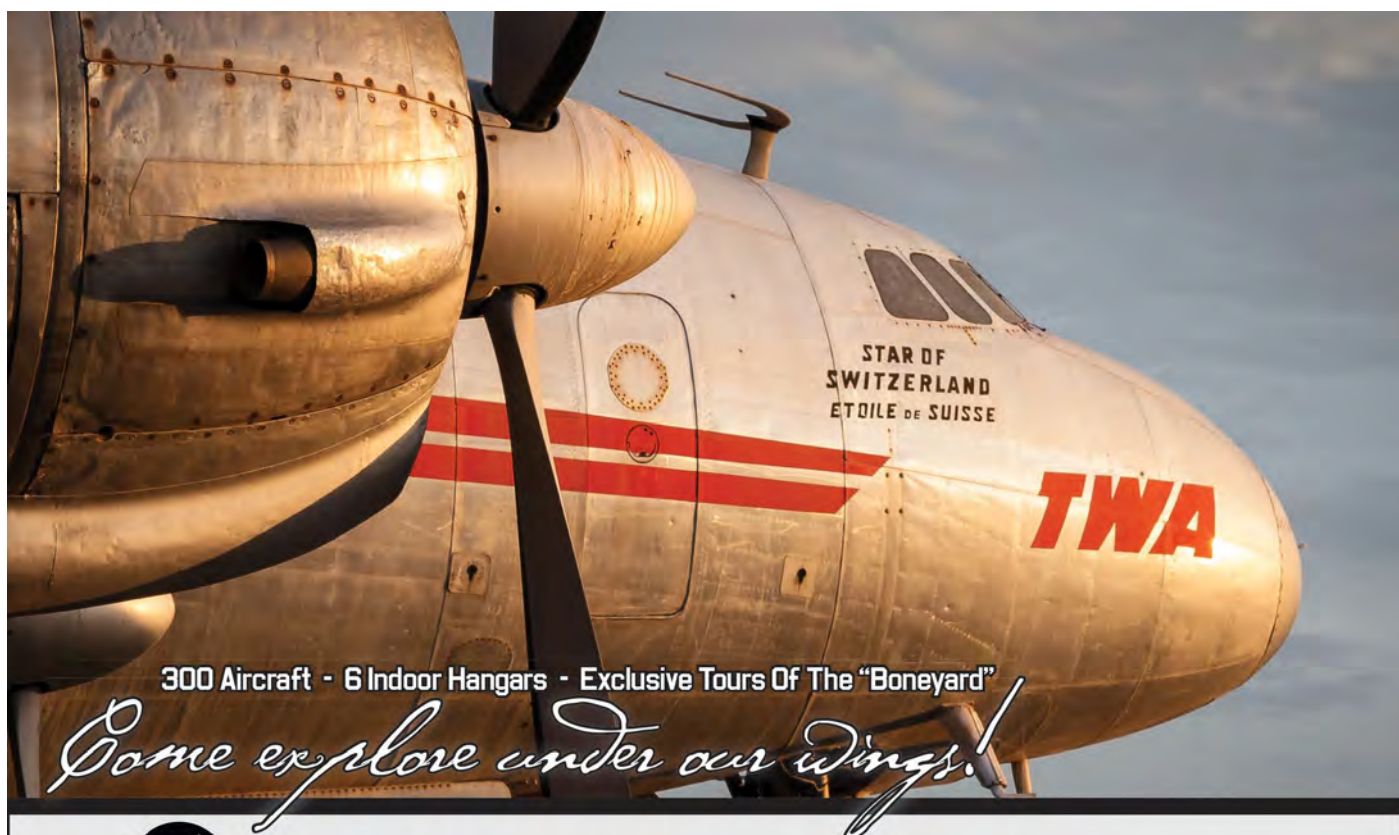
START YOUR OWN AIRLINE

- * Build your own **aviation empire** as the Airline CEO
- * Compete globally against other airline managers in this highly realistic **multiplayer simulation**
- * **Advanced** economy model with detailed data
- * Run a worldwide mega-carrier or a small regional airline.
Can you handle the **challenges?**

**TRY IT
FOR FREE**



Play online at www.airwaysim.com



300 Aircraft - 6 Indoor Hangars - Exclusive Tours Of The "Boneyard"

Come explore under our wings!



PIMA AIR & SPACE MUSEUM

www.pimaair.org

I-10 to Exit 267 - 6000 East Valencia Road, Tucson, AZ USA - +1 520 574 0462

BOMBARDIER CS3



Barry Woods-Turner reports from the handover ceremony of the first CS300 to be delivered to an airline, while **John Pagni** experiences a flight on the new jetliner.

“We are very proud to welcome our maiden CS300. We are also the first carrier in the world to take delivery, and launch commercial operations with this new airliner,” declared Martin Gauss, airBaltic’s Chief Executive Officer at the recent ceremony in Riga to induct the type into the airline’s fleet. He added the aircraft is: “the most innovative and technologically advanced aircraft in the world. Bombardier’s CS300 is an integral part in the execution of our development strategy and fleet optimisation planning.”

The lavish ceremony on November 28, involving a music and light display, was attended by 2,000 guests including the Latvian President, Raimonds Vējonis, VIPs, company employees and the media. Guests were invited on board to look around the company’s latest acquisition.

A second aircraft arrived on January 1. It will be followed by another six jets this year, with eight more in 2018 and the final examples due to arrive the following year.

Bombardier’s President, Commercial Aircraft, Fred Cromer was in an upbeat mood following the handover of the first CS300 to airBaltic. “Within six months we have managed to get a family of aircraft into revenue service. That has never been done before.”

Since the C Series’ conception there have been many changes to the management team at Bombardier, however, Robert Dewar, Vice President, C Series Aircraft Program, has been ever-present. He said: “This has been a long and challenging process, but I am pleased to say that both the CS100 and CS300 are performing above their original specification.

“The new Pratt & Whitney (P&W) Geared Turbofan engines have given us a few problems that have been well documented, fortunately the variant for the C Series was the launch engine and we went through all our testing earlier than the one used on the Airbus A320neo, so the start time issues are definitely behind us. We have fixed our start-up time at 90 seconds, which is in line with the rest of the industry and it is certified and operating under those requirements.”

As for how the airline planned to employ the type, Gauss said: “This jet is a wonder jet. During the test programme Bombardier informed us they were achieving better range and fuel burn than were contracted, and now we can confirm this. On the delivery flight [of the first aircraft] from Montréal to Stockholm [an overnight stop was necessary to ensure a delivery to Riga the next morning], there was more than five and half tonnes of fuel remaining in the tanks on landing, which meant it could have flown on past Moscow if we had wanted to. So, it is really a long-

range jet. We can reach Abu Dhabi from Riga and we can serve any destinations that are six- or seven-hours’ duration, giving us the opportunity to fly charters to the Canary Islands, which is something we couldn’t do before, and this is where we want to go. Also, there are some destinations in Russia that we cannot reach with the 737, and the Gulf states may also be of interest to us.”

The new aircraft, Gauss explained, are being financed under the company’s Horizon 2021 business plan, with extra capitalisation put in place in 2015. “This additional finance has enabled us to bring the jets onto our balance sheet. This first CS300 has been acquired through a 12-year financing agreement and similar arrangements will be made for the remaining 19 examples.

“With a stronger financial foundation, airBaltic decided to take a different approach to its current fleet and has started acquiring its existing Boeing 737 Classics as their lease periods come to an end. This gives us additional flexibility during this transition period. To date, we have bought nine of the 13 737s that are in our fleet and it is our intention to sell them when the timing suits us. However, by 2020 the last 737 will be taken out of service, this will be after our final CS300 is delivered the previous year, but we are growing at the same time, so we also need to ensure we can provide enough capacity for growth.”

00 ENTERS SERVICE



The first Bombardier CS300 for airBaltic climbs away from Riga International Airport against the backdrop of a stormy sky. Martin Tietz



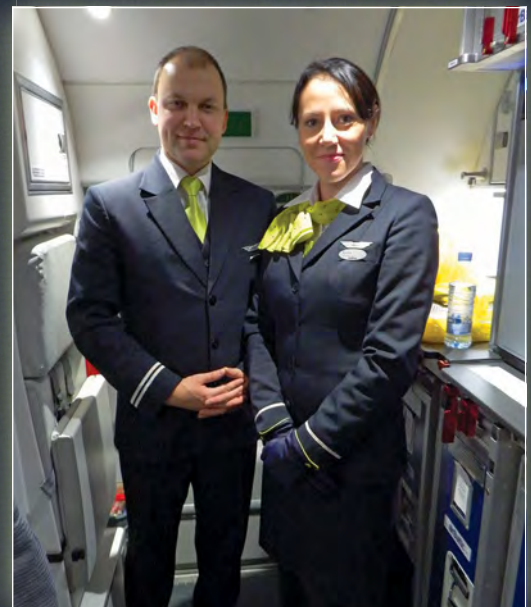
Raimonds Vējonis (left), President of Latvia and Pauls Calitis, airBaltic's Senior VP Flight Operations, in the cockpit of the CS300.

After the last 737 is retired the airline we will become a sole Bombardier operator with Q400s and the C Series. Gauss added: "In 2021, the business plan calls for 34 aircraft in our fleet – 12 Q400s and 20 CS300s – this leaves two that I should talk to Fred Cromer and Rob Dewar about, maybe they will give me a C Series for the price of a Q400? Also

during this period our growth will take airBaltic from carrying three million passengers per annum to four million."

IN-FLIGHT EXPERIENCE

Before entering service, the CS300 undertook two weeks of training and promotional flights. *Aviation News* got the



Purser Ivo Kalniņš and, on the right, air stewardess Andra Ceruka on the demonstration flight. John Pagni

chance to experience the type on December 9 flying from Riga to Helsinki. Passengers comprised representatives of the media and the airline's partners and we all collected our tickets from a specially set up CS300 counter in the airport.

Upon boarding, the initial impression is that the cabin is very bright and spacious ▶

A dramatic sound and light show was included during the ceremony in Riga to mark the CS300's induction into the airBaltic fleet. All photos airBaltic unless stated



The spacious overhead bins in the CS300.



AirBaltic has opted for a two-class configuration seating 145 passengers in its CS300s. John Pagni

with light flooding in through the oval windows that Gauss claims are 50% larger than on the rival Airbus 320. Also, adding to the effect is the white interior and light grey seats on a contrasting darker grey carpet. The configuration airBaltic has chosen is a 3-2 layout in two classes seating 145 passengers.

The seat-pitch is 30in (76cm) which I found ample (I am 6ft 1in/1.85m) and the cabin ceiling curves up to 6ft 11in (2.11m). Purser Ivo Kalniņš explained another feature: "The bins on the right, where there are three seats, are larger than those port side [above the two-seat row]. This means that airBaltic's cabin

luggage [size 24x17x11in] can be stacked on their sides leaving plenty of room, so no luggage need be put under the seats." On average, there is 2.5 cu ft (0.07m³) of space available per passenger.

There was none of the usual shaking associated with a take-off and I noticed that the Pratt & Whitney Pure Power PW1500G facilitated a smooth acceleration – within a very short time we were leaving the runway. I was certainly impressed by the lack of a high-pitched whistle or ear-splitting roar – Bombardier claims the CS300 is the quietest in its class with an effective perceived noise (EPN) of 255dB.

Normally the direct service to Helsinki takes about an hour. For this demonstration flight one of the pilots announced we would go off route, south over the Gulf of Riga, fly over Estonia's largest island, Saaremaa, then up the west coast of Finland to Vaasa, before turning southeast to Helsinki, taking 1hr 40mins in all.

This extended time gave the chance for the crew to present the CS300's features. Its Cabin Management System was briefly introduced – it intuitively controls such functions as air conditioning and the multi-coloured LED mood lighting.

Business and Economy Classes are separated by a curtain. On the port side in Business Class where there are three seats to create extra space the middle seat is not used and a table is placed there. On the other side of the aisle only one of the two seats is utilised. These passengers get a complementary menu offering a choice of hot and cold drinks including glasses of Heidsieck Monopole Brut Champagne. Meals are heated up in the two galleys, however there is no hot food on early morning and late evening flights, instead salads are served with cold cuts followed by desserts – though the rolls are always piping hot.

Business customers get metal cutlery, real crockery and glass bearing the airBaltic name, while those in Economy have to make do with disposable plastic. The latter passengers also pay for food, with hot meals priced at €6-8 and snacks €3-6, with drinks extra.

During our meal service a magician performed tricks and a master of ceremonies hosted a CS300 quiz with airBaltic prizes for the winners.

The two toilets (forward and aft) are spacious, and Kalniņš explained that they were accessible to most wheelchairs, with a handle to help the less mobile. A fold-out baby changing table has also been provided.

The aircraft has a glass cockpit as one would expect of a modern airliner. The airline's Chief C Series pilot Gerhard Ramcke commented: "It is not cramped. I particularly like the screens and their presentation. Generally, automation frees up a pilot's capacity to deal with other matters at the same time. The CS300's data presentation is much more advanced than on a A320 or 737. Whatever you desire, the screens give.

"Plus, the [three] cabin crew absolutely love the 'plane! It is a step ahead of what we have had before, with wider seats and aisle, which is important for the cabin crew and their service."

The small overhead screens display the route, moving maps, height, speed, distance travelled, time to destination and more besides.

So far Bombardier has confirmed 360 orders for the C Series, though deliveries in 2017 will be lower than originally planned due to issues with P&W's supply chain.

The first commercial airBaltic CS300 flight was from Riga to Amsterdam and back on December 14. In a Bombardier press release marking the service introduction, Gauss said: "airBaltic has been counting down the days to this landmark moment. During its maiden commercial flight today, the CS300 aircraft performed beyond our expectations and offered a new level of travel experience for our customers. We look forward to serving many communities across Western Europe and the Eastern markets with the CS300 aircraft – the largest variant in the world's most efficient and environmentally friendly family of airliners." **AN**



One of the screens above each group of seats that displays in-flight information. John Pagni



The lighting in the cabin can be altered to create different moods. John Pagni

Passengers board the first commercial service by a CS300 at Riga International Airport en route to Amsterdam on December 14.





RETURN OF THE 489TH BOMB GROUP

The 489th Bomb Group had a short but illustrious career during World War Two. Now, after 70 years, the unit is back with a vengeance and flies B-1B Lancers from Dyess AFB. **Scott Dworkin** reports.

The honour of becoming the first B-1B Lancer reserve unit in the USAF was handed to the 489th Bomb Group (BG). It was reactivated in 2014 but officially became operational at a ceremony at Dyess AFB, Texas on October 17 the following year. Although a Classic Associate unit of the active duty 7th Bomb Wing (BW), the 489th is actually assigned to Air Force Reserve Command's (AFRC) 307th BW, headquartered at Barksdale AFB, Louisiana.

Col Denis Heinz, commander of the 489th BG, is working hard to bring the unit up to full speed. He said: "We are already doing great stuff now to support the 7th Bomb Wing and the B-1 community as a whole...just wait five to ten years down the road when we have been running at 100% with our full complement of personnel who are highly trained and qualified. For now, we'll continue to grow, participate and assist with the 7th Bomb Wing and B-1 mission in any way that we can."

Above: **Blasting out of Dyess, the 'Bone' heads towards the local ranges for a two-ship reserve-crewed sortie.** All photos Scott Dworkin unless stated

Just two weeks prior to the unit standing up, B-1B operations transferred from Air Combat Command to Air Force Global Strike Command (AFGSC) as part of the realignment of all USAF bomber units. The 489th has been furthering the Total Force Integration (TFI) concept that aims to integrate active duty air force, reserve and Air National Guard components to complete the mission. Built on two models, Classic Associate and Active Associate units, TFI is designed to enhance the USAF's ability to conduct its tasks through the sharing of resources between active duty and Air Force Reserve components, including aircraft, crews, maintenance, and support. The Classic Associate structure comprises a regular air force unit hosting a reserve component unit, with the wing supplying all

the aircraft and equipment. In the case of the 489th, the Group does not own aircraft or bring any additional missions; rather it shares in the 7th Bomb Wing mission of employment of the B-1 aircraft to meet combatant commander requirements worldwide.

An Active Associate unit is where the Air Force Reserve owns the aircraft, while the active duty regular air force embeds a squadron, group or wing that provides aircrew, aircraft maintenance and support personnel who share the responsibility of flying and maintaining the aircraft.

The 489th BG encompasses more than 250 airmen, including 109 Air Reserve Technicians (ARTs) who are full-time civilian employees and work with the unit. They are also required to serve as members of the Air Force Reserve one weekend a month and do at least 14 days a year annual training. There are also 138 Traditional Reservists (TRs) who serve in the Unit Program, in which they have outside civilian



jobs and are required to report for duty with their parent AFRC unit at least one weekend a month and an additional two weeks a year. There are also three fully civilian personnel. The members of the 489th are spread across the 489th Bomb Group Staff and the 345th Bomb Squadron (BS), composed of aircrew that operate the B-1B along with the necessary support personnel. There is also the 489th Maintenance Squadron for day-to-day care of the aircraft and its weapons, while the 489th Aerospace Medicine Flight contributes medical and dental personnel to support the Reservists. The 489th is slated to be at full operational capacity in 2018.

WORK-UP

The historic 489th has hit many notable milestones since reactivation. It has deployed the B-1B (commonly called the 'Bone' from B-one) to participate in key exercises around the world.



Above: **The B-1B has been made more potent thanks to the Block 16 upgrade.**

Left: **Col Denis Heinz, the 489th BG commander.** Darren Willmin/Aviation In Action

Reserve aircrews began flying the day after the activation ceremony at Dyess and, at the time of writing (December 7), have had zero maintenance cancellations – something previously unheard of within the B-1 community. The 489th Maintenance Group has helped the 7th BW achieve the best B-1 mission completion rate seen in four years at Dyess. Additionally, the first three non-B-1 aircrew hired by the Group completed their Mission Qualification Training syllabus in August 2016 to become the first fully Reserve-hired and trained aircrew in the B-1 community. The Group also supported four Weapons School Integration exercises and aircrew

Just a quarter of the sprawling ramp at Dyess AFB with a line of B-1Bs. The base also houses C-130s from the 317th Airlift Group.



twice assisted the 28th BW at Ellsworth AFB, South Dakota, when they needed Standardisation and Evaluation (STAN/EVAL) qualified Instructor Weapons System Officers.

It also sent aircrew and maintenance personnel for exercises including Constant Vigilance, a week-long AFGSC annual exercise, conducted in April 2016, designed to gauge the service's ability to conduct conventional long-range strike and nuclear deterrence missions. In August it participated in the Rim of the Pacific (RIMPAC) exercise, designed to develop and sustain co-operative relationships between allied forces and help maintain the safety of sea lanes and security off-shore. The next month aircraft were deployed to Mountain

Home AFB in Idaho for Gunfighter Flag where USAF, US Navy and Royal Canadian Air Force aircraft trained for potential future joint service deployed operations in an environment similar to southwest Asia. The most recent was Ample Strike which features later in this article.

Since being reactivated, the 489th BG has completely integrated itself across Dyess and continues to work closely with all of the active duty B-1B squadrons. This seamless integration with active duty helps build and strengthen the relationship between the Bomb Wings and the Group. As the 489th looks into 2017 and beyond, the job of building a Bomb Group from the ground up has only just begun. The 345th BS currently has a mix of former active duty

B-1B (ten) and B-52H (four) aircrew, but the squadron has also reached beyond the bomber community and hired former KC-135, MC-12 and F-15E aircrew. There are also personnel from other service branches, including a former F/A-18 Super Hornet pilot and a weapons systems officer. The 345th BS aircrew currently comprises eight Air Reserve Technicians and 16 Traditional Reservists. For 2017 there are slots available for an additional eight aviators (four pilots and four WSOs). The 489th has been recognised by Global Strike Command and AFRC as the fastest growing TFI unit and the quickest to integrate with an active duty counterpart to date. Such leadership has given it a dynamic role in shaping the future of worldwide B-1B operations. The 489th





has been asked to supply a single crew and two support troops as well as a maintenance team for the Continuous Bomber Presence in the Pacific at Andersen AFB on Guam, despite the Group not yet attaining Initial Operating Capability. Finally, Reserve B-1B aircrews have been leading some operations in support of US Southern Command SOUTHCOM operations that are normally led by an active duty squadron. For these, the unit has been involved with Joint Interagency Task Force South (JIATF-South), which co-ordinates with the interagency and international partners in the fight against international organised crime networks and support interdiction and apprehension by US and partner-nation law enforcement agencies.

BACK TO EUROPE

The 489th BG deployed to Europe for the first time since World War Two last year and took part in Exercise Ample Strike, held in the Czech Republic. The group was based at RAF Fairford, Gloucestershire, from August 28 to September 27. The exercise involved 17 NATO and partner nations training with joint terminal attack controllers (JTACs) and forward air controllers (FACs).

The deployment was under the umbrella of Operation Atlantic Resolve, the United States' assurance and deterrence operation in Europe following Russia's annexation of Crimea. The 489th deployment consisted of two B-1Bs while a B-52H from the 307th BW also took part from Fairford. The Lancers were supported by personnel from

other units – the 7th Operational Support Squadron, 9th BS, 28th BS, 7th Aircraft Maintenance Squadron and other active duty units from the 7th BW.

The 2016 edition of this exercise marked the first time the US had deployed overseas the B-1B and B-52H together on a joint mission. Additionally, the B-1Bs both had the crucial Sustainment Block 16 upgrades. These jets flew 74 flight hours during the exercise allowing for extensive training with the newest technology available to the B-1 fleet.

The Block 16 upgrades are the largest and most comprehensive in the history of the B-1B programme. Survivability of the bomber has been improved by eliminating many of the aircrew's out-dated systems and procedures. It includes upgraded



Far left: The 489th Bomb Group commander's jet painted with sombre POW/MIA nose art. Most of the B-1Bs at Dyess now carry nose art.

Centre left: Aircraft 85-0089 wears the tail band of the 489th BG and carries 'CC' to signify it is flown by the unit's commander.

Above: The 7th BW commander's B-1B, flown by a 489th BG crew, is refuelled over Oklahoma by a KC-135 from the Iowa ANG. The 489th BG uses aircraft from this wing as it doesn't have its own B-1Bs.



navigation and radar systems, a modernised cockpit replacing the two monochrome pilot and co-pilot displays with four colour, multi-function displays, a fully integrated data link and a central integrated test system. This is used to detect and troubleshoot anomalies in the aft station. A modern moving map has been introduced.

The result is increased situational awareness as well as better systems reliability. It allows better data sharing between the B-1B and other aircraft as well as forces on the ground. The Lancer also employs the Lockheed Martin Sniper Advanced Targeting Pod Extended Range (ATP-XR), mounted on an external pylon below the cockpit. It can, for example, track vehicles by day and night. Using the pod means the B-1B can hit moving targets using the GBU-54 Laser Joint Direct Attack Munition (JDAM). This proved valuable during Ample Strike by helping aircrews acquire targets given to them by JTACs much faster and strike them with more lethal accuracy. Col Heinz said it was a 90-minute flight to the training area in the Czech Republic where

crews worked with JTACs/FACs and dropped simulated weapons on targets for up to two hours before returning to Fairford. He commented: "This has provided phenomenal training for our aircrews as well as the FAC/JTAC controllers. I flew the first sortie with Czech controllers and was impressed with their skills and professionalism." He added: "The Block 16 upgrades simply provide the aircrew and mission commander with an almost overwhelming amount of information about the battle space. Often, on home station sorties, an aircrew member will simulate a ground controller, but this realistic training has been invaluable for the crews as well as the controllers. The goal is to train like you plan to fight, Ample Strike gave this opportunity."

The B-1B successfully completed the exercise with zero missed sorties. During the deployment a B-1B and the B-52H also participated in the NATO Air Days airshow in Ostrava, Czech Republic. The visit by two USAF strategic bombers sent a strong message in the region. Ample Strike also provided further validation for the

Above: Both 307th BW types are represented in this image. The B-52 Spirit of Abilene is based at Barksdale AFB in Louisiana, while the 489th BG B-1B Lancer hails from Dyess AFB, Texas.

Above right: Close-up view of the Lockheed Martin Sniper XR pod. The pod, along with the various other Block 16 upgrades, brings significantly increased targeting capabilities to the B-1B fleet.

Right: Col Denis Heinz and crew prepare to launch during a drill weekend mission. This sortie was the first fully reserve-crewed B-1B in USAF history.

Below right: The only B-1B in 489th BG markings lands back at RAF Fairford after an Ample Strike sortie. Darren Willmin/Aviation In Action

USAF's Total Force model. By successfully deploying a mixed force of active duty and reserve airmen, the 489th and the B-1Bs proved TFI is tactically effective and will become more seamless to the larger USAF. There is no doubt the legacy of the historic 489th BG is in safe hands. **AN**





ILLUSTRIOUS PAST

The reactivation of the 489th Bomb Group (BG) took place exactly 70 years to the day after it was disbanded at the end World War Two. It began in October 1943 when the 489th BG was activated as part of the Eighth Air Force flying Consolidated B-24 Liberator bombers at Wendover Army Air Field, Utah. The unit entered the European theatre in May 1944, attacking targets across the Channel from Halesworth, Suffolk in preparation for the Normandy invasion. In one raid against coastal defences near Wimereaux, between Boulogne and Calais, on June 5, 1944, the group's lead plane was seriously crippled by enemy fire, killing its pilot. The Deputy Group Commander, Lt Col Leon R Vance Jr, who was commanding the formation was seriously injured. Although his right foot was practically severed, Vance took control of the B-24 and led the group to a successful mission. He managed to fly the damaged aircraft back to the coast of England, where he ordered the crew to bail out. Believing a wounded man had been unable to jump; he ditched the bomber in the English Channel and was rescued. Vance was awarded the Medal of Honor for his actions, the only B-24 pilot to receive the decoration.

Next day the 489th BG supported the Normandy landings, on June 6, 1944, thereafter bombed coastal defences, airfields, bridges, railways and V-weapon sites in the campaign for France. It was not long before it was also flying missions into Germany, primarily bombing strategic targets such as factories, oil refineries and storage plants. It also participated in the saturation bombing of German lines just before the breakthrough at Saint-Lô. Later that year the unit returned to the US to prepare for redeployment to the Pacific theatre redesignated as the 489th Bombardment Group (Very Heavy) and equipped with the Boeing B-29 Superfortress. The war ended before its deployment and the unit was deactivated on October 17, 1945.



This angle shows some of the graceful lines of the Lancer.

SUBSCRIBE &

WHEN YOU TAKE OUT A **2-YEAR** OR
DIRECT DEBIT SUBSCRIPTION TO

AVIATION^{NEWS}

THE PAST, PRESENT AND FUTURE OF FLIGHT



Image: Jamie Hunter

3 EASY WAYS TO ORDER This fantastic subscription offer!



Visit
www.aviation-news.co.uk



Call
UK: 01780 480404,
ROW: (+44)1780 480404



Complete the form and post to:
Aviation News, Key Publishing Ltd,
PO Box 300, Stamford, Lincs,
PE9 1NA, United Kingdom

Readers in the USA may place orders by
telephone toll-free **800-428-3003**
or fax **757-428-6253**
or by writing to **Aviation News, 3330 Pacific
Ave,
Ste 500, Virginia Beach, VA 23451-9828**
Alternatively, order online at
www.imsnews.com/aviationnews
quoting/entering code **AN0217**

Free gift is only available on Direct Debit with a minimum 2 year subscription.

☒ **YES,** I would like to subscribe to Aviation News

Please complete to receive news updates and offers from us by email.

Gift Choice: A-4 Skyhawk Cockpit DVD ☐ Extreme Airports Vol.3 DVD ☐ Please send gift card tick here ☐

OFFER CLOSE DATE: 28 FEBRUARY 2017 PLEASE QUOTE: AN0217

Signature Today's date

1303/16

Banks and building societies may not accept Direct Debit Instructions for some types of account.

Direct Debit UK only. If paying by Direct Debit please send in form.

Payments are accepted by Direct Debit, cheque, Postal Order, Credit Card and US Dollar check. Payments by credit or debit card will be shown on your statement as Key Publishing Ltd. Key Publishing will hold your details to process and fulfil your subscription order. Occasionally we may wish to contact you to notify you of special offers on products or events. If you do not wish to receive this information please tick here ☐ or mention when calling. Gift subject to change. Any alternative gift will be of equal or higher value. Should you cancel your subscription earlier than an invoice will be raised for the full price of the gift.

FRENCH POSTAL TRANSALLS

GETTING THE MAIL THROUGH

The Transall C-160 has been a military transport workhorse for decades, however from 1973 to 1991 it also flew mail in France. **Frédéric Marsaly** lifts the lid on this little-known aspect of the C-160's history.



Mail flights criss-cross countries in the dead of night operated by airliners or commuter aircraft configured for the task. However, an interesting exception to this norm occurred in France where an aircraft designed as a military transport was drafted in on postal duties.

The use of aircraft in France to carry the mail dates back to 1918 when Les Lignes Latécoère was formed for this purpose. It later became Aéropostale which developed an innovative and reliable service with aerial routes set up both within France and externally, including from Toulouse to Santiago in Chile. Its motto was 'the mail must pass through'.

At the end of World War Two, following the German occupation of France and the subsequent heavy fighting, the aerial postal service that had been operating prior to the conflict had to be reorganised for the challenges that lay ahead. In 1947 the

French Postes, Télégraphes et Téléphones (PTT) administration signed an agreement with Air France to provide aircraft for the new services. The agreement prompted Air France to create a special department, the Centre d'Exploitation Postal (CEP/Postal Operations Centre). To begin with, French-built Junkers 52/3M transport aircraft (or Amiot AAC.1s) were used. The night-time links provided by these reliable machines ensured that a letter posted within France could be delivered to any part of the country within 24 hours. As the network expanded, a batch of Douglas DC-3s was drafted in to complement the trimotors. In 1962 Douglas DC-4s replaced the AAC.1s and then in 1968 Fokker F27 Friendshipships were procured to replace the DC-3s.

On January 2, 1969, the Aviation Postale Intérieure (API) organisation was established following an agreement between Air France and PTT; this in turn altered the

way in which the CEP functioned. From then on the aircraft used were owned by PTT and operated by Air France. The airline provided and trained the aircrews, whilst all fees and usage costs were charged to PTT.

In 1971 the French Government separated the two elements of PTT – the Direction Générale des Télécommunications (DGT) and the Direction Générale de la Poste (DGP). The latter adopted the name La Poste in 1990 when it became an independent public sector company.

By 1970 operations were expanding, with 11 routes within France being flown by a fleet of 12 F27s and seven DC-4s. The previous year, API carried a total of 30,000 tons of mail. However, with an

increasing workload, both

API and CEP were looking for a more advanced aircraft type that would be faster and able to



Main photo: Throughout their career the C-160Ps were flown by Air France crew. J Guillem

Far left: Transall C-160P F-BUFQ was assigned the military serial F50 by the French Air Force. D Roosens Collection

Left: The postal Transalls only flew within France, including Corsica. S Guillemin Collection

A rare photo of a C-160P flying during the daytime – normally the type only took to the air at night to carry mail. D Roosens Collection



carry a heavier payload. Such a machine would also have to cope with the 621-mile (1,000km) route between Paris and Corsica, the longest journey on the internal network. Many aircraft were considered, including the Lockheed L-188 Electra, Armstrong Whitworth Argosy, Vickers Vanguard and Lockheed C-130 Hercules. The Sud Aviation Caravelle airliner was also considered, but following a month of trials on the Paris-Nice-Toulouse-Paris route, it was considered too noisy for night-time use at airports close to cities, in particular at Orly and Toulouse, where local residents had complained.

In May 1967, the Armée de l'Air (French Air Force) received its first example of a new tactical transport aircraft, the Transall C-160, which was delivered from the production line at Lemwerder

in West Germany. One month later, the first C-160 produced in France, at the Bourges factory, was rolled out. It was during the late 1960s and early 1970s that API and CEP began to look more closely at the C-160 as a possible addition to its fleet. It was a smaller aircraft than the Hercules, could not carry as big a payload and had less range and speed, but it was cheaper. After three years of discussions between the relevant parties, it was decided that PTT would lease four C-160s from the Armée de l'Air over a five-year period. The first of the four, F16 (F-RAMK), was delivered on August 10, 1972 and the last on January 30, 1973 – the other registrations being F47 (F-RAMS), F49 (F-RAMU) and F50 (F-RAMV). The civilian registrations were changed for the purposes of their new role, becoming F16 (F-BUFP), F47 (F-BUFQ), F49 (F-BUFR) and F50 (F-BUFS).

The modifications were undertaken at Châteauroux and each aircraft

was fitted with two rows of rails so that postal containers could be loaded. The resulting postal C-160P was able to carry 26 containers each capable of holding 1,323lb (600kg) of payload or 50 mailbags and were the only aircraft in the so equipped. In contrast, the F27s carried mailbags on shelves fitted to the sides of the fuselage. Containers made loading and unloading easier, faster and achievable with smaller workforces, which in turn delivered cost savings. In addition, the main instruments in the C-160 cockpits were replaced by the same types used in the F27, this enabled aircrews to have two type qualifications and regularly fly both aircraft.

The airworthiness certificate for the C-160P was awarded on June 22, 1973 and the first operational flight took place in July 1973 on the Paris-Lyon-Marseille-Nice-Corsica route. Usually one C-160P would fly overnight from Paris to Corsica, while a second flew the corresponding return route.



The last two C-160Ps were retired in 1991. J Guillem via S Guillem



Both aircraft would then spend the following day at Orly and Bastia, or Ajaccio, and the next night they would fly the respective routes with a stop-over. With two aircraft in operation and two in maintenance, the reliability of the C-160P fleet was good over the whole their career flying the mail.

OPERATIONS

The first years of C-160P service were very busy with each aircraft amassing about 1,000 flying hours per year. In 1975, 42,750 tons of mail were carried, this being equivalent to 170 tons each night. In 1978, the combined air postal activity peaked at 47,297 tons of mail with an availability rate for the C-160P fleet of 98.79%. Another factor that helped to get the mail through in poor weather was that all aircraft captains were allowed 'to go to see'. This meant that in poor night-flying conditions, such as rain, fog or snow, the aircrew could override regulations and follow the instrument landing

system (ILS), even under the minima, until they saw the runway. They were able to fly what in effect were Cat III ILS landings with a CAT I certified aircraft. This procedure was the responsibility of each aircraft captain and proved to be a successful one.

The C-160P fleet lease was due to end in 1979, but at around this time the Armée de l'Air ordered a batch of new-generation Transalls. Consequently, the C-160Ps were no longer required by the French military and were sold to CEP for the same price as two of the new-generation aircraft. However, a revolution was approaching. In 1981 President François Mitterrand inaugurated the TGV high-speed train. With a maximum speed of 168mph (270km/h), it could travel between Paris and Lyon on a dedicated railway line in just 2hrs 30mins. In 1984, a postal TGV was brought into service that could carry a 61-ton payload (compared with the 14 tons of the C-160Ps) in all weathers. This led to a reduction in the C-160P fleet;

during November 1984, F16 and F49 were returned to the Armée de l'Air, flying with the military until their respective retirements in December 1998 and November 2008. The aerial postal network was flown by the remaining two C-160Ps and 15 F27s.

At around the same time, Air Inter introduced the Airbus A300 on its domestic routes, which was able to carry a combination of passengers and freight. As a large percentage of the passengers, many of them on business trips, didn't travel with much luggage, the La Poste policy changed. An agreement was signed with Air Inter, and other companies such as TAT and Uni Air, for daily mail transportation. The contract between Air France and La Poste was terminated in 1985, and a new organisation was created in which the airline TAT had a 33% share. The new company became known as Société Française de Messagerie Internationale (SFMI). The livery worn by the two C-160Ps changed with the Air ►

Transall C-160P F-BUFS at rest during the day at Paris Orly between night postal flights on May 16, 1977. Christian Volpati



Behind this Transall at Orly is one of the F27s also used for postal flights. Christian Volpati



Transall F-BUFS's fuselage is now used to calibrate the carriage of loads at the Toulouse Aeronautical Test Centre for the French Air Force C-160 fleet. Henri-Pierre Grolleau

France logo replaced by that of La Poste, but the national carrier still trained and provided pilots and ground agents.

As La Poste had launched a new 48-hour delivery service for small parcels, the volume of freight carried increased considerably. This led SFMI to sign new contracts for a TAT Fairchild Hiller FH-227, a heavy-lift Canadair CL-44 and a Vickers Vanguard from Intercargo. (The Vanguard aircraft subsequently crashed on the night of January 28-29, 1988 while taking off from Toulouse. The crew were unhurt, but most of the load was lost.) These new machines not only

increased the available capacity, but were, in effect, replacements for the two departed C-160Ps. The remaining two C-160Ps, with their large cargo holds and payloads, were in great demand. They flew to Corsica, Brittany and Bordeaux, continuing to prove their outstanding reliability.

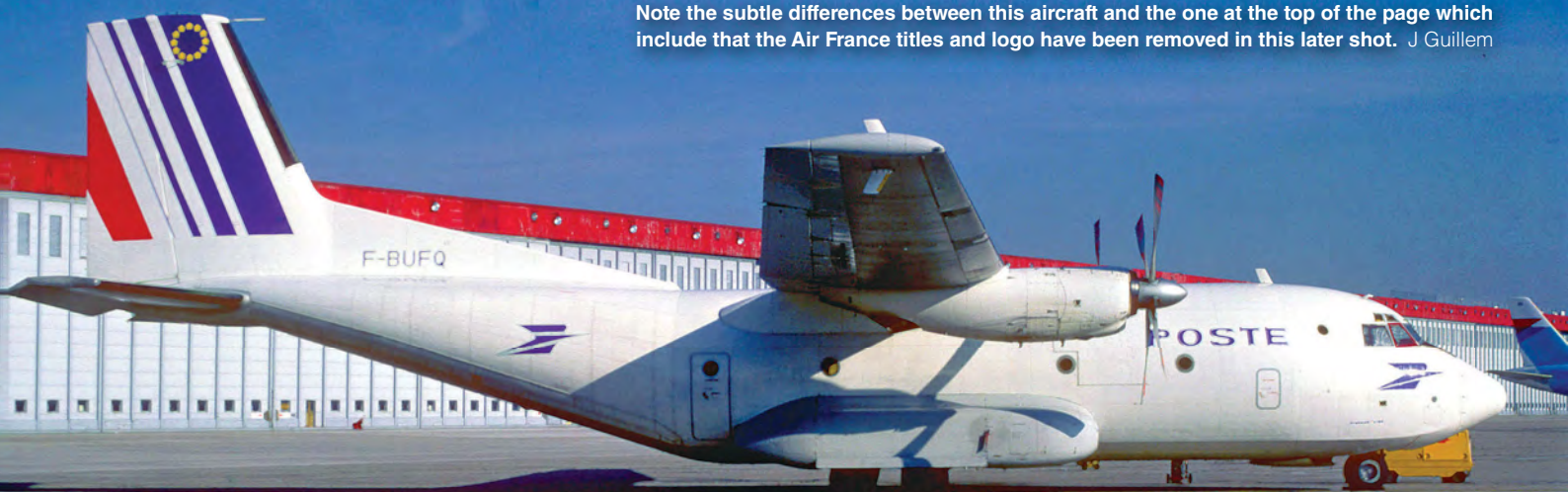
REORGANISATION AND RETIREMENT

At the start of the 1990s, the French postal aerial service was reorganised with the creation of a new operator called l'Aéropostale (airmail), which was a joint

venture between Air France, Air Inter (Air Inter Europe), TAT and La Poste. The aircraft fleet was made up of 16 Boeing 737-200 and 737-300QC (Quick Change) aircraft; these could be used to fly passengers by day and freight by night. They entered service alongside the 15 F27s and the two C-160Ps. Despite their obvious qualities, it did not prove economical to keep flying the C-160Ps and so they were phased out in 1991, with an average of 15,000 hours and more than 19,000 cycles flown. They were transferred to the Armée de l'Air – F47 being used at Cazaux Air Base for fire-fighting training while F50 was sent to Évreux and then to the Centre d'Essais Aéronautiques (CEAT/ Toulouse Aeronautical Test Centre). The hull of this reliable aircraft has since undergone endurance and ageing tests for the benefit of the entire military C-160 fleet, the aim being to see if other C-160s can be flown until they reach 22,500 cycles and 27,900 flying hours. The hull of F50 has also been used for the calibration of airborne loads, alongside a C-130A hull which is undertaking the same duties on behalf of the Armée de l'Air Hercules fleet.

In the whole of their career flying the mail, the C-160P fleet flew a total of 51,000 hours without any incidents. Combined with its high availability rate it is a tribute to the design of the aircraft that the type performed so well. **AN**

Note the subtle differences between this aircraft and the one at the top of the page which include that the Air France titles and logo have been removed in this later shot. J Guillem



Commemorating the men and machines of the RAF's strategic force

BOMBER COMMAND



Formed 80 years ago in the biplane era, Bomber Command was devised as a force that could deliver a hammer blow to potential aggressors. This 100-page special publication from the team behind *FlyPast* magazine pays tribute to the men of a mighty strategic force that played a significant role in the destruction of Europe's totalitarian regimes.

FEATURING:

Details of every Bomber Command operational squadron, 1936 to 1968

The life and times of Arthur 'Bomber' Harris, the command's warlord

Major milestones in the command's history

Bomber Command's lesser known types

Stories of aircrew on raids deep into Europe

The wartime airfields and what remains today

The present-day RAF squadrons that served with Bomber Command

And much more!

010/17

ORDER DIRECT

JUST £5.99 PLUS FREE P&P*

*Free 2nd class P&P on all UK & BFPO orders. Overseas charges apply.

Free P&P* when you order online at
www.keypublishing.com/shop

OR

Call UK: 01780 480404
Overseas: +44 1780 480404

Monday to Friday 9am-5:30pm

SUBSCRIBERS CALL FOR YOUR £1.00 DISCOUNT!

HARRIER GR.3s ON THE FRONTLINE

RAF GERMANY COLD WAR OPS

Air Chief Marshal (Ret'd) Sir Richard Johns recalls his time as Officer Commanding of 3 (Fighter) Squadron during the Cold War to **Doug Gordon**.

The RAF's 3 (Fighter) Squadron began its association with the Harrier on January 1, 1972 when it traded in its Canberras for Harrier GR.1As at RAF Wildenrath in North Rhine-Westphalia as part of RAF Germany (RAFG). It shared the base with both IV (Army Co-operation) Squadron and 20 Squadron, both of which were flying the GR.1 variant of the Vertical/Short Take-Off and Landing (V/STOL) ground-attack aircraft.

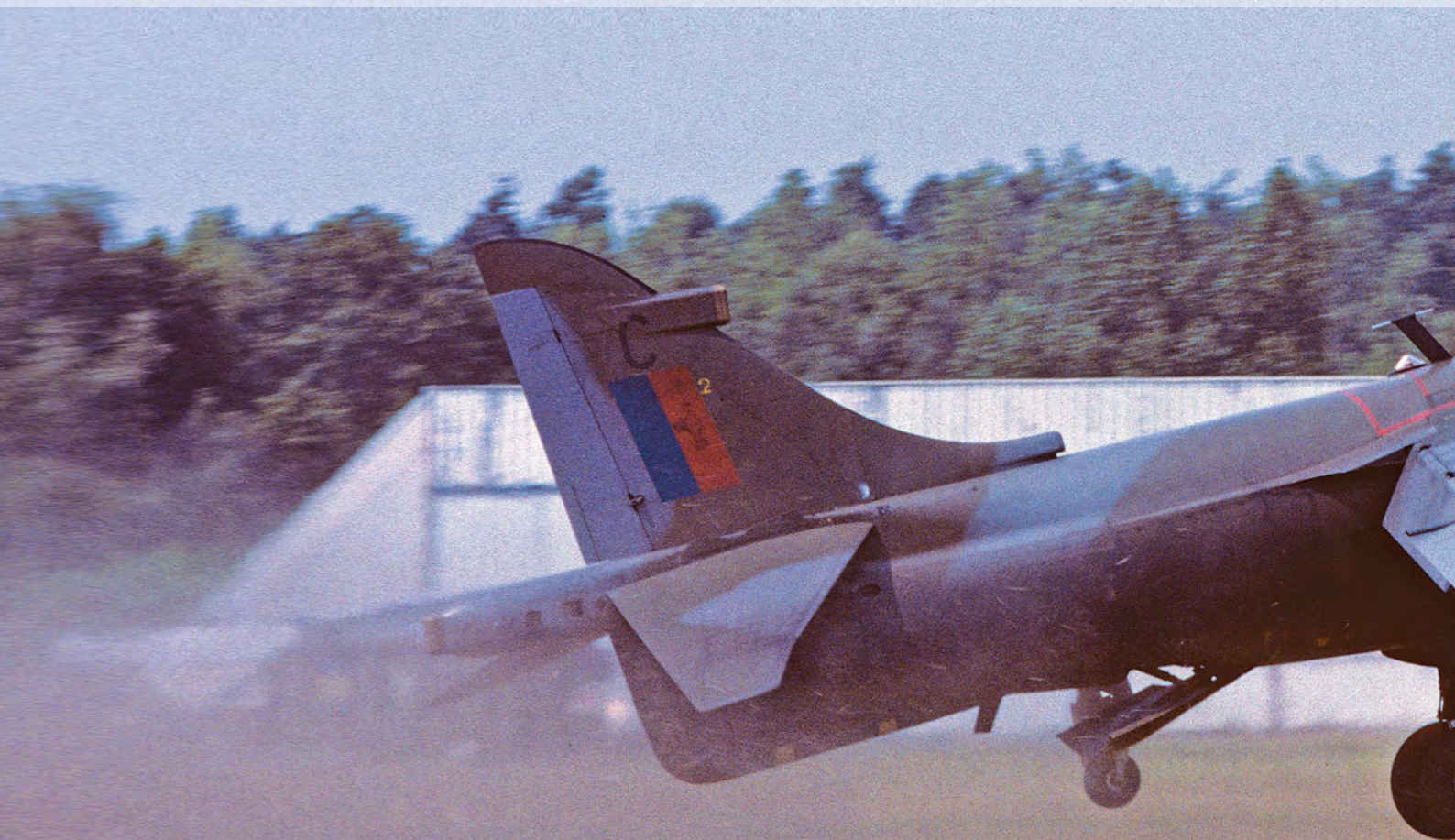
The squadron was the last of the initial Harrier units to be formed and it had two primary missions: battlefield interdiction and tactical reconnaissance. It was assigned 12 aircraft and 16 pilots to achieve this.

In January 1975 Air Chief Marshal (ACM) Richard Johns (then a Wing Commander) was appointed Officer Commanding (OC) of 3(F) Sqn which was replacing its Harrier GR.1As with the new GR.3 variant.

Compared with the initial GR.1, the GR.1A version had an updated 20,500lb/thrust Rolls-Royce Pegasus 10/Mk.102 engine, but the new GR.3 had even more power courtesy of its upgraded 21,500lb/thrust Pegasus 11/Mk.103. It was also fitted with the laser rangefinder and marked target seeker (LRMTS), which gave the aircraft its 'dolphin' nose profile. A radar warning receiver was also fitted to the leading edge of the vertical tail.

ACM Johns had converted to the GR.1A (and later the GR.3) at the Harrier Operational Conversion Unit in 1974. He had previously flown the Gloster Javelin, Hawker Hunter FR.10 and the Folland Gnat.

"In conventional flight, the Harrier was not a patch on the Hunter," he recalls. "The ride was bumpier and the turning performance not so good; but it was fit for purpose and the weapons system was easy to use for low-level operations. Achievement of NATO qualifying standards was not difficult. "We trained hard at low level and only went to medium level for transit flying or air-to-air combat when bad weather stopped low flying. The GR.3 also introduced an ECM [electronic



countermeasures] capability and a nose-mounted laser, which together gave improved weapons delivery and survivability.

"Two main serviceability problems concerned the radio fit, poor transmission and reception and the rather unreliable inertial navigation attack system. Shortly after take-off, a quick look at the moving map display would tell you if it was drifting off. Although you could fix it over a known feature, I preferred to ignore it and rely on old-fashioned heading, speed and time method as I used as a Hunter FR [Fighter Reconnaissance] pilot."

In 1977 the squadron moved to RAF Gütersloh in company with IV(AC) Sqn. At this point in time 20 Sqn was disbanded and its pilots, aircraft and ground crews were divided between the other two units; 3(F) Sqn expanding to 18 aircraft and 24 pilots.

The decision to move the RAFG Harrier force from Wildenrath to Gütersloh was a tactical one. The mission of the Harrier squadrons was to support the Army's 1 British Corps, which was a part of the Northern Army Group (NORTHAG). ACM Johns recalls: "The rear echelon of the 1 British Corps was a good 100nm to the east of Wildenrath. Getting from Wildenrath to our war sites in transition to war was critically dependent on warning time. Most of us felt that we would probably not have sufficient time, particularly with all our support vehicles and weapons moving east against a flow of refugees hurrying west.

"I was doubtful that we would be able to get off base. So, at the back end of 1976 and



Group Captain Richard Johns, pictured when he was Harrier Force Commander in RAF Germany, a post held from March 1982 to November, 1984. He was previously Officer Commanding of 3(F) Sqn. via Richard Johns

early 1977 the whole Harrier force deployed 135 miles east to RAF Gütersloh, where we were in easy reach of our forward deployment sites, where we could get off base quickly and where we would seek protection by dispersal and concealment."

FIELD OPERATIONS

The ability to disperse to 'field' sites was vital to the Harrier's role in the event of hostilities breaking out. The Harrier's V/STOL capability

meant it required only a stretch of minor road, a small wood or copse or other shelter and the space to lay down a 70ft (21m) square Mexe Pad for aircraft to land on. ACM Johns explains: "Our war sites were very difficult to find. They were on a strictly need-to-know basis and the only people in my squadron who knew were the site commanders, some station engineering and operations officers and the commanding officers of the relevant Royal Engineers and Royal Signals regiments.

"We had three war sites to go to. Once NATO had started the formal alert system preparation, parties would go out to the war sites. They would prepare them to receive aeroplanes by, for example, knocking down telegraph poles that might encroach on operations. All that was needed was a strip of minor road about 500m long and ten metres wide to enable take off with a full weapons load. Then we just needed a space for the Mexe Pad we would be landing on. The latter would be placed in close proximity to where the hide was to minimise exposure time. All war sites used minor roads for take off after taxiing out from 'sheltered accommodation' within existing infrastructure. This does not mean that all aircraft hides were within buildings – some were in adjacent yards to factories and camouflaged. No war sites operated from woods."

He continued: "One of our war sites was a particularly attractive one as it was at a brewery! This brewery had minor roads



A 3(F) Sqn Harrier GR.3 demonstrates its ability to operate from a grass strip. Peter Foster



No.3(F) Sqn was activated at RAF Wildenrath on January, 1972 and equipped with Harrier GR.1As. sg-etuo.de Erich Westersötebier

either side of it and an underground area that lorries accessed down a ramp to load the beer they were to deliver to the customers. All we had to do was to clear the beer lorries out and we could taxi the aeroplanes underground where they could be refuelled and re-armed and then taxied out of the other side and on to the road to take off.

"In a wartime deployment to the dispersal sites, timing was of crucial importance. It was envisaged under the WARLOC (War Location) concept that the first sorties would be carried out from the main base. With the missions accomplished Harriers would land back at their allotted war site to be re-armed and refuelled

for their next tasking."

He added: "It was not possible to use the wartime sites during peacetime in order to keep them secret so these were simulated on local land areas, principally the Sennelager British Army training area which was 25 miles (40km) to the east of Gütersloh. We exercised from woods in peace time because we could not get access to such infrastructure as we planned to use in war. In terms of operating it was much more of a challenge to work from rural peacetime exercise sites. On exercise the Harrier Force would use a mix of grass and road sites [for taking off].

"Getting access to road sites outside military

training areas in peacetime was difficult! We tried to minimise disturbance to local civilians. We did fly off grass strips when conditions allowed. If necessary you could do a rolling vertical landing (50kts) on to grass if firm enough."

A favourite area for ACM Johns was at Eberhardt, which became operational in 1974: He explains: "Three [training] sites were allocated to 3(F) Sqn and three to IV Sqn. The dispersed force was commanded by the Forward Wing Operations Centre [FWOC] where the Force Commander sat with the Force Engineer, the Force Intelligence Officer and the Commander of 33 Wing, RAF Regiment. FWOC was remote and well hidden and communications were provided by the Army.

"In addition to this, there were two heavily camouflaged logistic parks, which, every night, re-equipped the flying sites with all their needs from weapons to food. Fortnight-long deployments to the sites were held three times a year, all under close scrutiny. The first, in



Poor weather in central Europe often caused boggy conditions so when aircraft ventured off the tin taxi tracks it was not uncommon for them to get stuck in soft ground. Phil Ward



On November 4, 1975 Prince Philip, The Duke of Edinburgh, visited Gütersloh and a field site at Eberhardt. The then Wg Cdr Johns is partially obscured by the Prince. To the OC's immediate left is Air Marshal Sir Nigel Maynard Commander-in-Chief RAF Germany and to his left facing HRH is Group Captain David Leech, Harrier Force Commander. Phil Ward

'All we had to do was to clear the beer lorries out and we could taxi the aeroplanes underground...'

April, was under the watchful eye of a team from RAF Gütersloh, which was looking to ensure all NATO procedures were operating correctly. The second dispersal, in June, was overlooked by a team from RAF Germany. The third and final deployment of the year, in September, was subject to a NATO TACEVAL [Tactical Evaluation]."

ACM Johns said "I think anyone going into the field for their first deployment was pretty nervous about it. After you'd done about three deployments, you were getting confident in your ability to do the job. It was a unique way of living for military aircrew in those days. We were living in tents, we shared all our rations and cooking with our ground troops and, more often than not, it was very muddy. I can remember very few exercises when we went



out and didn't get wet. There was a terrific esprit de corps. People were very proud of the Harrier Force. We did something that no one else could do.

"As far as sortie generation was concerned, in peacetime we were restricted by German low-flying restrictions and times that meant we could only fly [at low level] between 0800hrs and 1700hrs. Nonetheless, with six Harriers on site we would certainly expect to generate at least 36 to 40 sorties a day.

"It most certainly would have worked in war. At that time, the flying that we did was in pairs, under FAC [Forward Air Control]. I didn't like that one bit, and when I was Harrier Force Commander a couple of years later I managed to get it changed after talking to the Army. I asked them not to 'muck around' just sending pairs to knock out a few solitary tanks. I told them they should wait until they've canalised an army's worth of armour that could no longer operate successfully because they were concentrating on getting across a river or other obstacle, or their manoeuvring had forced a concentration. Then they should let us loose and allow us to put 24 aeroplanes in a concentrated attack, each armed with five BL 755 cluster bombs, which would have a considerable impact."

The BL 755 was the Harrier Force's preferred weapon against Warsaw Pact armour in the mid-1970s. The GR.3 could also carry two ADEN cannon pods on its fuselage centreline; with each cannon carrying 100 rounds of high-explosive 30mm ammunition. The aircraft could also be fitted with four Matra rocket pods, each loaded with 18 French-designed SNEB 68mm rockets.

ARMAMENT PRACTICE CAMP

The whole squadron detached to Decimomannu, Sicily, once a year for three weeks of weapons training on an armament practice camp. This was one deployment the OC particularly enjoyed: "It was my favourite deployment of the year," he says. "Those three weeks with the whole squadron were great fun, and the competition in terms of who was going to get the best scores was acute. The aim of the exercise was a concentrated period of weapons training. We used to do retard bombing, SNEB rocket firing and strafing with the 30mm cannons. It was a great opportunity to get the kit right on the aeroplane, as well as

A Harrier GR.3 receives attention while a two-seat T.4 lands in the background at a field site near Geseke, approximately 19 miles from RAF Gütersloh. Phil Ward

getting really good practice at live firing. The bombs were practice; but the rockets were live and the cannons were armed with standard shells and not HE [High Explosive]."

Other ranges were used in Europe for air-to-ground weapons practice, most notably Nordhorn in Lower Saxony, West Germany. The Harrier GR.1 and GR.3 were both equipped internally with a single port-facing integral Vinten F.95 camera. The jets were also capable of carrying a Vinten low-level

daylight reconnaissance pod mounted on the aircraft's centreline. This pod was fitted with four F.95 cameras in the side-oblique configuration and an F.135 camera in the vertical position. The squadron's secondary mission was battlefield reconnaissance, but it was not a task it was often given as IV(AC) Sqn received the majority of these missions. According to ACM Johns: "We were rarely tasked on a reconnaissance sortie. If a flight was required to perform such a mission then, on completion of the sortie, the aeroplane would usually land at a IV Sqn site where the film would be downloaded, processed and interpreted." ▶



Harrier GR.3 XZ138 at a field site. This aircraft entered service with 3(F) Sqn in 1976. It featured in the Queen's Jubilee celebrations at RAF Finningley in June 1977. Phil Ward

THE QUEEN'S SILVER JUBILEE REVIEW, JUNE 1977

In June 1977 the RAF's 3(F) Sqn was tasked with presenting a six-aircraft Harrier display at the Queen's Silver Jubilee Review at RAF Finningley, Yorkshire. The pilots involved were the then Wg Cdr Richard Johns (pairs leader), Flt Lt Dave Binnie, Sqn Ldr Keith Holland, Flt Lt Neil Wharton, Flt Lt Ian Huzzard and Flt Lt Graham Tomlinson. Reserve pilots were Sqn Ldr Peter Squires (reserve leader) and Lt Cdr Byron Duff – the latter a US Navy exchange pilot. ACM Johns describes leading the formation as "my most memorable sortie."

"Our job was to show that the Harrier was a proper weapon of war. We used six aircraft in the show and had two spares. We [Wg Cdr Johns and Flt Lt Binnie] came out of our hides, which were on the south side of the airfield opposite the stand where the Queen was sitting, and did a pairs take off from the grass. In addition to our gun pods, each of us was carrying four SNEB pods and our basic job for most of the show was to fly very fast and very low, pulling lots of G-force to show that the aeroplane wasn't just fast, but could also turn tightly. These manoeuvres were choreographed with the other four Harriers, which were doing simultaneous and co-ordinated V/STOL manoeuvres from separate Mexe Pads.

"At the end of the show the four Harriers, which had been doing the V/STOL routines, bowed to the Queen. Two of these then landed vertically on the pads and the other two moved forward and performed vertical landings on the runway while myself and Dave Binnie came in behind them so we had four aeroplanes touching down simultaneously on the runway.

"When the display was successfully completed in front of Her Majesty and a vast array of VIPs, I was relieved. We had rehearsed and trained hard for the event, but were operating close to the aeroplane's limits. Immediately after the show all aeroplanes returned to Gütersloh because the squadron was expecting a TACEVAL."



An engine change is carried out in the field. sg-etuo.de Mark Richards



A 3(F) Sqn Harrier T.4 lines up with a Royal Danish Air Force F-100D Super Sabre from Eskadrille 727 at RAF Gütersloh during a squadron exchange in 1976. sg-etuo.de Thomas Westhoff-Düppmann

Squadron exchanges with other NATO units were an important and integral part of training. These exchanges sought to foster good working relationships between the units by flying together and learning about one another's tactics and aircraft.

During the time that ACM Johns was OC of 3(F) Sqn the unit was involved in two NATO-sponsored exchanges. The first of these occurred in June 1975 when the squadron visited the Luftwaffe base at Husum in northern West Germany. Husum was the home of Leichtes Kampfgeschwader 41 (LKG41), which flew the Fiat G.91 in the ground-attack role.

"We performed composite simulated attack profiles with them up in north Germany," ACM Johns recalls. "We were also involved in a NATO exercise called Crack Force during our time at Husum, which was an air defence exercise in which we played the attackers."

ACM Johns' squadron also took part in an exchange with Eskadrille 727 (Fighter Squadron 727) of the Royal Danish Air Force at

Skrydstrup in southern Jutland in March 1976.

"When we went to Skrydstrup they were flying the [North American] F-100 Super Sabre and, apart from being allowed to do low-level operations in Denmark, we also did dissimilar air combat training [DACT] with them."

The squadron also enjoyed an exchange with 421 Sqn of the Royal Canadian Air Force (RCAF) at Baden-Soellingen in Baden-Württemberg, West Germany, in October 1976, although the event was not conducted under the auspices of NATO and was organised by the units themselves. The Canadian squadron was operating the CF-104 Starfighter in the conventional strike role at the time.

AIR-TO-AIR

The Harrier GR.3 was not designed as an air defence fighter and was never intended to be used as such. Nonetheless it was necessary for the pilots of the aircraft to learn and practice manoeuvres that would enable them to avoid being shot down while flying a mission. To this end crews engaged

in exercises with other units with a view to developing evasion and escape tactics when engaged by air defence fighters.

Many of the training 'encounters' were impromptu, as ACM Johns explains: "Most of our air combat and low-level intercept was conducted with our own people. When on a gunnery mission or exercise, we would give our targets to our air defence boys flying the Lightning or the Phantom. They would set up CAP [Combat Air Patrol] lines and try to intercept us on the way, all at low level.

"The Dutch would always join in given half a chance. When we went over the border into Holland we would often find ourselves 'bushwhacked' by Dutch air force [Northrop] F-5 Freedom Fighters. The Dutch were far and away the most aggressive out in that neck of the woods; quite often supported by the Belgians, who wouldn't be slow to join in if they possibly could."

In the air-to-air combat role the Harrier's 'party piece' was Vectoring in Forward Flight – or VIFFing. Rotating the vectored thrust nozzles into a forward-facing position during normal flight allowed for more sudden deceleration and higher turn rates. This braking effect could cause a chasing aircraft to overshoot and present itself as a target for the Harrier it was chasing. However, as ACM Johns explains VIFFing had to be used cautiously. "One you started VIFFing you were losing energy. If someone was coming into attack you from line astern, you could get an overshoot very easily because there was nothing that could slow down quite as fast as a Harrier, particularly if he was coming in for a guns kill.

"But, it was all very well forcing an overshoot, but we didn't carry any air-to-air missiles at that time and the only weapon we had were our two 30mm cannons. In forcing an overshoot you had lost energy in forward propulsion, which you then had to regain and, by then, if the guy had any sense, he would have disappeared into the blue."

No.3(F) Sqn flew the Harrier GR.3 for 18 years before converting to the Harrier GR.5 in 1989. During its time with RAFG the GR.3 played a significant role in NATO's flexible response policy. Had the Cold War turned hot, there is no doubt that the contribution the aircraft made would have been crucial in confronting invading Warsaw Pact forces. **AN**



Three main differences distinguished the Harrier GR.3 and GR.1A: the upgraded Pegasus engine, laser rangefinder and marked target seeker (which gave the former its distinctive bottle-shaped nose) plus a radar warning receiver. Both carried the two 30mm cannon under the fuselage.

sg-etuo.de Wilfried Zetsche



FREE SPITFIRE POSTER WITH THIS ISSUE
Britain's Top-Selling Aviation Monthly

RESTORED SWIFT
ON DISPLAY WITH VULCAN

Spotlight
Bristol Beaufort

AT HOME WITH THE FLYING BULLS

THE MIGHTY B-36 PEACEMAKER

ONLY £4.60

FEBRUARY ISSUE - OUT NOW!

FREE

SPITFIRE POSTER - This high-quality, extra large poster pays tribute to Supermarine's legendary fighter

THIS ISSUE ALSO FEATURES:

SPITFIRE SPECIAL
A series of articles paying tribute to a genuinely iconic British fighter

Including:

HIGH FLIGHT
Andrew Thomas assesses the Spitfire VI and VII, interceptors designed for combat in the stratosphere.

SILVER SCREEN
A feature-length documentary

about the famous fighter is due to reach cinemas in 2018. Steve Beebe investigates.

NINE ALIVE
Gordon Riley looks back at the history and restoration of Spitfire IX BR601, with photography by John Dibbs.

PLUS! SPOTLIGHT - BRISTOL BLENHEIM
16-pages paying tribute relatively unsung warriors of World War Two

AND MUCH MORE!

Available **NOW** from [WHSmith](#) and all leading newsagents
ALTERNATIVELY, ORDER DIRECT:

Order online with **FREE P&P*** at
www.keypublishing.com/shop

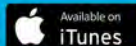
*Free 2nd class P&P on all UK & BFPO orders. Overseas charges apply. Postage charges vary depending on total order value.

 OR 

Call **UK 01780 480404**
Overseas +44 1780 480404
 Lines open 9.00am - 5.30pm GMT



Also available on


also available for PC, MAC & Kindle Fire from



B-17G HISTORY | REFERENCE PHOTOS | COLOUR PROFILES

B-17G

FLYING FORTRESS



NEW
SERIES



NO. 01

B-17G FLYING FORTRESS

Key Publishing's first reference book in the new Combat Machines series is a detailed 84-page study of the famous B-17G bomber, timed perfectly for the release of Airfix's new 1/72 kit of the type.

84 PAGES, SOFTBACK

Written by Malcolm V Lowe, the development and history of the B-17G, including its post-war service are covered in full with rare black and white (and colour) photos, more than 30 specially commissioned colour profiles, a two-page cutaway drawing and walk-round images of a restored aircraft.

This is a vital research and reference tool for modellers and aviation enthusiasts alike, and seeks to correct erroneous information published in other books. Besides offering useful material about the aircraft itself, Combat Machines B-17G also explores the flight crews, their clothing and Medal of Honor awards, as well as missions flown by the RAF and USAAF's numbered air forces.

Available **NOW** at [WHSmith](#) and other leading newsagents
ORDER DIRECT

JUST £7.99 + FREE P&P*

*Free 2nd class P&P on all UK & BFPO orders. Overseas charges apply.

FREE P&P* when you order online at
www.keypublishing.com/shop



Call UK: 01780 480404 Overseas: +44 1780 480404
 Monday to Friday 9am-5:30pm

SUBSCRIBERS CALL FOR YOUR £1.00 DISCOUNT!

1302/16

CHERRY POINT'S

Tom Kaminski reports on VMA-223, a US Marine Corps AV-8B Harrier II squadron that has been on many combat deployments in recent years.

Harrier unit VMA-223 'Bulldogs' – named 2016 Attack Squadron of the year by the Marine Corps Aviation Association for its outstanding contributions to USMC aviation during 2015 – resides at Marine Corps Air Station (MCAS) Cherry Point in North Carolina.

One of two bases supporting the service's AV-8B fleet, Cherry Point is home to more than 80 Harrier IIs assigned to the 2nd Marine Aircraft Wing (MAW).

Currently three operational squadrons and a training unit are at Cherry Point, with the 2nd MAW's Marine Aircraft Group 14 (MAG-14). The remainder of the fleet is at MCAS Yuma, Arizona, home to the 3rd MAW's MAG-13 and two operational squadrons.

The 'Bulldogs' is the most senior of the three operational squadrons at Cherry Point. It was originally activated as Marine Fighter Squadron VMF-223 'Rainbow' under MAG-23 at MCAS Ewa, Oahu, Hawaii, on May 1, 1942, flying the Brewster F2A-3 Buffalo.

It had transitioned to the Grumman F4F-4 Wildcat before it first saw combat in August that year during the Battle for Guadalcanal, and destroyed 83 Japanese aircraft in less than two months. It then flew a succession of types before adopting the Harrier.

Stationed at Cherry Point and assigned to MAG-14 since relocating from MCAS

Main photo: **Two VMA-223 AV-8B+ Harrier IIs carrying AN/AAQ-28 Litening targeting pods on the centreline stores stations. They also each have a pair of 300 US gal external fuel tanks on the inboard wing stations, plus an AIM-9 Sidewinder training round and an air combat manoeuvring instrumentation pod on the outer positions. The trailing aircraft is also equipped with two pods associated with the 25mm GAU-12 gun system under the fuselage.** Key-Jamie Hunter

Iwakuni, Japan, in August 1977, VMA-223 has operated the Harrier II since its transition from the Douglas A-4M Skyhawk began in October 1987. The 'Bulldogs' had operated the Skyhawk in various versions since 1961 and made several combat deployments to Southeast Asia between 1965 and 1969.

The squadron, which received its current identity as a Marine Attack Squadron (VMA) on December 1, 1954, is led by LtCol Benjamin K Hutchins, who took command on May 21, 2015 after serving as the squadron executive officer since October 2014.

Prior to VMA-223, LtCol Hutchins had

served with VMA-214, VMA-513 and VMA-231, and he has flown more than 2,700 hours, including 1,000-plus combat hours in the Harrier II.

The unit operates a mixed fleet, including the night-attack AV-8B(NA) and the radar-equipped AV-8B+, and pilots are rated on both.

HARRIER II VARIANTS

Jointly developed by McDonnell Douglas and British Aerospace from 1976, the AV-8B Harrier II entered operational service with the US Marine Corps in August 1985 when VMA-331 achieved initial operational capability (IOC).

'BULLDOGS'



The Harrier II eventually replaced both the A-4M Skyhawk and AV-8A Harrier in USMC service and, at its peak, was flown by eight operational squadrons and a Fleet Readiness Squadron (FRS). The Marines accepted the last of 259 AV-8Bs and 22 TAV-8Bs in September 2003.

Despite representing 40% of the Corps' tactical aviation (TACAIR) inventory, in late 2016 the active fleet comprised just 111 AV-8Bs, including 90 assigned to operational squadrons and four tasked with test and support duties. The remaining seven are operated by the FRS alongside 16 TAV-8Bs. Since 2003, the fleet has flown more than 50,000 hours in combat.

Originally deployed as a day-attack platform, the night-attack variant of the AV-8B first flew in June 1987 and entered service in September 1989. It featured a GEC-Marconi forward-looking infrared (FLIR) navigation

system installed above the nose, a new night-vision goggles (NVG)-compatible wide-angle head-up

display (HUD) and colour head-down displays in the cockpit along with a colour digital moving map. The jet also incorporated aerodynamic modifications, a 23,400lb st (104.1kN) Rolls-Royce F402-RR-408 engine and four AN/ALE-39 chaff/flare dispensers on the aft fuselage. Sixty-six production aircraft were delivered.

Development of the radar-equipped AV-8B+ began in 1990 and the first production aircraft flew in March 1993. The upgrade installed the AN/APG-65 radar (with air-to-air, air-to-ground and sea search modes) and a larger environmental control system. Structural modifications included a 17in (0.43m) fuselage stretch and a larger, thicker leading-edge root extension (LERX) which increased the aircraft's turn rate.

Night-attack capabilities were retained, although the FLIR was moved further aft on top



Above: The unit's squadron badge. USMC

Left: Lieutenant Colonel Benjamin K Hutchins (pictured) assumed command of VMA-223 on May 21, 2015 and turned the squadron over to Lieutenant Colonel Ryan Ward during a change of command ceremony on December 9, 2016. USMC

of the nose. The Marines received 101 production aircraft – 27 new-builds and 74 earlier day-attack AV-8Bs converted to the

latest configuration – with VMA-223 taking on its first AV-8B(NA) in September 1989. Its first AV-8B(+) arrived in 1994.

While both variants can conduct air-to-ground missions, the lack of a radar system precludes the night-attack model from deploying radar-guided AIM-120 AMRAAM missiles – although its lighter weight means it has greater 'bring-back' capability than the radar model.

When operating at sea this means the aircraft can return to a ship with a greater number of unused weapons than would otherwise need to be jettisoned prior to landing.

DEPLOYMENTS AND COMBAT

Since 2001, VMA-223 has conducted multiple deployments to the US Central Command (USCENTCOM) area of responsibility and supported combat operations in Afghanistan, Iraq and Syria. ▶



An Aviation Boatswain's Mate signals a VMA-223 AV-8B(NA) to launch from the amphibious assault ship USS Bataan during January 2002 in support of Operation Enduring Freedom in Afghanistan. The USMC Harriers' light grey paint scheme is being phased out in favour of darker colours that reportedly make the aircraft harder to acquire visually. US Navy/PH3 John Taucher

As well as full and partial squadron deployments to land bases, VMA-223 participates in Marine Expeditionary Unit (MEU) embarkations aboard US Navy amphibious assault ships.

In support of these operations, Harrier squadrons typically detach six or seven AV-8Bs to be part of a 'reinforced' Marine Medium Tiltrotor Squadron (VMM) with Bell-Boeing MV-22B Ospreys, Sikorsky CH-53E Super Stallions, Bell UH-1Y Venoms and AH-1W Super Cobras or AH-1Z Vipers.

Previously they joined a reinforced Marine Medium Helicopter Squadron (HMM) which used Boeing Vertol CH-46E Sea Knights prior to the entry into service of the Osprey.

The detachments typically comprise a mix of radar-equipped and night-attack variants, although some have sailed with a full complement of six radar-equipped AV-8B+ jets.

AV-8Bs from VMA-223 flew combat missions over Afghanistan during the earliest phases of Operation Enduring Freedom. Detached to HMM-365 (Rein.) aboard the USS Bataan (LHD 5) as part of the 26th MEU, Detachment A flew its first strikes against the Taliban on November 21, 2001, the first time the squadron had seen combat since 1969.

In January 2003, the 'Bulldogs' deployed ten Harrier IIs aboard the USS Kearsarge

(LHD 3). Following its arrival in the Northern Persian Gulf, the squadron moved to the Bataan. A combined force of 26 AV-8Bs, made up of VMA-223 and VMA-542, operated from the ship, and together flew 1,400 combat hours during 797 sorties starting in early March in support of the invasion of Iraq.

They delivered 122 tons of munitions against more than 470 targets. At the time of the deployment, VMA-223's remaining jets and personnel were attached to HMM-264 (Rein.) in preparation for a scheduled deployment aboard the USS Iwo Jima (LHD 7), which began in March and also headed to the Persian Gulf.

The 'Bulldogs' returned to the theatre in August 2005, deploying to Al Asad Air Base in Iraq. Detachment A, deployed with the 22nd

MEU as part HMM-261 (Rein.), had arrived in the region aboard the USS Nassau (LHA 4).

On departure in March 2006, the squadron's 16 AV-8Bs had logged more than 4,700 flight hours and delivered 14.5 tons of precision-guided munitions (PGMs) over 1,700 sorties.

Detachment A subsequently deployed six Harriers aboard the USS Kearsarge with HMM-261 (Rein.) as the 22nd MEU's ACE in June 2007. The aircraft began flying combat missions over Iraq in September that year, but operations shifted to Afghanistan the following month. The deployment ended when the detachment returned to Cherry Point in February 2008.

The 'Bulldogs' next deployed ten Harriers to Kandahar Airfield, Afghanistan, in support of Operation Enduring Freedom in November 2011, relieving VMA-513.

Assigned to the 2nd MAW (Forward) and later to the 3rd MAW (Forward), VMA-223 flew operations throughout Helmand Province in support of Marines assigned to Task Force Leatherneck and coalition forces assigned to the NATO International Security Assistance Force (ISAF).

Before returning to Cherry Point in May 2012, the 'Bulldogs' had flown 4,000-plus hours, responded to 2,070 requests for assistance and delivered 61,500lb (27,896kg) of ordnance.

On September 8, 2014, Harriers from VMA-223 Detachment A, operating from the USS Bataan as part of VMM-263 (Rein.), conducted the first air strikes on Daesh militants near the Haditha Dam in Northern



Above: A 'Bulldogs' aircraft takes on fuel over Iraq during an Operation Inherent Resolve mission in December 2015. USAF/TSgt Nathan Lipscomb

Below: One of the squadron's aircraft conducts a vertical landing onto a mock flight deck at Marine Corps Auxiliary Landing Field Bogue (also known as Bogue Field), North Carolina. USMC/LCpl Glen E Santy





Above: Four of the 'Bulldogs' radar-equipped AV-8B+s over the Atlantic Ocean near MCAS Cherry Point during a training sortie. The unit flies a mixed fleet of AV-8B+ and night-attack AV-8B models. Key-Jamie Hunter

Right: A pilot prepares to take-off from a simulated amphibious assault ship flight deck at Bogue Field. It is the only location on the US East Coast where Harrier pilots can conduct simulated ship operations. USMC/ Lance Cpl Glen E Santy



Iraq. Prior to the attacks Harrier operations had been limited to intelligence, surveillance and reconnaissance (ISR) sorties in support of Iraqi Government forces.

The unit's most recent ship-based deployment involved six AV-8Bs attached to VMM-162 (Rein.) aboard the USS Kearsarge as part of the 26th MEU. From October 2015 it was despatched to US European Command/US Africa Command (EUCOM/AFRICOM) and US Central Command (CENTCOM) areas of responsibility. The 'Bulldogs' rejoined the fight against Daesh on November 19, 2015, launching airstrikes from the Kearsarge on missions over Iraq and Syria. The last missions from the ship supporting Operation Inherent Resolve were on March 10 of last year and the cruise concluded in May. The 'Bulldogs' undertook 60 strikes against Daesh.

During the same period ten Harriers from the squadron left Cherry Point in October 2015 for Shaikh Isa Air Base in Bahrain, as part of Special-Purpose Marine Air-Ground Task Force Crisis Response-Central Command (SPMAGTF-CR-CC). While in theatre they dropped 667 bombs and returned to the US in April.

According to LtCol Hutchins, the aircraft carried a variety of precision weapons and

were typically loaded with a mix of 500lb (227kg) GBU-54 Laser Joint Direct Attack Munitions (LJDAMs) and GBU-38 JDAMs to prosecute attacks on stationary, moving or hardened targets. They also used laser-guided 2.75in (70mm) Advanced Precision Kill Weapon System (APKWS) rockets.

Missions included close air support, armed over-watch and non-traditional ISR using the AN/AAQ-28 Litening II targeting pod. In an interview with the New York Post on May 28 last year, while deployed, LtCol Hutchins compared the Harrier's response to that of a fire apparatus: "We're like the firehouse in the sky," he said. "So if they need the fire engine, the fire engine comes."

Under the Corps' Unit Deployment Program (UDP), the squadron provides supports to the 1st MAW in Japan. During these six-month deployments a detachment of six AV-8Bs is assigned to MAG-12 at MCAS Iwakuni to support 31st MEU operations.

The 'Bulldogs' first such deployment took place between May and November 1992; its most recent began in November 2013 and ended in May 2014.

As part of the UDP assignment, six AV-8B+s, detached to VMM-265 (Rein.), were embarked aboard the USS Bonhomme Richard (LHD 6) for an at-sea period in support of the 31st MEU in February and March 2014. Meanwhile, although VMA-223 is currently in a rest, refit and regroup phase, work-ups are under way for another deployment with VMM-365 (Rein.) as part of the 24th MEU in spring 2017.

While VMA-223's primary mission is air-to-ground attack support for the Marine Air-Ground Task Force, from sea or land, its AV-8Bs can carry both AIM-9 Sidewinder and AIM-120 air-to-air missiles, and in August 2014 it became the first 2nd MAW Harrier squadron to fire the AIM-120 missile during an exercise.



Integration of the radar and AIM-120 provided the Harrier with, according to LtCol Hutchinson, "a formidable capability to defend the MEU".

This, along with its ability to self-escort, is considered a secondary mission for the Harrier. While its dogfight capabilities are comparable to that of the Royal Navy's now-retired Sea Harrier, engaging in that form of combat is seen as a last resort because technology fielded in fifth- and sixth-generation fighters, and beyond-visual-range weapons such as AIM-120 missiles, have eclipsed its air-to-air manoeuvring capabilities.

ENHANCEMENTS

First incorporated in 2002, the Litening II targeting pod enabled the Harrier to autonomously deliver PGMs, enhanced its day and night target acquisition and improved low-level night-flight capabilities.

Introduction of the LTP and PGMs to the jet has greatly changed the way it's employed. Earlier, the aircraft was required to ingress and egress target areas at low altitude to avoid radar detection – the newer, advanced

systems enable the Harrier to operate at safer stand-off ranges and altitudes.

According to LtCol Hutchins, the pod's ability to transmit data directly to joint terminal attack controllers (JTACs) or forward air controllers (FACs) on the ground enhances battlefield awareness and increases situational awareness for battlefield commanders.

Most upgrades have been incorporated through incremental modifications to the aircraft's Operational Flight Program (OFP), new capabilities having improved the radar and the LTP integration and added additional weapons, including the 500lb GBU-51 dual-mode laser-guided bomb (DMLGB) and the AIM-120 AMRAAM.

The Harrier II also acquired a video downlink capability to transmit live video from the LTP to the JTAC/FAC via the Remote Operated Video Enhanced Receiver (ROVER) ground station.

Recent OFP updates have given the jet a Tactical Aircraft Moving Map Capability (TAMMAC) and relocated the LTP from the wing to the centreline weapon station – improving the pod's field-of-view and freeing up the wing stations for additional stores.

The recently integrated H6.1 OFP software gave the Harrier full integration of the Generation 4 Litening Targeting Pod (G4 LTP), which has increased coverage, expanded improvised explosive device (IED) detection capability and broadened the video downlink range to support ground units equipped with ROVER and Video Scout ground stations.

Asked by Aviation News how the pod has changed the mission, LtCol Hutchins said: "As the integration of the targeting pod has matured, we can carry more weapons and additional fuel, increasing our lethality at range compared to where we were 15 years ago."

The G4 pod also features common software, making it completely interchangeable with the F/A-18.

Upgrades have also equipped the Harrier with the BRU-70 Digital Triple Ejector Rack (DTER) and an expanded carriage for the AIM-120 – the DTER increasing the number of smart weapons that can be carried from four to as many as ten 500lb (227kg) JDAMs, and enabling the aircraft to uplift as many as six PGMs along with external fuel tanks.

The H6.1 software also delivered a mission systems computer/warfare

Ground personnel assist in preparing an AV-8B+ at Shaikh Isa Air Base, Bahrain, in preparation for a mission against Daesh in December 2015. USMC/Cpl Akeel Austin





An AV-8B+ prepares to launch from NAS Key West, Florida, for an air-to-air training sortie. It is carrying a live AIM-120A AMRAAM missile. US Navy/MC1 Brian Morales

management computer (MSC/WMC) Processor Upgrade and added MIL-STD-1760 wiring to the outer wing stations for them to carry additional smart weapons.

The jet also started to carry the AN/ALQ-231 Intrepid Tiger II, an airborne communications-band jammer pod, in Afghanistan during May 2012. A later Block 1 version followed in November 2013.

Subsequent H6.2 OFP upgrades will include initial Link 16 tactical data link capability and Federal Aviation Administration (FAA)-compliant Required Navigation Performance/Area Navigation (RNP/RNAV) capability. Later, the H7.0 OFP will give the AV-8B+ full Link 16 integration, Boeing receiving a \$30m contract in November 2016 to begin the work on 73 AV-8B+ aircraft.

Planned upgrades will incorporate airborne variable message format (AVMF) terminals that will enhance digital-aided close air support technology; and additional weapons capabilities including AIM-120C/D and AIM-9X Block II missiles.

OPERATIONS

The Harrier fleet shrank to seven operational squadrons, and then six, when VMA-331 and VMA-513, which had been assigned to MAG-14 and MAG-13, were deactivated in 1992 and 2013.

Because attrition had taken a chunk out of the fleet, the Primary Aircraft Authorization

(PAA) for Harrier squadrons had been cut to 14 aircraft. The already stretched fleet was further reduced when six VMA-211 aircraft were lost in a Taliban attack on Camp Bastion on September 14, 2012.

But VMA-211's recent transition to the F-35B has made a sufficient number of AV-8Bs available to return the PAA of the remaining squadrons to 16 aircraft.

The Harrier can operate from austere land bases and when flying from a ship carries a smaller useful load (less fuel or fewer weapons) enabling it to take off from the flight decks of the US Navy's amphibious assault ships and conduct vertical landings.

During work-ups for MEU deployments, Harrier detachments typically train at several locations. MAG-14 squadrons prepare for shipboard operations at Marine Corps Auxiliary Landing Field (MCALF) Bogue, around 15nm (27.8km) southwest of MCAS Cherry Point, a simulated flight deck used for Field Carrier Landing Practices (FCLP).

According to LtCol Hutchins, shipboard operations challenge the aviator's skill sets and "require focus and consistency," adding: "Training and a repetitive approach mitigate the evolution that carries the most risk in naval aviation."

When operating from their home station the aircraft normally fly sorties lasting 1hr 6mins to 1hr 18mins, but in operations over Afghanistan and Iraq VMA-223's missions

typically averaged 3 to 4 hours in duration. More recently, while supporting Operation Inherent Resolve, VMA-223 pilots flew missions lasting as long as 7hrs 30mins to 8 hours, requiring as many as five or six aerial refuellings.

Work-ups for MEU deployments begin six months before the scheduled deployment, when the detachment begins composite Marine Air-Ground Task Force (MAGTF) operations with the ACE and the Amphibious Ready Group (ARG). Preparation includes taking part in a series of three sea-based exercises which include Amphibious Squadron (PHIBRON)-MEU Integration Training (PMINT) and Composite Training Unit Exercise (COMPTUEX) before a final integrated training event known as the Certification Exercise (CERTEX).

When possible, additional training, including live weapons delivery, is carried out from Marine Corps Air-Ground Combat Center Twentynine Palms, California, or MCAS Yuma, Arizona, before the deployment begins.

At the end of the deployment, the unit remains attached to the ACE for around 30 days in standby status to ensure the next MEU is operationally ready to assume the duties within its assigned area of operations.

In accordance with the 2016 Marine Aviation Plan, the operational Harrier fleet will be reduced to just 80 aircraft by the end of Fiscal Year (FY)17, which began on October 1, 2016.

The inventory will remain steady until FY20 when operations will be consolidated at Cherry Point. Reductions and transitions begin in earnest that year, and the FRS will initially cut its fleet from 12 AV-8Bs and 12 TAV-8Bs to eight of each. Training will conclude in 2024 and the last AV-8Bs will be retired in 2026.

The 'Bulldogs' is currently scheduled to be the first Cherry Point Harrier squadron to convert to the F-35B in FY23. Until then its jets will continue to be upgraded, enabling them to respond to world events from land and sea bases. **AN**

Two AV-8B+ Harrier IIs land on the flight deck of the amphibious assault ship USS Kearsarge during training in the Atlantic Ocean in January 2015. US Navy/MC3 Tamara Vaughn





Spectacular shot of a IV(AC)
Sqn Harrier GR.9 in
a vertical climb carrying a
Maverick missile. Geoff Lee

UK HARRIERS

FROM LAND AND SEA

The Harrier story is one of the most remarkable in post-war British aviation history, reflecting technological advance, innovation and both political and service indecision. **Dr Kevin Wright** looks back at five decades of development and operation of the UK's Harriers and Sea Harriers.

From the very first tethered flight to the mountains of Afghanistan via Cold War West Germany, Belize and the Falklands, the British Harrier story spans more than 50 years from creation and operational use through to premature retirement.

The engineering challenges to create the world's first vertical/short take-off and landing (V/STOL) fighter aircraft to enter operational service were formidable. They included design and construction of sufficiently powerful engines to lift and propel the fighter, how to transition from vertical to wing-supported flight and back again and development of complex flight controls among a host of issues.

FINDING FINANCE

British Government funding and service interest in the project was close to non-existent and early finance was provided by

Hawker Siddeley and the US/NATO-financed Mutual Weapons Development Program.

By the late 1950s, momentum for Hawker Siddeley's P.1127 project gradually began to grow, but enthusiasm for the more ambitious, supersonic P.1121 and P.1154 projects waned. The latter were eventually abandoned in 1964.

In March 1959 Hawker Siddeley decided to build two P.1127 prototypes, mostly using its own funds. There was support from NASA with wind tunnel and experimental assistance, plus NATO-sourced money for the new NBMR-3 (NATO Basic Military Requirement) V/STOL fighter initiative to replace the Fiat G-91.

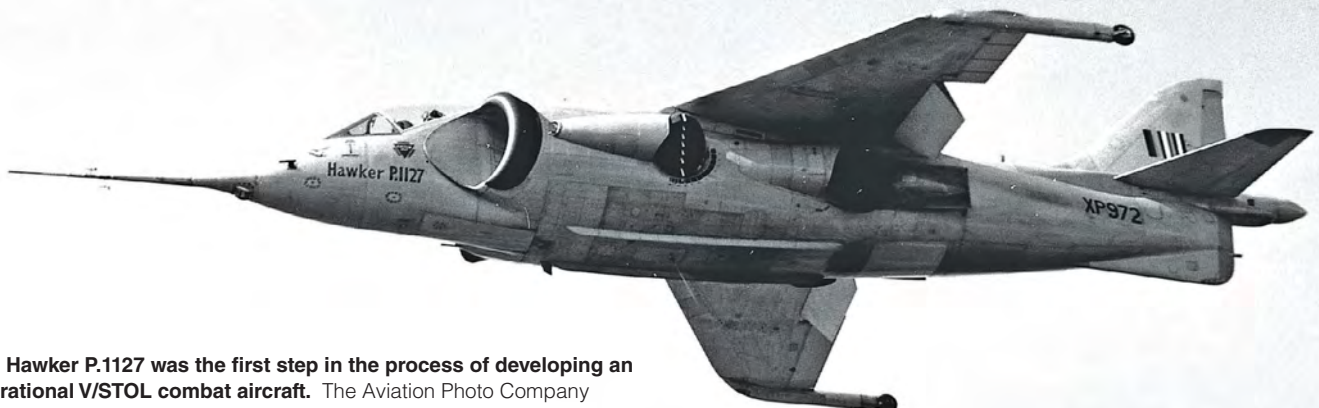
Belatedly, in June 1960, the British Government finally provided official funding for the project and contracted Hawker Siddeley to provide two prototype aircraft (XP831 and XP836) under Experimental Requirement ER.204D. They were officially

designated as 'research' machines.

On October 21 the same year, XP831 became airborne for the first time. Test pilot Bill Bedford was at the controls for the flight from Dunsfold, Surrey. The aircraft was tethered for initial trials but when that requirement was removed, and as control mechanisms were improved, the hover techniques were gradually perfected and transition from vertical to horizontal flight was achieved on September 12, 1961.

Further evaluation aircraft emerged with a batch of four P.1127s followed by nine Kestrel FGA.1s assigned to the Tripartite Evaluation Squadron. British, American and West German pilots flew 938 missions with the unit at RAF West Raynham, Norfolk during 1964-65.

Next came a further six aircraft block of P.1127(RAF) aircraft – flying between August 1966 and the following July. ▶



The Hawker P.1127 was the first step in the process of developing an operational V/STOL combat aircraft. The Aviation Photo Company



Above: **Nine Kestrel FGA.1s, including XS688, were purchased to serve with the Tri-partite Evaluation Squadron at RAF Watton in 1964-65.** The Aviation Photo Company

Below: **RAF Germany Harrier GR.1 of 20 Squadron, complete with weapons display, at RAF Wildenrath in July 1975.** Peter Foster



FIRST-GENERATION HARRIER

The Harrier GR.1 first flew on December 28, 1967. While superficially similar to the Kestrel, the production Harriers were very different aircraft in engineering terms. The Kestrel's 15,200lb st Bristol Siddeley BS.53 Pegasus 5 engine was replaced in the GR.1 by the 19,000lb st Rolls-Royce Pegasus Mk.101. The new variant was also superior as it included flight control surface improvements, better avionics and other design enhancements. The GR.1s were ushered into service by the Harrier Conversion Team (HCT), formed at RAF Wittering, Cambridgeshire on January 1, 1969.

After considerable testing with Hawker Siddeley the first aircraft for the HCT arrived on May 17, 1969. The initial examples were first used to train additional instructors and a cadre of squadron pilots. This was all without the benefit of a simulator, or two-seat trainers, with pilots introduced to vertical flying via a

Westland Whirlwind helicopter. The HCT was wound down when 233 Operational Conversion Unit (OCU) formed on October 1, 1970 and the first two-seat Harrier arrived in July the same year. Soon 'twin-tub' Harriers would also be available at squadron level too.

Intended to operate as an army close-air support and tactical reconnaissance aircraft, the Harrier's key operational attribute was its flexibility to be free of traditional runways. For field operations it could, in theory, deploy almost anywhere, which in turn led to the creation of a whole range of flying and logistical techniques for 'dispersed operations'. The potential value of such a capability had been clearly demonstrated just a few years before, during the June 1967 Six-Day War when the Israeli Air Force carried out pre-emptive strikes against airfields across Egypt, Syria, Lebanon and Jordan, paralysing their air forces.

INTO SERVICE

The Harrier GR.1 entered service with 1 Sqn at RAF Wittering in summer 1969, beginning the unit's 41-year association with the type. The squadron received its full aircraft complement by August 1970 and was soon committed to NATO's Allied Mobile Force (AMF), expected to be deployed on the Alliance's northern flank and a regular visitor to Norway for exercises.

The unit was also assigned to the UK Mobile Force (UKMF) for rapid deployment in support of independent British interests. In war time the aircraft would have dispersed away from airfields to conduct operations. They would have been supported by a range of personnel such as an intelligence cell, mobile photo-processing units, RAF Regiment force protection as well as Royal Engineers. For more on this type of operation see the article that starts on p36.

RAF Germany (RAFG) was the obvious choice to base Harriers because it was in West Germany where it was most likely to be needed for close air support against Warsaw Pact forces.

As such, IV (Army Co-operation) Squadron, which was already operational in West Germany and had been flying the Hawker Hunter, became the second RAF operational Harrier unit on June 1, 1970, followed by 20 Squadron on December 1 the same year and 3 (Fighter) Squadron on January 1, 1973.

Rather than working up at RAF Wittering, 3(F) Sqn formed in West Germany with its new-build Harrier GR.1As. All three units were based at RAF Wildenrath, near the Dutch-German border, but in early 1977 exchanged places with 19 and 92 Sqs from RAF Gütersloh. This placed the Harriers within 75 miles (120km) of the East German border.

No.20 Sqn ended its first association with the Harrier in the spring of 1977 when it re-equipped with SEPECAT Jaguar GR.1s and moved to RAF Brüggen. Its Harriers and crews were divided between the remaining two RAFG Harrier squadrons, bringing them up to the full NATO Squadron strength of 18 aircraft each.

GR.1 TO GR.3

The early Harrier GR.1s contained several unique pieces of equipment for the time, including a Ferranti FE541 inertial navigation system, moving map and head-up display (HUD). The GR1A had the the Pegasus



A Harrier T.4 of 3(F) Sqn. Two-seat Harriers were made available to all frontline squadrons to assist with unit continuation training. AirTeamImages.com/Keith Blincow (ATI)

Mk.102 with 1,500lb of extra thrust and minor avionics differences. It first flew on June 11, 1971.

The RAF purchased 118 single-seat first generation Harriers including: 61 GR.1 airframes, 17 GR.1As and 40 new-build GR.3s, all delivered between December 28, 1967 and February 1987. Surviving GR.1 and GR.1A aircraft were converted to GR.3 standard by 1975.

The GR.3 had the 21,500lb st Pegasus Mk.103 with other modifications including an improved starter and electrical system. The latter facilitated installation of a radar warning receiver (RWR) and the Ferranti Type 106 Laser Ranger and Marked Target Seeker (LRTMS), which had been developed for the Jaguar. This was built into new production aircraft and retrofitted into the rest of the Harriers being modified to GR.3 standard; the new nose being the main external distinguishing feature of the GR.3.

Small, incremental combined packages of avionic, airframe and engine improvements, largely became the pattern of British Harrier Force development throughout its career.

Elsewhere, in the former British colony of Belize, periodic fears of a Guatemalan invasion saw RAF Harriers based there from 1975.

Six Harriers from 1 Sqn arrived at Belize International Airport in November 1975 as a show of force to deter Guatemalan aggression. They returned to Britain in April 1976 but in June 1977 Harrier GR.3s deployed directly from the UK again as part of a larger, more permanent British Army and RAF presence. Ground defences were stepped up and a series of semi-permanent hides and facilities constructed.

This deployment was rotated between Harrier squadrons for some time before becoming 1417 Flight on April 18, 1980. Meanwhile, back in Britain, 233 OCU became responsible for technical support of 1417 Flight and when 1 Sqn converted to the new Harrier GR.5 the OCU retained ten GR.3s until 1417 Flight, the last operational GR.3 unit, disbanded in July 1993.

No.1417 Flight was established to operate Harrier GR.3s from Belize City airport between 1980 and 1993 as a deterrent to potential Guatemalan aggression against the former British colony. Key Collection



Above: **Pristine Sea Harrier FRS.1 in 800 NAS markings shortly after the unit was formed in April 1980.** Dr Kevin Wright

Below: **An 899 NAS Sea Harrier FRS.1 at RNAS Yeovilton in 1980 and pre-Falklands squadron colour scheme and markings.** Dr Kevin Wright



CARRIER HARRIER

Shipborne Harriers were an obvious progression of the programme; identified from very early on as offering great potential benefits. Shorter decks for take-off and vertical recovery also obviated the need for complex catapult and arrestor gear.

However, possible Fleet Air Arm (FAA) Harrier acquisition was inextricably linked to the wider discussions over purchase of a new generation of carriers for the Royal Navy. The concept of small deck operations had already been demonstrated during P.1127 trials in 1963, again in 1969 when RAF Harriers briefly operated from the helicopter platform HMS *Blake*, and in March the next year when two RAF Harriers flew from the ageing aircraft carrier HMS *Eagle*.

The US Marine Corps (USMC) order for 110 AV-8As, delivered between 1971 and

1976, helped considerably to build the case for a British 'Maritime Harrier' too. But, it was not until May 1975 when, after a prolonged period of inter-service, political and financial wrangling, that an FAA contract for 24 Sea Harrier FRS.1s and a T.4 trainer was announced, accompanying the decision to buy Invincible-class 'through-deck cruisers' – aircraft carriers in all but name. In June 1978 a follow-up order for another ten single-seat aircraft was announced.

The resulting aircraft were not a major technological step forward and modifications for the naval role were minimal. The biggest changes were made forward of the engine intakes and included a raised cockpit for better visibility and revised cockpit layout. Most important was installation of the Ferranti Blue Fox radar (no RAF Harrier variant ever had a radar fitted), with both its air-to-air ►





Above: Two Sea Harrier FRS.1s recovering to a carrier. During the Falklands War the type proved to be a formidable fighter. Key Collection

Below: This 3(F) Sqn Harrier GR.3 wears a temporary winter camouflage usually applied for deployed operations. sg-etuo.de Wieland Stolze



and air-to-ground modes, new HUD and navigation equipment which all made Royal Navy Sea Harriers much more 'multi-role' than their RAF counterparts. Other airframe changes included a more corrosion-resistant skin and deck tie-down points were installed. The Sea Harrier was fitted with the Pegasus Mk.104 supplying 21,500lb st.

There were no distinct Sea Harrier prototypes, although the first three aircraft (XZ438-440) were initially fitted with manufacturer test equipment. The first Sea Harrier flight was on August 20, 1978, when XZ450 flew from Dunsfold.

A short-lived trials unit, 700A Squadron, was established in June 1979 at RNAS Yeovilton, Somerset to develop Sea Harrier

operational techniques. Equipped with six aircraft it was renumbered as 899 Naval Air Squadron (NAS) on April 1, 1980 and acted as the headquarters and training squadron.

The unit was committed to reinforcing the two sea-going operational squadrons; 800 NAS (formed on the Sea Harrier on the same day as 899 NAS) and 801 NAS (established January 28, 1981).

Two-seat Harriers were also purchased, in the shape of one T.4 (from the original order) for use with 233 OCU and three new-build navalised T.4Ns with Sea Harrier avionics.

However, when aboard *Invincible*-class carriers they could not be stored below deck as they were too long to fit into the aircraft lifts.

Harrier shipboard performance was also

improved with the advent of the 'Ski Jump'. A slope of 13° was installed on British carriers and enabled the Sea Harriers to carry up to 2,500lb (1,135kg) extra weight.

GOING TO WAR

The Sea Harrier had barely entered service when the 1982 Falklands War turned it into a legend. The aircraft and the new AIM-9L version of the Sidewinder missile made a deadly combination in the South Atlantic and the 28 Sea Harriers deployed for the Falklands conflict amassed an impressive operational record.

Lt Commander Andrew Auld's 800 NAS was assigned to HMS *Hermes* with 12 aircraft, and Lt Commander Nigel 'Sharkey' Ward's 801 NAS to HMS *Invincible* with eight aircraft. Later, additional airframes would bolster their numbers.

The Sea Harriers performed more than 1,100 combat air patrol (CAP) missions and 90 offensive sorties during the war, shooting down 22 Argentinian aircraft (even without the benefit of airborne early warning).

The Sea Harrier's Doppler-based navigation system proved its worth in overwater operations whereas the RAF Harriers embarked alongside them had significant problems aligning their inertial-based system on the pitching carrier decks.

On April 8, 1982 a new unit was hastily re-formed at Yeovilton. No.809 NAS gathered together aircraft returned to the base from maintenance, development and trials work. Eight Sea Harriers subsequently joined HMS *Hermes* and HMS *Invincible* on May 18-19, after an earlier direct air refuelled flight to Ascension Island.

Back in Britain, 809 NAS deployed another eight Sea Harriers aboard the new HMS *Illustrious*, which set sail for the Falklands from Portsmouth on August 2, 1982 to relieve the two deployed carriers. The unit disbanded upon its return to Yeovilton in December.

In addition to the Sea Harriers ten RAF Harrier GR.3s also served during the

Four Sea Harrier FA.2s from 801 NAS. Its Blue Vixen radar and AIM-120 AMRAAM gave the type beyond visual range capability.

Crown Copyright 2005/LA(PHOT) Bunting



Falklands conflict. Following the Argentinian invasion, 14 Harriers from 1 Sqn were swiftly readied for South Atlantic operations. Within two weeks they were proofed against the effects of salt water, and modified to enable carrier deck operations. They were also fitted with the latest AIM-9L Sidewinder, chaff and flares dispensers and the pilots were trained to launch from ski-jumps. Their air-to-air combat skills were also honed.

In early May 1982, ten of the aircraft deployed direct to Ascension Island, involving a nine-hour flight and five air refuellings. From Ascension Island they were flown to the container ship *Atlantic Conveyor* and wrapped in heavy-duty 'rubber bags' for their journey further south.

On May 18, after rendezvousing with HMS *Hermes*, the Harriers were transferred to the carrier. A further eight GR.3s deployed non-stop to Ascension Island a month later just as hostilities ceased. Four then continued a further 3,500 miles (5,632km) direct to HMS *Hermes* with the remaining quartet shipped aboard the container vessel *Contender Bezant*.

Between May 21 and the June 14 ceasefire, Harrier GR.3s from 1 Sqn flew 126 sorties in the battle zone from both HMS *Hermes* and a forward operating base established at Port San Carlos. Missions were launched against Stanley and Goose Green, plus Argentine command centres, storage dumps and in direct support of ground forces. Weapons included rockets and cannon, together with general-purpose cluster and laser-guided bombs, the first to be used in action by the RAF. Of the ten Harriers involved during the conflict, three were shot down by enemy defences and a further one lost in a landing accident. In each case, the pilot ejected safely. Two FAA Sea Harriers were lost to ground fire and four more in accidents.

From June 26, 1982 an advance party from 1 Sqn established a Harrier Detachment (HarDet) at the renamed RAF Stanley and flew in the air defence role armed with Sidewinder missiles and two 30mm ADEN cannon.

Soon crews from other Harrier squadrons rotated through Stanley for three monthly periods of detached duty but the aircraft reverted to their usual ground attack role when 23 Sqn's McDonnell Douglas F-4 Phantoms arrived at RAF Stanley.

The HarDet was renamed 1453 Flight on August 20, 1983 but after Mount Pleasant airfield opened the unit's presence was largely considered unnecessary and it disbanded on May 12, 1985.

BLUE VIXEN & SEA EAGLE

In the immediate wake of the South Atlantic conflict there was a minor Sea Harrier update programme, which included installing double Sidewinder rails, and Microwave Aircraft Digital Guidance equipment. The latter enabled more effective recovery onto the carriers without the necessity for a talk-down. Replacements for the lost aircraft were also ordered.



HMS *Invincible* was off the coast of Oman when this Sea Harrier FA.2 was photographed taking part in Exercise Magic Carpet 05. Crown Copyright 2005/LA(PHOT) Bunting



A selection of British Harrier variants – from front to back is a GR.7, GR.5, FRS.1, T.4 and GR.3. Key Collection



The Harrier T.12 was the ultimate British trainer variant, with enhanced weapons capability and GR.9 avionics. This example was assigned to 20(R) Sqn at RAF Wittering. AirTeamImages.com/JHribar



A T.8N trainer from RNAS Yeovilton-based 899 NAS. Peter Foster

A much more ambitious full Mid Life Update (MLU) programme began in 1985. The subsequent Sea Harrier FRS.2 was designed around a new Ferranti Blue Vixen pulse-Doppler radar system, which required a more bulbous nose and a 14in (35cm) plug to create extra room for the radar. Coupled with the new AIM-120 AMRAAM missile, it gave the redesigned aircraft a beyond visual range capability. It used the 21,500lb st Pegasus Mk.106.

The Sea Harrier FRS.2 was a very capable system and it became better still in 1987 when it was fitted with the Sea Eagle anti-ship missile.

In December 1988, an order was placed to convert 29 FRS.1s to the new standard, to which 18 new-build aircraft and four more conversions were added in 1995.

The first FRS.2, ZA176, was delivered to 899 NAS at Yeovilton during September 1993. In May 1994, the aircraft's designation was changed from FRS.2 to FA.2 – formalising the removal of the reconnaissance and strike (nuclear) roles but retaining fighter with the 'A' standing for attack.

The first Sea Harrier FA.2 was delivered to 899 NAS in September 1993. October 1994 saw 801 NAS become the first operational FA.2 squadron and the last FRS.1 was withdrawn on March 17, 1995. The final FA.2 (ZH813) was delivered in December 1988.

The Sea Harrier FA.2 had a busy career that included three and a half years supporting UN and NATO no-fly zones over Bosnia and Kosovo. During this time the jets conducted armed reconnaissance and close air support missions as well as maintaining CAP for Operation Deny Flight. These missions involved crews flying from carriers based in the Adriatic for seven months at a time from January 1993.

A single Sea Harrier was lost in action when XZ498 was shot down by a Bosnian Serb surface-to-air missile whilst conducting a mission over Goražde on April 16 1994. Lt Nick Richardson, from 801 NAS, managed to eject and was safely recovered.

In May 2000 Sea Harriers aboard HMS *Illustrious* were deployed to Sierra Leone, to bolster the UN mission during that country's

long-running civil war. Although no ordnance was dropped, the reconnaissance missions and 'reassurance patrols' provided a sufficient deterrent to rebels on the ground to contribute to a successful outcome.

In 2002, with the prospect of another major update approaching, the Ministry of Defence (MOD) announced the Sea Harrier would be withdrawn on March 31, 2006, essentially on cost grounds.

NEXT GENERATION

It was the USMC, again, that had stimulated the next major development stage in British Harrier history.

The Harrier II project originally began as a collaborative effort between the USA and Britain, but the UK abandoned the programme in 1975 due to budgetary constraints. Following British withdrawal, McDonnell Douglas extensively redesigned the earlier AV-8A Harrier to create the AV-8B to meet USMC requirements.

Some years later, through British Aerospace, the UK re-joined the improved Harrier programme and became a partner in 1981. It received a significant share of the work in the project and enabled UK-specific modifications to be introduced into the version that would join the RAF as the Harrier GR.5.

A key part of the Harrier II design was the 28ft (8.53m) carbon fibre composite wing, some 300lb (136kg) lighter than the old one and much stronger. Extensions to the wing leading edge also generated more lift and an additional stores pylon was added under each wing. The aircraft also benefited from a new engine (Pegasus Mk.105 producing 21,750lb st) and better cockpit visibility – all of which combined to create a much more capable aircraft.

A pair of development aircraft took to the air from 1979 and the type entered service with the USMC in January 1985. This was followed by the RAF's first GR.5 (ZD318), which performed its maiden flight from Dunsfold on April 30, 1985.

Entry to service began in May 1987 when the first examples joined 1 Sqn. The unit became operational on November 2, 1989 and was followed by 3(F) and IV(AC) Sqn.

Among the modifications required to turn the AV-8B into the RAF's GR.5 was installing a Smiths SU-128/A HUD, Hughes Angle Rate Bombing System, Ferranti moving map and single rail outboard Sidewinder pylon. As it turned out, this was only the first of several other in-service modifications for RAF



Above: A Naval Strike Wing Harrier GR.9 at low level in the Lake District, wearing the markings of 800 NAS and 801 NAS. Ian Nicol-Heap

Below: Close-up of a Harrier GR.9 taxiing carrying a Maverick air-to-ground missile. Key Collection



Harriers that would substantially improve its capabilities over the coming decades.

An original feature of the snub-nosed GR.5 was the under-nose fairing designed for the Miniature Infrared Line Scan Equipment Sysyem (MIRLS) system (for infrared reconnaissance) that was being developed but later abandoned and never installed. Britain also opted for a different gun system – a new ADEN 25mm cannon – that also proved troublesome and was shelved in 1999. However, the gun pods remained as they contributed to the Harrier's aerodynamic lift.

Developments were fast flowing and soon a new night attack system using a GEC-Marconi 1010 forward looking infra-red radar (FLIR) and a night vision goggle (NVG) compatible cockpit provided the basis for the GR.7. The most immediate visual difference with the GR.7 was a redesigned nose to accommodate the FLIR and Marconi-Zeus ECM system. The GR.7 first flew on November 20, 1989.

The initial 1988 contract for 60 Harrier GR.5s also provided an option for 34 examples to be built to GR.7 standard. There was also a declared intention to upgrade existing GR.5s to GR.7 configuration at a later stage. New-build aircraft were equipped with the 23,800lb st Pegasus Mk.107 engine and designated GR.7A. The converted GR.5s retained their original engines and so were called GR.7s. The GR.7A's more powerful engine was necessary for operation in the Middle East and Afghanistan where heat degraded engine performance.

RAF Harriers participated in Operation Southern Watch, enforcing the no-fly zone over Iraq. In the Balkans Harriers contributed to Operation Deliberate Force in 1995, designed to contain Serb aggression against Bosnia. This saw GR.7s fly some 144 bombing and reconnaissance sorties. Four years later, from April 1999, Harriers flew in support of NATO Operation Allied Force in the skies over Kosovo. GR.7's flew 870 sorties using some 894 weapons.

Nos. 3(F) and IV(AC) Sqn's had moved from RAF Gütersloh to RAF Laarbruch in 1992 then



Above: A 20(R) Sqn firing SNEB rockets over a range in the UK. Geoff Lee

Below: Joint Force Harrier squadrons took turns to deploy to Afghanistan – this is a IV(AC) Sqn jet during a sortie over Helmand Province. The wing stores include: Paveway IV bombs, CRV-7 rocket pods and fuel tanks. Under fuselage is a Sniper targeting pod and Digital Joint Reconnaissance Pod. Crown Copyright 2009



to RAF Cottesmore in May 1999. They were joined by 1(F) Sqn which moved across from nearby RAF Wittering in July 2000.

JOINT FORCE HARRIER

Accompanying the technical changes were major organisational developments for the Harrier fleet. These included the creation of Joint Force Harrier in April 2000.

The types participated in Operation Telic (the invasion of Iraq in 2003). Harrier GR.7s of 1 and IV(AC) Sqn's flew from Ahmed Al Jaber Air Base in Kuwait, as 'Harrier Force South' while 1 and 3(F) Sqn's operated from Azraq in Jordan as 'Harrier Force West'. They mainly conducted close air support operations using Maverick missiles and Paveway IIs while the Joint Reconnaissance Pod was used for a large number of recce missions. Harriers flew 1,126 sorties and expended 560 munitions.

The Joint Force Harrier concept initially sought to relocate FAA Sea Harrier squadrons from Yeovilton to RAF Cottesmore and RAF Wittering to be based alongside the RAF's Harriers – although this was later cancelled when the Sea Harrier was phased out in 2006.

Abandoning the Sea Harrier provided the opportunity to settle on a common Harrier variant suitably equipped for combined missions at sea and from land bases. The same year (2006) saw the RAF's 3(F) Sqn transition to the Eurofighter Typhoon and 800 NAS take over the squadron's former Harriers. At the same time, the size of each squadron was reduced from 12 to nine aircraft. It had been the intention for 801 NAS to re-form with Harriers in 2007, however on March 9 of that year the Naval Strike Wing was formed with elements of both FAA squadrons amalgamated into a single unit. ▶

A IV(AC) Sqn Harrier GR.7A about to depart HMS *Invincible* with a pair of Enhanced Paveway IIs. Crown Copyright 2005/LA(Phot) Bunting



UPGRADED AND PHASED OUT

The next Harrier upgrade would see 60 GR.7s modified to GR.9 standard. Core to the upgrade was a MIL-STD 1760 weapons databus and new main computer system with totally modernised weapons software. The improved weapons capacity included Hellfire air-to-ground missile and Paveway IV bomb and the ability to carry the Sniper Advanced Targeting Pod. New GPS-INS navigation equipment, a ground-proximity warning system (GPWS) and improved cockpit displays were also installed. The first Harrier GR.9 was delivered in October 2006 and the upgrade programme was completed during 2009. Harrier GR.7s became GR.9s and 7As were named GR.9As.

Whilst all these changes were taking place, aircraft and pilots were heavily engaged in missions over Afghanistan. Six RAF Harriers had first arrived at Kandahar in 2004 to support the early NATO-led International Security and Assistance Force (ISAF). Initially, sorties were flown during daylight hours only, but in 2006 demands intensified such that round-the-clock flying was required and the number of deployed Harriers increased. Some aircraft were held on alert to quickly launch and provide close air support.

Most sorties involved supporting ground troops using close air support tactics but much time was also committed to reconnaissance missions, particularly using the Sniper pod, to provide detailed visual intelligence.

By June 2009 at the end of the Harriers time in Afghanistan, the type had accumulated over 8,500 sorties and spent more than 22,000 hours airborne in the region. Tornados GR.4s replaced the Harrier in theatre.

On April 1, 2010, the Naval Strike Wing reverted to become 800 NAS. The previous day the RAF's 20(R) Sqn had disbanded at RAF Wittering and its role as Harrier OCU was taken over by IV(R) Sqn.

At the same time, Joint Force Harrier was renamed Joint Strike Wing and the remaining Harrier GR.7s retired. However, the final, perhaps most surprising, decision was the October 19, 2010 announcement that the

Below: **The Royal Navy School of Deck Handling at RNAS Culdrose maintains a number of Harrier FA.2 and T.8s that can taxi and are used to teach carrier deck handling skills.** Kevin Wright

Harrier would be phased out completely by April 2011 as part of the government's Strategic Defence and Security Review. This was well ahead of the arrival of the Lockheed Martin F-35 Lightning IIs scheduled to replace the Harrier in service.

In fact, the end came even quicker than expected. The last time UK Harriers flew off a carrier was on November 24, 2010 when four Harrier GR.9s, embarked on HMS *Ark Royal*, left the ship. On December 15, a 16-aircraft flypast from RAF Cottesmore marked the final flights by British Harriers. Just over a month later, on January 28, 2011, 1(F) Sqn, IV(R) Sqn and 800 NAS finally disbanded.

SOLD

After retirement, 79 Harriers were stored at RAF Cottesmore pending their fate. In November 2011 junior defence minister Peter Luff told Parliament: "We have agreed the sale of the final 72 Harrier aircraft frames and associated parts which will be used as a major source of spares for the US Marine Corps Harrier AV-8B fleet of aircraft." The price of the total deal was said to be \$180m: \$130m for the airframes and a further \$50m for the remaining spares stock.

Rear Admiral Mark Heinrich, Commander, Naval Supply Systems Command, explained that America was getting a very good deal because many of the Harriers had recently undergone major modernisation: "We're taking advantage of all the money the Brits have spent on them. It's like we're buying a car with maybe 15,000 miles on it. These are very good platforms."

The jets were subsequently stripped down and shipped to the USA. During 2014 at least 62 of the remaining airframes were noted in open storage with the 309 Aerospace Maintenance and Regeneration Group at Davis-Monthan AFB, Arizona.

Two airframes were retained by the MOD for training purposes: one with the Royal Naval Air Engineering and Survival School at Gosport and the other at RAF Wittering as a gate guard. Further examples were passed to the Fleet Air Arm Museum at Yeovilton, Royal Air Museum at Hendon and Imperial War Museum in London.

STILL RUNNING

However, the Harrier is not yet dead in the UK and the honour of keeping the type 'active' in British service lies with the Royal Navy. The Fleet Air Arm's School of Flight Deck Operations still retains 14 Sea Harrier FA.2s and T.8s at RNAS Culdrose, Cornwall to train deck handlers.

Using a mock-up of an Invincible class deck, trainees are taught how to manoeuvre aircraft in the constrained space of a carrier. The Sea Harriers and T.8s are taxied, so trainees get the feel of real jets moving around at close quarters.

Harriers and Sea Harriers served the UK well on operations. Catapulted into the headlines during the Falklands, Harriers and Sea Harriers participated in almost every significant overseas air operation in which British forces have been engaged since the mid-1970s through to the final 2010 withdrawal. **AN**



Above: **RAF Harriers were sold to the US Marine Corps for spares in 2011. Most turned up at AMARG at Davis-Monthan AFB in 2014 – this image was taken in July 2015.** Brian Corbett



AVIATION

THE PAST, PRESENT AND FUTURE OF FLIGHT Incorporating **JETS** NEWS

Your favourite magazine is now available digitally.
DOWNLOAD THE APP NOW FOR FREE.



FREE APP

with sample issue

IN APP ISSUES £3.99

SUBSCRIBE & SAVE

Monthly £2.99

6 issues £19.99

12 issues £34.99

SEARCH: Aviation News

Read on your iPhone & iPad Android PC & Mac kindle fire BlackBerry Windows 10

**ALSO
AVAILABLE FOR
DOWNLOAD**



**SEARCH
FLYPAST**

FREE APP
with sample issue

IN APP ISSUES £3.99



**SEARCH
AIRFORCES MONTHLY**

FREE APP
with sample issue

IN APP ISSUES £3.99

FREE Aviation Specials App



IN APP ISSUES
£3.99

Simply download to purchase digital versions of your favourite aviation specials in one handy place! Once you have the app, you will be able to download new, out of print or archive specials for less than the cover price!

SEARCH:
Aviation Specials

KEY

How it Works.

Simply download the Aviation News app and receive your sample issue completely free.

Once you have the app, you will be able to download new or back issues (from October 2010 onwards) for less than newsstand price or, alternatively, subscribe to save even more! Don't forget to register for your Pocketmags account. This will protect your purchase in the event of a damaged or lost device. It will also allow you to view your purchases on multiple platforms.



Available on PC, Mac, BlackBerry, Windows 10 and kindle fire from **pocketmags.com**

Requirements for app: registered iTunes account on Apple iPhone, iPad or iPod Touch. Internet connection required for initial download. Published by Key Publishing Ltd. The entire contents of these titles are © copyright 2017. All rights reserved. App prices subject to change. 021/17

A HARRIER GR.3 BROUGHT BACK TO LIFE

The most thrilling restoration project of his career, that's how **Chris Wilson** of Jet Art Aviation recalls the rollercoaster of challenges getting an RAF Harrier GR.3 back to ground-running condition.



Jet Art Aviation specialises in supplying and restoring ex-military aircraft and parts. One project has stood out in recent years and had a sentimental element for me. Our skilled team at Jet Art Aviation (JAA) has just completed 18 months of work on Hawker Siddeley Harrier GR.3, XZ130, that was built in 1976. It was a rollercoaster of successes and obstacles that have left us feeling incredibly satisfied and proud of the result. Some of my favourite career moments have come through this project. In ten years in business we have been lucky enough to own and restore 11 Harriers, this one being the most thrilling and successful restoration of them all.

AIRCRAFT HISTORY

We have the aircraft's full MOD service history thanks to the F700 log book and movement cards showing XZ130 served with 1 (Fighter) Squadron and 233 Operational Conversion Unit at RAF Wittering in Cambridgeshire, 3 (Fighter) Squadron and IV (Army Co-operation) Squadron at RAF Gütersloh in West Germany and 1453 Flight at Stanley Airport in the Falkland Islands. A large percentage of the aircraft's career was spent at Gütersloh during the Cold War.

The jet was retired in August 1990 and had its engine and APU inhibited. It then spent the next 15 years as an instructional

airframe at RAF Cosford, Shropshire; where, coincidentally, a fresh faced 19-year-old version of myself started his service training on this very aircraft.

After its time as an instructional airframe at the No 1 School of Technical Training came to an end, it spent the best part of ten years (2005-2014) on loan from the MOD to RAF Air Cadets' 1034 (Surbiton) Squadron in London. The Harrier was used as a guard on the parade ground. The time spent exposed to the elements had taken its toll and there were signs of weather-induced wear. Also, a few health and safety issues were starting to become evident from a lack of professional maintenance – leading the MOD to decide it was time to move the aircraft on. It was put up for disposal via public tender.

In November 2014 the prospect of

Top: Harrier GR.3 XZ130 looking superb after its restoration by Jet Art Aviation. All photos Jet Art Aviation unless stated

Below: The same aircraft during its service with IV(AC) Sqn at RAF Gütersloh. Marcus Herbote



acquiring XZ130 came to our attention. My interest in the Harrier was not just piqued with nostalgia having learned my trade on this airframe – I also saw what could be a good investment and a chance to restore a British icon back to its former glory. I travelled to London to survey the aircraft on the public viewing day and assessed the site to come up with an extraction plan which we subsequently submitted to the MOD. JAA was lucky enough to be the winning bidder.

MOVING THE HARRIER

In 2005 the aircraft had been put into position at the rear of the Air Cadet squadron by a large crane from an industrial estate. Over the next ten years buildings had been erected, and barriers and gates installed, getting it out was going to be a logistical nightmare. Our team was hit with the first challenge – how to extract the seemingly landlocked aircraft from its now boxed-in location within a two-day timeframe. Our solution was presented as part of our bid proposal, key components of which involved;

making the aircraft as small as possible by removing the nose and tail cone, freeing the brakes, inflating the tyres and turning the wheels which hadn't been moved in ten years. We would then tow it across the parade area without damaging the ground and put it onto a single low loader using a rear-mounted



The Harrier being disassembled at the Air Cadets' parade ground.

crane at full stretch from the entrance gateway. It would be a very tight squeeze through the front gate, reversing out onto a residential London street. The key to all this was using a very reliable and understanding lorry driver. The bespoke plan went off without a hitch and the truck embarked on its 250-mile (402km) journey to JAA's hangar at its premises in Yorkshire which would be XZ130's home for the next two years.

RESTORATION

Over the next few weeks we carried out an in-depth survey of the aircraft and realised that looking past the slightly weathered exterior it was fairly complete and in good order. Our brief was to make this the best Harrier GR.3 we've ever done. It also quickly dawned on us that we could potentially get this aircraft's engine running again so long as the missing components could be sourced. The engine spun, gas turbine starter (GTS) moved freely by hand and the aircraft still had oil and fuel in their fuselage tanks. We trawled through all the paperwork that accompanied the aircraft, and noted that the jet's good condition owed much to the engine being inhibited with preservative oils back in 1990 and engine covers being fitted.

The first step of the restoration was to work out what was missing and then source it. For example, control rods for all the reaction nozzles that provide directional control in the hover had been removed prior to arriving at the air cadet unit to prevent fingers being trapped by anyone moving the control column. Other items on the extensive list included avionics from the rear bays, clamps, seals, fuses, a pair of batteries,

attitude indicator in the cockpit, amplifier unit for some of the instruments and the angle of attack probe. Plus, we knew we needed to replace the wheels and tyres, locate a handful of external panels and some other items to enhance the aircraft. We found some wing pylons and replaced the canopy with a fresh-out-of-the-box unit that had sat in a barn for the last 25 years.

We obtained missing parts from a variety of locations, some more unusual than others. We bought a spares source Harrier wing purely to obtain control rods, special bolts and washers. A cockpit section owned by a Harrier enthusiast yielded instrumentation and the forward reaction nozzle control rod. A whole spares source fuselage was purchased to provide such items as fixings, fasteners and pipes.

Once most of the necessary parts were gathered, the team began the mechanical work on the Harrier, first removing the already vacated birds' nests from the nose undercarriage bay. Next we took off the rear plastic replica nozzles that had been fitted at Surbiton and sourced real ones. We had to free off the nozzle bearings and lubricant, again with a special heat-resistant molybdenum grease – readily available while the Harrier was in service, though not so easy to find 20 years later as a civilian. Inside the engine's plastic nozzles we found a variety of items; crisp packets, an empty soft drink can and a paper plate with 'good bye my lovely' written on it. Presumably put there by a sentimental cadet prior to the Harrier leaving Surbiton.

Our dreams of making the aircraft run again were then reliant on ground support



Safely removed and on the lorry – the aircraft starts its journey to Jet Art Aviation's facility in Yorkshire.

equipment. We borrowed a nitrogen trolley and used it to charge the accumulators. These had been discharged ten years previously and even after we had made the system complete and replenished the hydraulic reservoirs we didn't know what would happen. Fortunately, this only produced a few hydraulic leaks and so we worked around the system retorquing unions, some of which still had the original factory single-strand locking wire on, so had never been disturbed since leaving the factory. The correct oils had to be sourced and replenishment pumps found.

Once we were happy that everything was complete, the team double checked the lot. The aircraft was now hydraulically sound with accumulators pressurised and no leaks apparent, fuel in the tanks, batteries reconnected and every electrical system working.

GROUND RUN

The long haul of mechanical restoration culminated in the successful ground run and systems check on March 8, 2016. In preparation, we handed the aircraft over to some good friends, who had worked on Harriers in RAF service, to carry out an independent check and a full after flight/before flight (AF/BF) walk-round. We enlisted the help of a fast jet pilot who had run a Harrier previously to make sure a very experienced individual was in the cockpit monitoring all the key systems.

Months of hard work was rewarded during the 4½ minute test when the iconic Rolls-Royce Pegasus engine started up for the first time in 25 years. In dramatic fashion, ▶



A Jet Art Aviation employee refitting the hot nozzle heat shields after the repaint. The shields had to be removed to give access for painting.



Harrier XZ130 has its engine started for the first time in over 25 years.



Above: Jet Art Aviation has applied the name of a USAF exchange pilot, Capt L Y Ching, to the aircraft.

Right: The restored cockpit of XZ130.

Bottom: The Harrier is an icon of British aviation.



the GTS ran up and the engine fired into life with a puff of smoke accompanying the sweet sound only a Rolls-Royce Pegasus engine could make. The expected smoke was due to the presence of the preservative oils in the engine after it was inhibited in 1990. The engine was powered up to 35% thrust and the movement of the nozzles tested. The whole team was exhilarated. A true testament to British engineering and build quality. It's not every day that you run your own Harrier jet in the back yard!

APPEARANCE

Once the engine run was completed the cosmetic phase of the restoration got

under way. This included a strip down of the weathered paint and a repaint in beautiful shiny gloss with IV Sqn markings applied – the last it wore in service. We used gloss instead of the matt finish favoured by the RAF as we felt the former is more aesthetically pleasing and it also has better weather resistance. We decided to apply the name of a USAF exchange pilot, Capt L Y Ching, to the starboard side of the cockpit who flew XZ130 when serving in Gütersloh. His was the last name applied to the aircraft before it was retired. Incidentally, he has been in contact

Below: It took 18 months to get the aircraft to this condition.

with us throughout the restoration process and received regular updates on his old aircraft.

We are incredibly moved by the buzz surrounding this Harrier and have received a huge amount of positive feedback from around the world. We are immensely proud with all we have achieved and are now looking for a buyer for XZ130. With a future return to flight a possibility for this aircraft it is the best condition Harrier we have restored: electronically and hydraulically live, ground runnable and cosmetically beautiful. We look forward to seeing her go to her new home, though we may shed a tear as well. **AN**



COMBAT
AIRCRAFT
SPECIAL

UNITED STATES AIR FORCE AIR POWER YEARBOOK 2017

AIRCRAFT • PERSONNEL • SQUADRONS • MISSIONS • PROGRAMS

UNITED STATES AIR FORCE

AIR POWER YEARBOOK 2017



IN ASSOCIATION WITH
**COMBAT
AIRCRAFT**



NEW!

Produced by the *Combat Aircraft* team; the 2017 US Air Force Air Power Yearbook is the ultimate guide to the world's most powerful air arm. With exceptional photography and exclusive interviews, this 100-page publication is a must-have for USAF aviation fans.

FEATURES INCLUDE:

UNITED STATES AIR FORCE IN 2017

Thomas Newdick talks with Gen Herbert 'Hawk' Carlisle about the challenges facing Air Combat Command in the modern era.

YEAR IN REVIEW

Combat Aircraft reviews the major news stories around the USAF in 2016.

READY FOR COMBAT?

Jamie Hunter and Thomas Newdick recount how the F-35A was declared 'combat ready' on August 2, 2016.

NEW TRAINERS

In December the US Air Force was expected to formally request proposals from the four competing teams all vying for the lucrative T-X trainer deal to replace the T-38 Talon.

UNITED STATES AIR FORCE AIR POWER REVIEW

Tom Kaminski provides an extensive overview of the USAF including a detailed directory of units, bases and aircraft.

And much more!



A **NEW** SPECIAL PUBLICATION FROM **KEY PUBLISHING**

AVAILABLE NOW FROM WHSmith AND ALL LEADING NEWSAGENTS

JUST £5.99 PLUS FREE P&P*

*Free 2nd class P&P on all UK & BFPO orders. Overseas charges apply.

1211/16

Free P&P* when you order online at
www.keypublishing.com/shop

OR

Call UK: 01780 480404
Overseas: +44 1780 480404

Monday to Friday 9am-5:30pm

SUBSCRIBERS CALL FOR YOUR £1.00 DISCOUNT!

FRENCH FANCY

James Ronayne examines Dassault Aviation's Falcon 8X ultra-long-range business jet – the French manufacturer's new flagship model.

How do you improve the most successful product your company has ever produced? That was the challenge facing designers at Dassault Aviation's business jet division following the success of the Falcon 7X, the fastest-selling Falcon ever. The company's answer is the Falcon 8X, which was unveiled at the European Business Aviation Convention & Exhibition (EBACE) in May 2014.

This latest trijet takes many of the features of the 7X and enhances them. The result is a sleek and impressive aircraft capable of linking major cities across the world. With eight passengers and three crew, the Falcon 8X can fly 6,450nm

(11,945km) non-stop at Mach 0.80 – 500nm (926km) more than the 7X – and can connect Beijing with New York, Hong Kong with London or São Paulo with Moscow.

One of the Falcon 7X's biggest plus points is its ability to fly approaches up to 6°, which the Falcon 8X is also capable of, enabling it to fly into challenging airports such as London City and Lugano in Switzerland.

FEATURES

The Falcon 8X's cabin is 6ft 2in (1.88m) high, 7ft 8in (2.34m) wide and 42ft 8in (13m) long, and Dassault offers customers a remarkable 30 different cabin configurations. Options include three different galley sizes, two of

which incorporate a crew-rest option, and several lavatory layouts including one with a shower. A typical configuration would have room for 12 passengers.

The French firm has teamed up with Rockwell Collins to produce the FalconCabin HD+ cabin management system, enabling passengers to control the environment from anywhere on board via an Apple device. An optional extra is Skybox, a wireless media server giving passengers access to a 1TB iTunes library and the facility to share television shows and music wirelessly on demand; they can also stream content directly from their devices onto the cabin's displays. The 8X's cabin altitude is kept at 3,900ft while cruising at 40,000ft, to reduce



the effects of jet lag and ensure passengers feel fresh on arrival at their destination.

Three Pratt & Whitney PW307D engines power the aircraft, each delivering 6,722lb (29.9kN) of thrust, a 5% increase on the PW307A used on the 7X. Enhancements have been made to the wing structure, reducing overall aircraft drag during cruise and cutting weight by 600lb (272kg), including an improved winglet design.

Dassault claims the new engine and optimised wing make the 8X up to 35% more fuel efficient than any of its competitors in the ultra-long-range market, and says the jet offers a significant decrease in “community noise” and NOx emissions.

In the cockpit, the 8X benefits from the latest generation of Dassault’s EASy flight deck, with the Honeywell Primus Epic system. The flight deck is also equipped with Dassault’s new FalconEye Combined Vision System, a head-up display combining synthetic and enhanced vision.

FLIGHT TEST PROGRAMME

Falcon 8X F-WWQA (c/n 401) made its first flight from Bordeaux Mérignac on February 6, 2015, a little over a month after it was rolled out. Test pilots Eric Gérard and Hervé

Laverne had the honour of performing the first flight, which lasted 1hr 45mins and covered flight handling manoeuvres and systems tests.

“Throughout the flight, the Falcon 8X demonstrated excellent handling qualities, the hallmark of all Dassault Aviation aircraft,” Gérard said afterwards. “We reached each of the performance objectives set for the first mission and, in a few cases, surpassed target goals.”

Two other aircraft – F-WWQB (c/n 402) and F-WWQC (c/n 403) – have been used in the flight test and certification programme. Most of the work has been carried out at Dassault’s flight test centre at Istres.

The first test aircraft, F-WWQA, was used to open the flight envelope, including high-speed performance testing at Mach 0.96, taking it to a maximum ceiling of 51,000ft and through the full range of angles of attack. It also tested a number of weight configurations, including maximum take-off weight (MTOW) and a high-energy brake test.

The second jet, F-WWQB, has been used to verify key performance parameters including fuel consumption and landing/take-off distance. In June 2015, F-WWQC was

fitted with a complete interior at Dassault Aviation’s completion facility in Little Rock, Arkansas, and put through a stringent test campaign focused on cabin comfort and sound levels. In March 2015, it underwent cold soak trials at Rankin Inlet, Nunavut, in Canada. During testing, temperatures dropped as low as -33°C (-27°F).

Aircraft ‘QC then began an extra month-long global test campaign to assess operational reliability and performance in different conditions. The trial covered 55,000nm (101,860km) and took the 8X throughout Europe, the Middle East, Asia and North and South America on more than 65 flights, from short hops to ultra-long-haul flights. Dassault said the campaign placed particular attention on cabin equipment and functionalities and high-speed communications systems during long intercontinental flights and journeys over remote areas.

Dassault announced on June 27 last year that the Falcon 8X had achieved European Aviation Safety Agency (EASA) certification. Eric Trappier, Dassault Aviation Chairman and CEO, said: “Not only did we develop a Falcon which is exactly in line with the needs of our customers, in terms ►



The Falcon 8X is the latest addition to the Dassault business jet family.

Katsuhiko Tokunaga/DAC via Dassault Aviation



Part of the Falcon 8X production line at Bordeaux Mérignac. Dassault Aviation

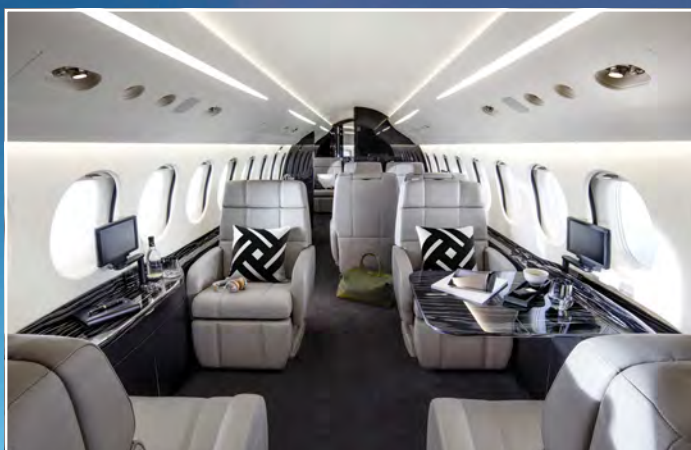
of range, comfort and operational flexibility, but we also did so in record time and with an unparalleled process to ensure aircraft reliability and maturity". The next day it revealed Federal Aviation Authority (FAA) certification had been approved.

The first delivery took place on October 5, 2016 to Amjet Executive of Athens, Greece.

Following receipt of their aircraft customers can utilise Dassault pilot operator support services to smooth entry into service. These include dispatching Dassault test and operational pilots or support engineers to the operator's premises to provide support during initial flights or assist crews with special mission requirements.

The type made its debut appearance at the NBAA Business Aviation Convention & Exhibition (NBAA-BACE) in Orlando, Florida over November 1-3, 2016.

Production is in full swing at Dassault's Bordeaux-Mérignac plant along with work at the completion centre in Little Rock. Dassault was asked for the number of



Above left and right: Dassault offers up to 30 cabin configurations for the Falcon 8X. www.jfromero.fr via Dassault Aviation



The first and second 8Xs built. Sebastien Rande via Dassault Aviation



The Falcon 8X was put through its paces on the extensive flight test programme. Katsuhiko Tokunaga/DACT via Dassault Aviation



Above left: Dassault's EASy flight deck on the 8X with the Honeywell Primus Epic system is at its heart. It also has the aircraft manufacturer's new FalconEye Combined Vision System, a head-up display combining synthetic and enhanced vision. Dassault Aviation



Above right: Amjet Executive of Greece received the first Falcon 8X. Philippe Stroppa via Dassault Aviation

Falcon 8Xs delivered to date and aircraft on order but responded that such figures cannot be released before a financial press conference in February. A new hangar has been built at the Arkansas airport for 8X completions and a new maintenance,

repair and overhaul facility opened at Bordeaux on November 10 last year for the 8X, 5X and 7X.

Dassault has high expectations for the 8X in both Asia and South America, where the 7X has proved popular.

Like the other members of the Falcon family – particularly the trijets – the Falcon 8X is beautiful to look at and successfully matches style with substance. It has every chance of being as successful – if not more so – than the 7X. **AN**

Below: On February 6, 2015 the Falcon 8X took to the air for the first time. Katsuhiko Tokunaga/DACT via Dassault Aviation



LUFTWAFFE PRECISION BOMBING IN WW2

Britain and Germany fought a 'battle of the beams' in the opening years of World War Two. **Chris Goss** describes the technological contest.

More than 500 bombers blitzed Coventry on the night of November 14, 1940, starting a firestorm which brought about a temporary collapse of social order. Large sections of the West Midlands industrial city were flattened in the raid, the most infamous of the war so far.

The Luftwaffe had flown some 300 miles (482km) in darkness from bases in northern France, Belgium and the Netherlands to 'blind bomb' their target, and achieved great accuracy by 'following the beam'. Bomber aircrews had earlier relied on good visibility to identify targets and drop bombs, but mass daylight raids had failed during the Battle of Britain and new tactics were needed.

Darkness would give the attackers a cloak of invisibility. RAF night-fighter defences at the

time were minimal. The challenge was finding the target, particularly in poor weather, and scientists and technicians on both sides played a cat-and-mouse game to try and outflank each other and gain the upper hand.

EARLY YEARS

The Luftwaffe was far more advanced in precision night-bombing than its adversaries in the early years of the war, carrying out experiments in 1939 to try and overcome an aircrew skills gap.

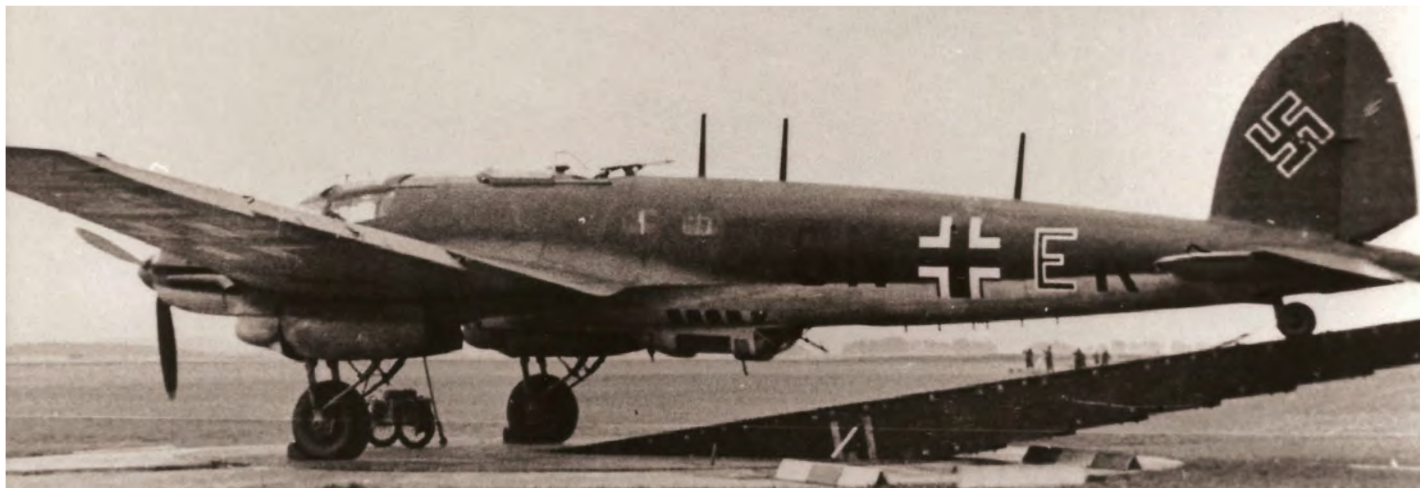
Germany had pilots who were 'blind flying' experts – that is, experienced in flying on instruments. Newer crews needed navigational aids to bomb at night with any degree of accuracy. The basis of such technology was a development of the Lorenz blind landing system.

The Lorenz system, which worked only over short distances, enabled pilots to land in bad weather or at night. An aircraft aligned with a runway and flew down a glide path. A system comprising a transmitter close to the runway threshold and three parallel, antennas, each sending out beams.

One gave an audible tone similar to Morse code dots, another dashes, according to whether the aircraft was left or right on the centre line. Dots indicated too far left and dashes too far right. If the aircraft was correctly on the centre line and glide path, the pilot would hear a constant tone. It was simple, effective and the forerunner of today's Instrument Landing System (ILS).

Slight modifications made the system suitable for blind bombing. It was known as a Knickebein – meaning crooked leg, but also





believed to be the name of a mythical raven which could always find its way back home. Two bigger transmitters projected narrower beams which intersected over the target. The aircraft flew along one until the pilot heard the contrasting audible tones of the other. Bombs were dropped when a constant tone was heard.

The British had received word that Germany was developing blind bombing systems as early as November 1939 but had no detailed information. At this point Germany was developing Knickebein and X- and Y-Verfahren (more on these latter two systems later). On April 3, 1940 RAF intelligence uncovered evidence, a piece of paper mentioning the 'Knickebein beam' being found on a crewman captured from a Stab II Gruppe./Kampfgeschwader 26 (Stab II./KG 26) Heinkel He 111.

As the air war intensified in the summer of 1940 more and more bombers of all types were now fitted with Knickebein, especially as more night missions were flown. As simple as it was this system did have its problems as a crew shot down attacking Birmingham on the night of November 19, 1940 discovered. Survivors from Oberleutnant Hans Klawe's He 111 – from 2./KG 55 – said after capture that the Knickebein was set for Birmingham. They were to pick it up north of London. After a few problems taking off from their base at Dreux in France, the bomber flew by normal

Below left: **KGr 100 over the Skagerrak, between Norway and Sweden, on April 9, 1940. All aircraft have the three aerials showing they are fitted with X Gerät. A Viking badge can be seen on the nearest aircraft.** All photos Chris Goss Collection

Above: **Heinkel He 111 H 6N+EK of 2/KGr 100 on the compass swing base at Vannes, Brittany. As with other KGr 100 He 111s, it has the individual letter on the tip of the tail, in this case a red 'E'.**

navigational means and successfully found the signal. The tone soon became variable, sometimes heard at full strength and then fading to almost inaudible. Soon they heard nothing.

Electrical failure then led to the compasses and artificial horizon not functioning properly and, struck by anti-aircraft fire, the Heinkel crashed near Nuneaton, killing Klawe and one other. Two crewmen were captured.

It's not known whether this was a genuine failure of the system or a successful British attempt to jam (as opposed to 'bend') the Knickebein by transmitting a continuous note of great strength to swamp the German signals which disorientated the bomber's planned flight path.

From October 1940, the RAF was successfully confusing the Germans by using a high-powered transmitter, code named Aspirin. Initially it transmitted

interference but later broadcast an extra "dot" signal, which appeared to "bend" the beam away from the target.

The Luftwaffe was still forging ahead with the technology and from August 1940 began using new, more advanced blind bombing systems.

AUTOMATIC RELEASE

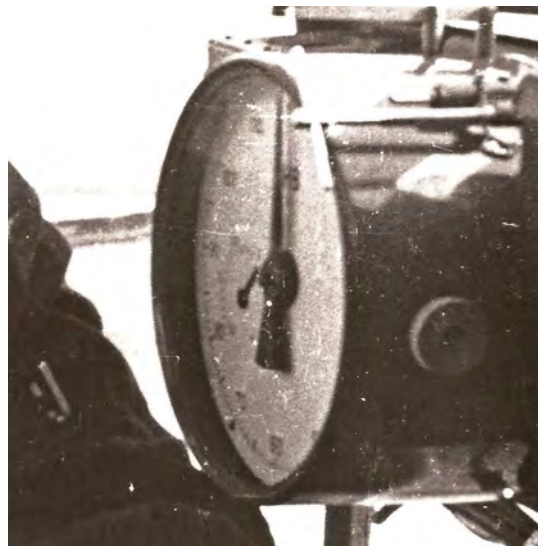
One of them, X-Verfahren (X System or Procedure), used two ground 'Wotan I' transmitters to send multiple beams, one of which was for the approach to a target. Pilots knew they were on track by the Knickebein-like dots/dashes/constant tone heard over a headset via the 'X-Gerät' (X Apparatus) receiver in the aircraft. Three more beams intersected the approach beam.

One, at 50km (31 miles) from the target, served as a warning to pilots that they were approaching the objective. At 20km (12.5 miles), a second beam told the Beobachter (observer) to start the X-Uhr, a special stop clock.

At 5km (3 miles) from the target, the Beobachter pressed another button on the X-Uhr, the first hand of which stopped and a second started. The distance from the second beam to the third beam was three times that from the third beam to the bomb release point. When both clock hands met, the bombs dropped automatically. ▶



An X Beam transmitter on the Gmunderberg, Austria.



The X-Uhr clock became part of the Luftwaffe's electronic navigation aids for bombing accurately by night.



Left: An He 111 of KGr 100 camouflaged for night operations.

Few bombers had X-Verfahren equipment, and the new system needed modified aircraft and specially trained crews. A unit initially designated Luftnachrichten-Abteilung 100 (LnAbt 100-Air Signals Section 100) first flew aged Junkers 52s, but from early 1939 the He 111. Its aircraft were distinguishable from other He 111s by three aerial masts atop the fuselage.

The unit flew during the Polish campaign in September 1939, gaining valuable experience with X-Verfahren. In November it was retitled Kampfgruppe 100 (KGr 100) and came under the leadership of Oberstleutnant Joachim Stollbrock.

It spent the next few months training crews and developing tactics and techniques, occasionally flying over the North Sea. On February 13, 1940 Oberstleutnant Stollbrock strayed too close to the British coast and his He 111 was shot down by Spitfires of 54 Squadron flown by Sqn Ldr Herbert Pearson and Plt Offs Basil Way and John McKenzie. The Heinkel crashed into the Thames Estuary eight miles northeast of RAF Manston in Kent, taking its secret equipment with it.

Command of KGr 100 went to Hauptmann Artur von Casimir and, for the time being, X-Gerät was removed from the unit's aircraft.

The Gruppe took part in the Norway and Denmark campaigns of April and May 1940

and Hauptmann von Casimir was shot down and taken prisoner on May 29 – but his capture failed to give the British any further insight into X-Verfahren.

Operational flights had not warranted its use and, with the campaigns over, the unit returned to Germany. Crews reacquainted themselves with blind bombing techniques, gained a new commanding officer, Major Kurd

'The Luftwaffe was far more advanced in precision night bombing than its adversaries in the early years of the war.'

Aschenbrener, and moved from Lüneberg to Vannes in western France – and soon started using X-Verfahren over Britain.

Their first mission was on the night of August 13/14 when 21 He 111s struck the Birmingham area, in particular the Dunlop factory and the Nuffield Morris Motors plant at Castle Bromwich. Weather conditions were

not helpful and four aircraft had trouble: one suffered engine problems and turned back.

An He 111 force-landed on a beach south of Quimper in Brittany on its return. A pilot temporarily lost control over southern England but before he recovered a crew member baled out and was captured. Another aircraft returned early when a signal flare ignited inside, slightly burning two crewmen.

Eleven bombs successfully fell on target. It was a portent. KGr 100 targeted Derby, Plymouth, Bristol, Birmingham, Gloucester and Liverpool/Birkenhead on the remaining nights of August 1940. Similar raids followed in September and October.

The Air Ministry was aware of the new blind bombing beam by the end of August 1940 but it would be some time before a countermeasure, known as Bromide transmitters, became effective. But X-Verfahren was not totally successful for the Luftwaffe. Its advanced technical nature meant accuracy was a problem, although this was offset by the experienced KGr 100 crews using it.

A breakthrough for the RAF finally came on November 6 with the capture of an He 111, flown by Feldwebel Hans Lehmann of 2./KGr 100. With his X-Gerät equipment not working properly, he and his crew had got lost and, low on fuel, ditched off the coast. Lehmann at first thought they were off Brittany, and then northern Spain. In fact it was the Dorset coast between Bridport and Eypemouth. The RAF had its first X-Gerät, albeit damaged by seawater.

COMPLICATED Y-VERFAHREN

The third and last blind bombing system then made an entrance. X-Verfahren was complicated, and Y-Verfahren added even greater sophistication. A 'Wotan II' transmitter radiated a single beam in pulses, aimed towards a target. Aircraft received these signals and transmitted them back to a ground station which determined the bomber's position with greater accuracy. Adjustments were sent as necessary.

When the aircraft was over the target, the ground station signalled crews to drop their bombs. However, it was too advanced for its time. In the summer of 1940, the Luftwaffe

Below: A KGr 100 aircraft which crash-landed on a beach returning from the first attack by the unit on the night of August 13/14, 1940.



Right: **Major Viktor von Lossberg of III./KG 26, his He 111 clearly showing the Y-Verfahren aerial behind the cockpit.**

test centre at Rechlin attached an He 111 with Y-Verfahren to KGr 100 for operational trials. It was very unreliable and had many 'bugs'.

The system reappeared over England in November, operated by Hauptmann Karl Wolfien's III./KG 26 from Poix in northern France (Wolfien would be replaced by Hauptmann Viktor von Lossberg in February 1941). These Y-Verfahren aircraft were easily recognisable, having one large aerial ahead of the normal radio mast.

The RAF soon discovered the new threat and responded with countermeasures using a jammer called Domino. A receiver at Highgate in north London picked up the echo from the German bomber and passed it to a nearby transmitter at Alexandra Palace. The signal was adjusted and retransmitted to the bomber, causing it to send a false ranging signal back to its ground station.

Capture of Y-Gerät equipment from a downed III./KG 26 aircraft in early 1941 revealed more secrets. It was discovered the automated mechanism for measuring bearing error was susceptible to what was known as continuous wave jamming – which could further jam or interfere with the bearing analyser circuit, making the transmissions inaccurate.

Nevertheless it would appear that, when it worked, Y-Verfahren was popular with its crews as Leutnant Julius Tengler of 9./KG 26 related. "My crew on the night of April 8, 1941 had Unteroffizier Zender as a trainee radio operator learning Y-Gerät with Unteroffizier Faber. Y-Gerät was the pathfinder device used by III./KG 26. We started from Paris Le Bourget, flying west-north-west over the Channel to pick up our Y Beam from Cherbourg to Coventry.

"When on this beam, the steering was automatic – I could leave my feet off the rudder pedals and all I needed to move the control column was my finger. The distance to the target was measured by a phase difference between the signal and electrical pulses from my plane.

"For calculation purposes, near to the target we should be on as steady a course,



height and speed as possible. I think now we were a good target for night fighters."

Tengler's last sentence was correct. On approach to his intended target, Coventry, the bomber was attacked and shot down by a Boulton Paul Defiant of 264 Squadron flown by Sqd Ldr Arthur Sanders and Plt Off Fred Sutton. The He 111 crashed at Whitwell in Hertfordshire. Tengler and three crewmen were captured but his observer died.

MOONLIGHT SONATA

There was one more countermeasure against the blind bombing raids. An RAF operation known as Cold Water planned to disrupt the Luftwaffe by flying nuisance raids against its bases and transmitters in northern France.

During the afternoon of November 14, 1940, the RAF was aware of beams targeting Coventry for what was Operation Mondscheinsonate Korn (Moonlight Sonata, 'Korn' being the code name for Coventry). That night Bomber and Coastal Command aircraft attacked airfields at Rennes, Vannes, Lorient, Cherbourg, Orléans-Bricy, Villacoublay, Melun, Chartres and Châteaudun.

The attacks took place after the German aircraft were airborne and the only casualties were three aircraft slightly damaged, one

badly damaged at Vannes and five personnel killed and six wounded at Cherbourg.

RAF night fighters, also part of the Cold Water plan, reported just one combat, claiming to have damaged an aircraft near Swaffham in Norfolk. It was scant retribution for the devastation inflicted on Coventry that night, especially when the only German losses were a Dornier 17 to anti-aircraft fire and an He 111 to icing.

It was clear the Luftwaffe's blind bombing systems and techniques were far more advanced than the RAF's during 1940 and 1941 and the British quickly introduced effective countermeasures and rapidly improved anti-aircraft and night-fighter defences. The widespread introduction of airborne radar also made a significant difference.

Most of the Luftwaffe's bomber force moved eastwards in June 1941 in preparation for attacking the Soviet Union, the RAF using the breathing space to bolster defences and countermeasures. Later Luftwaffe attacks on the UK were a shadow of what had been experienced in the Battle of Britain and the Blitz of September 1940 to May 1941, and were rarely as effective as the attack suffered by Coventry. **IAN**

Junkers Ju 88s were among the types of bombers that used the Knickebein system.



Flight Bag

The latest products for the discerning aviation enthusiast

ACES, AIRMEN AND THE BIGGIN HILL WING – A COLLECTIVE MEMOIR 1941-1942

Book

Written by: John EC Tan

Price: £25

The work of RAF wartime ground crew tends to be barely mentioned in aviation literature. This book highlights the duties of a typical airman in support of Fighter Command squadrons based at Biggin Hill. The author's late grandfather, David Raymond Davies, was assigned to a specialist armourers' team which eventually solved problems associated with the often temperamental 20mm cannon – his recorded oral reminiscences forming the core of this excellent book. In his armourer capacity, Davies, had close association with such notable pilots as Don Kingaby, Brian Kingcome and Bob Stanford-Tuck, to name but a few. Despite rank and the social divisions of the time, pilots and the 'erks' who looked after them saw themselves as comrades in arms and this comes through very well in the story.

Illustrated with 48 black and white photographs, the text is punctuated by highly relevant quotations from published and unpublished memoirs, plus more recent historical works, as well as extracts from Operations Record Books. The author skilfully weaves these sources into a flowing story that faithfully recreates what everyday life was like on a fighter station. He says in his introduction that he was "wrestling with the difficulties of trying to convey a sense of being there", and he has certainly succeeded.

Published by Pen and Sword Aviation, ISBN 9781473881693, available from www.pen-and-sword.co.uk



LUFTWAFFE EAGLES OVER IRELAND – THE STORY OF GERMAN AIR CRASHES OVER NEUTRAL IRELAND 1940-1945

Book

Written by: Justin Horgan and Paddy Cummins

Price: €35

During World War Two, the Republic of Ireland remained neutral but saw frequent overflights by aircraft of the opposing sides, but the Irish Air Corps had no suitable aircraft to intercept them.

The Luftwaffe's battles with the RAF in the skies around the Irish coast led to many crashes and forced landings in neutral Irish territory. Mountainous terrain and bad weather also played a part. The book describes the events leading up to these incidents, the response of local people and the extensive efforts to save crew members. Among the subjects covered in its 28 chapters are an Fw 200 Condor crash on Mount Brandon, where parts still remain; and another accident involving the same type, where an Irish nurse was awarded a German medal for saving a crewman from the burning wreckage. In contrast is an amusing account of life in Curragh Camp, where German (eventually totalling 56) and RAF internees were allowed out to cinemas and local pubs, honour-bound to return. The final two chapters are Life After Ireland, which covers the Germans after the war; and German Military Cemetery, Glencree, Co Wicklow, which lists casualties.

During more than 20 years of research the authors interviewed many of the survivors. The text is well illustrated with reproductions of official reports, letters and other memorabilia, along with 160 colour and 430 black and white photographs. Sadly co-author Paddy Cummins died in 2013 but he would have been very proud of his involvement in this superb book.

Published by Horgan Press, ISBN 9780995553002, and available from www.horganpress.com



RUSSIA'S WARPLANES VOLUME 2 – RUSSIAN-MADE MILITARY AIRCRAFT AND HELICOPTERS TODAY

Book

Written by: Piotr Butowski

Price: £34.99

The second volume in a series on the aircraft currently in service or under development for Russian military aviation and for export customers – the types featured in five chapters are long-range bombers, maritime aircraft, strategic transports and tankers, theatre and special-purpose transports and trainers. The author is a distinguished expert on Russian aviation and has visited most of the country's aircraft design bureaus and their production plants plus many air bases as well as numerous air shows and defence exhibitions.

The amount of detail packed in is remarkable. Neatly tabulated are airframe and systems, powerplant, dimensions, weights, performance figures, avionics, armament and self-protection equipment. Each type has a well written history which covers its operational career, production and operators, variants and upgrades.

Also included is a 24-page addenda section which updates the series' first volume – on tactical combat aircraft and helicopters, transport helicopters, reconnaissance and special duty aircraft. Involvement in Syria is also brought up to date. A single, short appendix lists aircraft design and production facilities, along with a location map, and there are 200 colour photographs.

The book is a must for air force libraries and defence ministries worldwide – as well as Russian airpower enthusiasts who will find it equally indispensable.

Published by Harpia Publishing, ISBN 9780997309201, available from www.casematepublishing.co.uk



X PLANES: BELL X-1

Book

Written by: Peter E Davies

Price: £12.99

Another of the X-Planes series, this features the first and ultimately successful attempts to break the sound barrier in controlled flight. At the end of World War Two no-one knew if it was possible, but the Bell Aircraft Corporation, which had a reputation for innovative designs, had already built a rocket-powered aircraft with the aim of supersonic flight.

The fuselage of the Bell XS-1 (Experimental, Sonic No 1) was modelled on a 0.50-calibre bullet, a shape known to go supersonic with ease. Because there was no hard data on which to base calculations, the airframe was incredibly strong, being stressed to 18g, at least 50% more than any existing design.

Its first gliding flight took place in January 1946 using a B-29 Superfortress to carry the XS-1 to altitude, as it would for subsequent powered sorties – the first of which came in December 1946.

By now redesignated as the X-1, the aircraft's best known achievement was in October 1947 when Chuck Yeager took it up to Mach 1.06. In 12 years, the type – seven built with four lost in accidents – went on to establish a series of speed and altitude records far in excess of those envisaged at the beginning, including an ultimate speed of Mach 2.4.

Illustrated with seven colour and 58 black and white photographs, plus seven original cutaway and profile artworks and a two-page spread colour painting, this is a very good book, packed with interesting information about a groundbreaking aircraft.

Published by Osprey Publishing, ISBN 9781472814647, and available from www.ospreypublishing.com



REGISTER REVIEW

The latest changes on the UK, Irish, Isle of Man, Guernsey and Jersey registers.



A new addition to Aurigny Air Services' fleet is ATR 72-212A, G-LERE, shown at a wet Manchester Airport on November 18. Nik French

RESTORATIONS

REG'N	MODE(S)	TYPE	C/N	OWNER
G-AWHC	407216	Hispano HA.1112-M4L Buchon	40/2	Air Leasing Ltd, Sywell, Northamptonshire
G-AWHM	407217	Hispano HA.1112-M1L Buchon	187	Air Leasing Ltd, Sywell, Northamptonshire
G-BBXX	400C88	Piper PA-34-200 Seneca	34-7450056	A Elliott, Blackpool, Lancashire
G-BNJE	402919	Cessna A152 Aerobat	A152-0805	DJ Hockings, Deanland, East Sussex
G-CBNJ	404730	Raj Hamsa X'Air 582(11) (built by MK Slaughter, JL Francis & M Hunt)	BMAA/HB/187	MD Hadley, Boston-Wyberton, Lincolnshire
G-CFAE	4008D7	Avro RJ100	E3381	Triangle Regional Aircraft Leasing Ltd, Cranfield, Bedfordshire
G-DLRA	407246	Pilatus Britten-Norman BN-2T Islander (Modified)	2140	Britten-Norman Ltd, Lee-on-Solent, Hampshire
G-MMLK	407224	Micro Biplane Aviation Tiger Cub 440	SO112	MJ Aubrey, (Kington, Herefordshire)
G-STUE	40505C	Europa Aviation Europa	PFA 247-12869	F Xuereb, (Orpington, Kent)
G-WNSF	406841	Sikorsky S-92A	920046	CHC Scotia Ltd, Aberdeen, Aberdeenshire

NEW REGISTRATIONS

REG'N	MODE(S)	TYPE	C/N	OWNER
G-CJHF	407150	Aeropro EuroFOX 912(iS)	LAA 376-15399	PJ Fincham, Trustee of BGC Eurofox Group, Hinton-in-the-Hedges, Northamptonshire
G-CJIV	4071A6	Airbus Helicopters H145 (officially registered as a BK117D-2)	20111	Airbus Helicopters UK Ltd, Oxford, Oxfordshire
G-CJMI	407210	Eurocopter EC145 (officially registered as BK117C-2)	9423	The Milestone Aviation Asset Holding Group No.8 Ltd, (Hamilton, Bermuda)
G-CJMM	407211	Eurocopter EC145 (officially registered as BK117C-2)	9426	The Milestone Aviation Asset Holding Group No.8 Ltd, (Hamilton, Bermuda)
G-CJNC	407212	Eurocopter EC145 (officially registered as BK117C-2)	9468	The Milestone Aviation Asset Holding Group No.8 Ltd, (Hamilton, Bermuda)
G-CJND	407213	Eurocopter EC145 (officially registered as BK117C-2)	9471	The Milestone Aviation Asset Holding Group No.1 Ltd, (Hamilton, Bermuda)
G-CJNL	407220	Jodel DR1050-M	LAA 304-15103	MG Dolphin, (Grantham, Lincolnshire)
G-CJNS	407221	Avro RJ100	E3342	Triangle Regional Aircraft Leasing Ltd, Cranfield, Bedfordshire
G-CJNV	40655F	Agusta AW189 (built by AgustaWestland Ltd)	92001	Bristow Helicopters Ltd, Norwich International, Norfolk
G-CJNW	407225	Agusta A109S Grand	22075	Ariane SRL Unipersonale, (Sondrio, Italy)
G-CJOK	40718C	Glasflugel 304 MS (built by HPH spol s.r.o.)	064-MS	PS Tickner, Trustee of JOK Syndicate, Lasham, Hampshire
G-CJPB	407229	Best Off SkyRanger Swift 582(1)	BMAA/HB/691	TW Thiele, (Radwell, Hertfordshire)
G-CJPG	40722B	Cameron C-80	10460	PRO Audenaert, (Overmere, Belgium)
G-CJPN	40722D	Cessna 152	152-80337	M Magrabi, Bournemouth International, Dorset

G-CJRI	407243	Robinson R66 Turbine	0759	Heli Air Ltd, Wellesbourne Mountford, Warwickshire
G-CJSI	40724B	Lindstrand LTL Series 1-310	020	Lindstrand Technologies Ltd, (Oswestry, Shropshire)
G-CJSR	407252	Steen Skybolt (built by JC Brown)	SB-1990	SL Millar, (Deeping St. James, Lincolnshire)
G-CJSY	407256	Sackville BM-34	BN02	BJ Newman, (Rushden, Northamptonshire)
G-CJTC	407234	AutoGyro Calidus (assembled by Rotorsport UK Ltd)	RSUK/CALS/032	Rotorsport Sales and Service Ltd, Wolverhampton Halfpenny Green, Staffordshire
G-CJVT	407235	AutoGyro Cavalon (assembled by Rotorsport UK Ltd)	RSUK/CVLN/022	Rotorsport Sales and Service Ltd, Wolverhampton Halfpenny Green, Staffordshire
G-CLSH	4070AD	Schleicher ASK-21	21940	Lasham Gliding Society Ltd, Lasham, Hampshire
G-CLTC	407219	Schempp-Hirth Janus Ce	280	CA Willson and PJD Smith, Rivar Hill, Wiltshire
G-CLTL	407232	Schleicher ASW-19B	19340	JP Salt, Kirtin-in-Lindsey, Lincolnshire
G-CMNK	4071F0	de Havilland DHC-1 Chipmunk 22	C1/0173	N and AD Barton, (St. Columb, Cornwall)
G-CMRA	40714B	Eurocopter AS355N Ecureuil II	5560	Cheshire Helicopters Ltd, Blackshaw Hays Farm, Mobberley, Cheshire
G-CORS	407227	Noorduyn AT-16 Harvard IIB	14A-1884	Propshop Ltd, Duxford, Cambridgeshire
G-DHHF	406E97	North American SNJ-5 Texan (officially registered as an AT-6 Harvard II)	88-17678	DH Heritage Flights Ltd, Compton Abbas, Dorset
G-DHKC	40712E	Boeing 757-256	30052	DHL Air Ltd, Leipzig/Halle, Germany
G-DOLS	40116F	Piper PA-28-236 Dakota	2811046	PJ Crowther, White Waltham, Berkshire
G-DVOR	4061F8	Diamond DA 62	62.040	Flight Calibration Services Ltd, Goodwood, West Sussex
G-DXTR	4061F2	Beech 200 King Air	BB-1244	Synergy Aviation Ltd, Fair Oaks, Surrey
G-EOMP	406E16	Piper PA-28-181 Archer II	28-7890124	Dynamic Aviation BV, Lelystad, Netherlands
G-EVEN	40110F	Cirrus SR22	2234	Glemmestad Invest AS, Goodwood, West Sussex
G-EZPR	4070CA	Airbus A320-214	7372	easyJet Airline Company Ltd, London Luton, Bedfordshire (NB)
G-EZPS	4070CB	Airbus A320-214	7410	easyJet Airline Company Ltd, London Luton, Bedfordshire (NB)
G-EZPU	4071D6	Airbus A320-214	7490	easyJet Airline Company Ltd, London Luton, Bedfordshire (NB)
G-FBKH	407207	Cessna 510 Citation Mustang	510-0354	Blink Ltd, Blackbushe, Hampshire
G-FBKJ	407218	Cessna 510 Citation Mustang	510-0169	Blink Ltd, Blackbushe, Hampshire
G-FBKK	40723F	Cessna 510 Citation Mustang	510-0182	Blink Ltd, Blackbushe, Hampshire
G-GFCM	40723A	Piper PA-44-180 Seminole	44-7995027	Coöperatief Air Waterland UA, Lelystad, Netherlands
G-HBEE	40724C	Lindstrand LTL Series 2-80	047	Lindstrand Technologies Ltd, (Oswestry, Shropshire)
G-JKAT	40724B	Robinson R22 Beta	0566	HQ Aviation Ltd, Denham, Buckinghamshire
G-JZHM	4070E1	Boeing 737-800	63570	Dart Group PLC, Leeds-Bradford, West Yorkshire (NB)
G-JZHN	4070E2	Boeing 737-800	63146	Dart Group PLC, Leeds-Bradford, West Yorkshire (NB)

G-JZHO	4070E3	Boeing 737-800	63569	Dart Group PLC, Leeds-Bradford, West Yorkshire (NB)
G-KIAB	407209	Scheibe SF-25C Falke 2000	44439	L. Ingram, Shennington-Edgehill, Oxfordshire
G-LERE	407201	ATR 72-122A	891	Aurigny Air Services Ltd, Guernsey, Channel Islands
G-MCDD	407072	Hughes 369D	1111D	Eastern Atlantic Helicopters Ltd, Brighton City, West Sussex
G-MDLE	407242	McDonnell Douglas MD.520N	LN108	Loxwood Holdings Ltd, Oxford, Oxfordshire
G-MEFT	4071A0	Grob G.120TP-A	11100	Affinity Flying Training Services Ltd, RAF Barkston Heath, Lincolnshire
G-MFLT	40721D	Eurocopter AS365N3 Dauphin II	6806	Multiflight Ltd, Leeds-Bradford, West Yorkshire
G-MFTS	4071A1	Grob G.120TP-A	11099	Affinity Flying Training Services Ltd, RAF Barkston Heath, Lincolnshire
G-MORO	407247	Bombardier Challenger 601	3017	Volare Aviation Ltd, Oxford, Oxfordshire
G-NEII	4038AF	Montgomerie-Bensen B.8MR	PFA G/01-1082	Dept of Doing Ltd, (Kettering, Northamptonshire)
G-OJCL	40350F	Robinson R22 Beta	1950	JC Lane trading as JCL Aviation, (Green Crize, Herefordshire)
G-OJSD	4071C3	Aeropro EuroFOX 912(S)	LAA 376-15428	JD Sinclair-Day, (Rowlands Gill, Tyne & Wear)
G-OSAR	407231	Bell 206L-1 LongRanger	45704	Vantage Aviation Ltd, Southwick, Wiltshire
G-OTUM	407239	Best Off SkyRanger Nynja LS 912S(1)	BMAA/HB/692	DW Wallington, (Gotham, Nottinghamshire)
G-OURT	40712C	Lindstrand LTL Racer 56	019	AB Court, (Morda, Shropshire)
G-OWLL	4071CD	UltraMagic M-105	105/214	JA Lawton, (Eton, Surrey)
G-PDGO	407226	Aérospatiale AS365N2 Dauphin 2	6405	PLM Dollar Group Ltd trading as PDG Helicopters, Dalcross Heliport, Inverness, Highland
G-POLF	401255	Eurocopter EC135T2+	0267	Police & Crime Commissioner for West Yorkshire (operated by National Police Air Service)
G-PRPG	4071BA	Bombardier Dash 8-Q402	4191	Flybe Ltd, Exeter International, Devon (NB)
G-RJIT	40723D	Groppo Trail Mk.2 (built by IM Belmore, JP Kloos, AT Banks, GS Scott & RA Brown)	LAA 372-15355	IM Belmore & RA
G-SAKS	4071F5	Pilatus PC-12/45	508	Saxon Logistics Ltd, Elstree, Hertfordshire
G-TAAT	407204	Piper PA-32-301FT 6X	3232027	AD Trotter, (London W4)
G-TOOO	40721B	Guimbal Cabri G2	1175	Helicentre Aviation Ltd, Leicester, Leicestershire
G-TYRO	406D08	AutoGyro MTOSport (assembled by Rotorsport UK Ltd)	RSUK/MTOS/056	I Bryant, RNAS Yeovilton, Somerset
G-XJCJ	407203	Cessna 550 Citation Bravo	550-1129	Xclusive Jet Charter Ltd, Southampton International, Hampshire (NB)
G-YMKH	4071F6	Embraer Legacy 650	14501214	TAG Aviation (UK) Ltd, Farnborough, Hampshire (NB)
G-ZBEN	407208	Yakovlev Yak-52 (built by Intreprinderea de Avioane Bacău)	822708	BA Nicholson, Longside, Aberdeenshire
EI-FJY	4CACE5	Boeing 737-800	42272	Norwegian Air International Ltd, Oslo-Gardermoen, Norway (NB)
EI-FNL	4CA639	Airbus A330-243	1028	Whitney Ireland Leasing Ltd, (for Capital Airlines, Beijing, China as B-8550)
EI-FSR	Not Allocated	ELA Aviacion ELA-07S	09061140724	R Fitzpatrick, Slieve Croob, Castlewellsan, Co. Down, Northern Ireland
EI-FTC	4CA79B	Boeing 737-800	44753	Ryanair Designated Activity Company, Dublin (NB)
EI-FTG	4CA8A9	Boeing 737-800	44757	Ryanair Designated Activity Company, Dublin (NB)
EI-FTH	4CA745	Boeing 737-800	44758	Ryanair Designated Activity Company, Dublin (NB)
EI-FTJ	4CA8AB	Boeing 737-800	44760	Ryanair Designated Activity Company, Dublin (NB)
EI-FXO	4CA76E	Airbus A320-214	5240	LATAM Ireland Aircraft Designated Activity Company, (stored Abu Dhabi International, United Arab Emirates 11.16)
EI-LSY	4CA785	Gulfstream G550	5350	GainJet Ireland Ltd, Shannon, Co. Clare
EI-SOO	4CA543	ATR 72-122A	577	ASL Airlines (Ireland) Ltd, Dublin (NB)
M-ABKP	43EACF	Boeing 737-8Q8	30704	Inishdawson Leasing Ltd, (for Ethiopian Airlines as ET-ATV)
M-ABKT	43EAD0	Embraer 175	17000147	Celestial Aviation Trading 71 Ltd, (stored Porto Alegre-Salgado Filho International, Brazil)
M-MEVA	43EAD1	Cessna 560 Citation Ultra	560-0346	AVEMR, (Lamballe, France)
M-RCCH	43EAAF	Embraer Legacy 650	14501225	Russian Copper Company Holdings Ltd, Yekaterinburg-Koltsovo International, Russia

M-RRRR	43EACD	Bombardier Global 6000	9704	Prestige Investments Ltd, TBA
M-YFLY	43EACE	Pilatus PC-12/47E	1110	Fly High Ltd, TBA
2-AVOF	TBA	Airbus A319-133	3077	Aerfin Finance Ltd (stored at Tarbes-Lourdes, France 11.16)
2-CGLE	TBA	Airbus A340-313	146	GKL MSN 146 Trust (stored at Tereul, Spain 11.16)
2-GOLF	43EB98	Cessna 525A CitationJet CJ2+	525A0446	Cessna Aircraft Company, Jersey
2-JSEG	43EB83	Eclipse EA500	000144	Truly Classic LP Inc, Guernsey
2-LFEA	43EB99	ATR 42-500	621	Phoenix Aircraft Leasing PTE Ltd, TBA
2-MMTT	TBA	Boeing 727-76(RE)	19254	Platinum Services Ltd, Perpignan-Rivesaltes, France
2-MSTG	43EB96	Cessna 510 Citation Mustang	510-0295	Mustang Sally Aviation Ltd, Brighton City, West Sussex
2-TAXI	43EB94	Piper PA-34-200T Seneca II	34-8070003	Quantstellation Investment Management (Guernsey) Ltd, Guernsey
2-TGHH	TBA	Embraer ERJ 145LR	14500958	Alphastream Ltd (stored at Alverca, Portugal 11.16)
2-TGHI	TBA	Embraer ERJ 145LR	14500949	Alphastream Ltd (stored at Alverca, Portugal 11.16)



Boeing 737-800, EI-FTJ, arrives on its delivery flight from Seattle at Dublin Airport on November 29. Ashley French

PREVIOUS IDENTITIES

REG'N	P.I.	REG'N	P.I.
G-AWHC	ex N1109G	G-MEFT	ex D-EGAQ
G-AWHM	ex N90604	G-MFLT	ex YR-PRC
G-BBKK	ex G-FBPL	G-MFTS	ex D-ETPI
G-BNJE	ex G-OWFS	G-MORO	ex 2-MORO
G-CFAE	ex HB-IYS	G-NEII	ex G-BVJF
G-CJIV	ex D-HADT	G-OJCL	ex G-HRHE
G-CJMI	ex XA-UPT	G-OSAR	ex OY-HPJ
G-CJMM	ex XA-UPU	G-PDGO	ex LN-OLE
G-CJNC	ex XA-UQC	G-POLF	ex G-ESEX
G-CJND	ex XA-UQD	G-PRPG	ex N191WQ
G-CJNS	ex OO-DWI	G-SAKS	ex M-ICKY
G-CJNV	ex G-MCGN	G-TAAT	ex OK-SIV
G-CJNW	ex I-BSPL	G-TYRO	ex G-CINT
G-CJPN	ex EC-GEC	G-WNSF	ex PH-EUI
G-CJSR	ex N46294	G-XJCJ	ex M-BRVO
G-CLTC	ex D-5580	G-YMKH	ex OO-ARO
G-CLTL	ex D-7719	G-ZBEN	ex SP-YOC
G-CMNK	ex N31352	EI-FNL	ex PK-GPK
G-CMRA	ex N912EM	EI-FSR	ex ZK-CEJ
G-CORS	ex KF183	EI-FXO	ex PR-MYW
G-DHHF	ex N6972C	EI-LSY	ex SX-GJJ
G-DHCK	ex N530DH	EI-SOO	ex HB-ACE
G-DLRA	ex ZG989	M-ABKP	ex B-5172
G-DOLS	ex G-FRGN	M-ABKT	ex XA-GAB
G-DXTR	ex ZS-DEX	M-MEVA	ex N399AF
G-EOMP	ex D-EOMP	M-RCCH	ex PR-LKX
G-EVEN	ex G-CGRD	M-RRRR	ex N161GF
G-EZPR	ex F-WWDM	M-YFLY	ex C-GKRY
G-EZPS	ex D-AXAV	2-AVOF	ex XA-VOF
G-EZPU	ex D-AVVR	2-CGLE	ex EC-GLE
G-FBKJ	ex F-HOUR	2-GOLF	ex N446TA
G-FBKJ	ex F-GLOS	2-JSEG	ex N90NE
G-FBKK	ex F-GISH	2-LFEA	ex HK-4949
G-GFCM	ex D-GFCM	2-MMTT	ex M-FAHD
G-JKAT	ex G-WIZY	2-MSTG	ex N246RE
G-KIAB	ex D-KIAB	2-TAXI	ex D-GAIR
G-LERE	ex OY-YBO	2-TGHH	ex B-3058
G-MCDD	ex N13175	2-TGHI	ex B-3059
G-MDLE	ex HB-ZQP		

Air-Britain News 2017 - Sign Up Now at www.air-britain.co.uk



Air-Britain News is the must for the dedicated aviation enthusiast, crammed with information, including details on the latest registrations worldwide and news of airlines, biz jets, biz props, military aviation, and airshow & airfield reports.

- * 164-196 pages per month.
- * Available as a printed or electronic edition.

January-December 2017 subscriptions are now on sale. All subscribers are automatically members of Air-Britain and are also sent our house magazine, **Aviation World**, 48pp quarterly, packed with fascinating features on aviation topics, both current and historical. Two historical magazines also available at extra cost - see website.

Members also enjoy benefits such as

- * Air-Britain Travel to overseas airports,
 - * e-mail information exchange service
 - * one-third off the prices of all Air-Britain Books
- we publish 10-20 books per annum including UK & European Registers, Airline Fleets and Business Jets books (these include our annual Quick Reference range of carry around books from £9.95)



SPECIAL OFFERS

Membership runs January - December 2017 and costs £49 (£47 electronic for iPad) (UK)
SIGN UP NOW to take advantage of the FREE offers (expires 31 Jan'17)

FREE December'16 Air-Britain NEWS & Aviation World [NEW UK subscribers only]

FREE £10 off £30 Air-Britain Books Voucher for use by 30 June 2017 [All NEW subscribers]

DISCOUNT £2 off a 2-year subscription 2017+2018

INCLUDED Aviation World magazine, 48pp quarterly

& up to 1/3rd off all Air-Britain Book prices (buy at Member prices)

New Books from Air-Britain available now POST FREE in the UK (overseas at cost)



THE SQUADRONS AND UNITS OF THE FLEET AIR ARM

The result of unparalleled research using information gathered from a wide range of sources, including Museum and National Archive records, Squadron and Flight diaries, Navy Lists, individual Flying Log Books, aircraft records, reference works, photographic records, contemporary newspaper reports and the magazines, reports and websites of various naval and aviation historical societies and associations, THE SQUADRONS AND UNITS OF

THE FLEET AIR ARM is the standard and most authoritative reference work on the subject.

Throughout 512 pages of information, much of it never before published, are contained brief histories of every Naval Air Squadron - including Australian, Canadian and Dutch squadrons where these have been numbered in the 700- and 800-series - aircraft- and helicopter-capable ships, bases, Battle Honours, Trophies and Awards, detailed sections on helicopter flights and notes of many of the Schools, Sections and Units that have supported the Fleet Air Arm for more than eight decades, illustrated throughout by more than 800 photographs and, for the first time in one volume, over 180 squadron, ship and unit badges, mostly in colour.

Members: £34.95 Non-members: £47.50



DE HAVILLAND DROVER Australia's Outback Workhorse

Flying across the Australian Outback, Papua New Guinea and the Pacific Islands, the story of the de Havilland Australia Drover is told in marvellous detail by acclaimed Australian aeronautical historian Geoff Goodall. Demonstrating that it most definitely was not a Dove with an extra engine, he explains the genesis and design of the Drover as a replacement for the pre-war Dragon. The issue with the variable pitch propellers, which arguably sealed the commercial fate of the aircraft, is examined together with the attempts to solve this and the subsequent fitting of Lycoming engines.

The type's service with Qantas, TAA, the Royal Flying Doctor Service and subsequent third level operators is dealt with in detail. As with all Air-Britain books there is a comprehensive production history of all the aircraft produced. There are excellent drawings by Juanita Franzi and over 160 photographs, the majority of which have not been in a published book before.

Members: £14.95 Non-members: £19.95

Order at www.air-britain.co.uk
or by post

Air-Britain Trading Ltd, Unit 1A Munday Works, 58-66 Morley Road, Tonbridge TN9 1RA

Cheques in £ Sterling payable to **THE AIR-BRITAIN TRADING LTD**, and most credit/debit cards accepted (not AMEX)

CONTACT SALES : sales@air-britain.co.uk 01732 363815

CONTACT MEMBERSHIP: membership@air-britain.co.uk 01394 450767

SEE MORE ABOUT AIR-BRITAIN and our magazines & books at www.air-britain.com



This Boeing 767-36NER(BDSF), now registered OY-SRU, previously flew with Transaero as EI-RUW. It was converted to a freighter, though yet to be repainted, and entered service with Star Air at the end of November. It was photographed at Edinburgh Airport on December 8.

CANCELLATIONS

REG'N	TYPE	C/N	REASON
G-ARLB	Piper PA-24-250 Comanche	24-2352	To USA (possibly for parting out as it made a heavy landing at Old Buckenham 11.06.16, damaging the propeller, lower engine cowling, nose landing gear, left wing and the engine was shock-loaded)
G-BATW	Piper PA-28-140 Cherokee Fliteline	28-7225587	Cancelled by CAA (CoFA expired 24.10.14. Last noted as an instructional airframe at Perth College, University of the Highlands & Islands, Perth, Perth & Kinross 7.16)
G-BBGC	SOCATA MS.893E Rallye 180GT Gaillard	12215	To Sweden
G-BPSJ	Thunder Ax6-56	1479	Cancelled as Permanently WFU (CoFA expired 02.10.13)
G-BRZZ	CFM Streak Shadow	PFA 161A-11628	Cancelled as Permanently WFU (Permit to Fly expired 13.05.08)
G-BXAS	Avro RJ100	E3301	To Canada
G-CBUR	Zenair CH.601UL Zodiac	PFA 162A-13891	Cancelled as Permanently WFU (Permit to Fly expired 08.09.16)
G-CBVT	Yakovlev Yak-52	9010305	To Poland as SP-YMA
G-CCPO	Cameron N-77	3217	Cancelled by CAA (CoFA expired 16.07.14)
G-CCWR	Mainair Pegasus Quik	8053	Cancelled by CAA (crashed on landing at Farway Common, Devon 18.04.14)
G-CEWG	Aerola Alatus-M	AS 01-011	To Germany
G-CFVG	AutoGyro MTOSport	RSUK/MTOS/007	Cancelled as Permanently WFU (crashed on take-off from Northrepps, Norfolk 26.09.16)
G-CFXL	Lindstrand LBL 90A	1258	To USA as N467US
G-CGHH	Piper PA-28-140 Cherokee Cruiser	28-7425143	Cancelled as Permanently WFU (badly damaged in a heavy landing at Caernarfon, Gwynedd 18.06.15)
G-CGKA	Grob G.115E	82301/E	To Finland
G-CGRD	Cirrus SR22	2234	Re-registered as G-EVEN
G-CINT	AutoGyro MTOSport	RSUK/MTOS/056	Re-registered as G-TYRO
G-CLRV	Grob G.103 Twin Astir	3106	To USA as N110NS
G-EENE	Rolladen-Schneider LS4	4271	To Poland
G-EFAT	Robinson R44 Raven II	11721	To Germany
G-EFOO	Cessna T210N Turbo Centurion	210-64296	To Kenya
G-ESEXP	Eurocopter EC135T2+	0267	Re-registered as G-POLF
G-EZPP	Airbus A320-214	7340	To Switzerland as HB-JXF
G-EZWN	Airbus A320-214	5757	To Switzerland as HB-JXG
G-EZWY	Airbus A320-214	6267	To Switzerland as HB-JXH
G-FCED	Piper PA-31T2 Cheyenne II XL	31T-8166013	To USA
G-FDZF	Boeing 737-8K5	35138	To Canada as C-FEZF
G-FRGN	Piper PA-28-236 Dakota	2811046	Re-registered as G-DOLS
G-GANE	Sequoia Falco F.8L	PFA100-11100	To Italy
G-HRHE	Robinson R22 Beta	1950	Re-registered as G-OJCL
G-HISX	Marganski Swift S-1	111	To Germany
G-JONB	Robinson R22 Beta II	2593	To Czech Republic
G-JPVA	BAC Jet Provost T. Mk.5A	EEP/JP/953	Cancelled as Permanently WFU (Permit to Fly expired 06.01.17, stored at North Weald, Essex)
G-JTJT	Robinson R44 Raven I	1848	To USA as N821JP
G-LEAB	Cessna 510 Citation Mustang	510-0073	To USA as N648JW
G-LEES	Glaser-Dirks DG-400	4-238	To Slovak Republic
G-MAXP	Hawker 800XP	258477	To South Africa as ZS-DAD
G-MCGN	Agusta AW189	92001	Re-registered as G-MCGN
G-MNVW	Mainair Gemini Flash II	466-986-4-W246	Cancelled as Permanently WFU (Permit to Fly expired 29.09.09)

G-MTFT	Solar Wings Pegasus XL-R	SW-WA-1163	Cancelled by CAA (Permit to Fly expired 24.08.14)
G-MVOF	Mainair Gemini Flash IIA	730-289-6-W622	Cancelled by CAA (Permit to Fly expired 11.07.14)
G-MWKZ	Solar Wings Pegasus XL-Q	SW-WQ-0363	Cancelled by CAA (Permit to Fly expired 22.07.09)
G-OACA	Piper PA-44-180 Seminole	44-7995202	To Germany
G-OBYF	Boeing 767-304	28208	To Germany as D-ATYF
G-OCFC	Robin R2160 Alpha Sport	374	Cancelled as Permanently WFU (badly damaged when it overran upon landing at Bodmin, Cornwall 27.05.15)
G-OLFF	Cameron Z-120	11522	To Bulgaria
G-OWFS	Cessna A152 Aerobat	A152-0805	Re-registered as G-BNJE
G-PAFR	Glaser-Dirks DG-300 Elan	3E344	Cancelled by CAA (CoFA expired 26.03.15)
G-RRFC	SOCATA TB20 Trinidad GT	2053	To New Zealand
G-SENT	Bombardier Global Express	9094	To Guernsey
G-SIIS	Pitts S-1S Special	PFA 009-12485	To Sweden
G-SOHO	Diamond DA 40D Star TDi	D4.079	To France
G-SPEE	Robinson R22 Beta	0939	Cancelled as Destroyed (crashed between Origny le Sec and Ossey les Trois Maisons, Aube, France 05.09.16)
G-WIZY	Robinson R22 Beta	0566	Re-registered as G-JKAT
G-YAKT	Yakovlev Yak-52	8910302	To Norway
EI-EFS	Boeing 737-8AS	37542	To Ukraine as UR-PSU
EI-FNL	Airbus A330-243	1028	To People's Republic of China as B-8550
EI-RUW	Boeing 767-36N	30107	To Denmark as OY-SRU
EI-SLR	ATR 72-201	108	To South Africa as ZS-XCH
M-ACHO	Bombardier Challenger 605	5840	To San Marino as T7-A00
M-BRVO	Cessna 550 Citation Bravo	550-1129	To United Kingdom as G-XJCJ
M-ICKY	Pilatus PC-12/45	508	To United Kingdom as G-SAKS
M-IWPS	Cessna 525A CitationJet CJ2	525A0496	To Germany as D-IWPS
M-RRRR	Bombardier Global 5000	9683	To USA as N683JC
2-ATTE	Airbus A319-112	1018	Cancelled as Parted Out (last known of stored at Goodyear-Lichfield Municipal. Arizona, USA 14.10.16)
2-IFNB	Embraer 170	17000093	To Austria as OE-LTK
2-LNOA	ATR 42-500	532	Cancelled as Parted Out (flown into Gloucestershire Airport 04.11.16 for parting out)
2-MORO	Bombardier Challenger 601	3017	To United Kingdom as G-MORO

Key: NB – Nominal Base

A place name in brackets relates to the owner's address as where the aircraft is based is unknown.

UPDATES & CORRECTIONS

REG'N	DETAILS
G-BBZF	Became F-HAAU 17.11.16
G-BRLV	Became LN-PFX
G-CEOV	Became SP-BIG 08.08.16
G-CFBK	Became VH-AOE 27.10.16
G-CHFI	Became N141MG
G-CHJH	Became D-KDPT 07.16
G-CICK	Type officially changed to a Spitfire Mk.T.IX 04.11.16
G-CILE	Became VH-IQN
G-CIYL	Builder officially changed to RM Cornwall and S Williams and type to a EuroFOX 912IS(1) 10.11.16
G-CJEO	Became VH-ZVE 15.11.16
G-CJGO	Type officially changed to a Lindstrand LTL Racer 65 07.11.16
G-EGKE	Became SP-HKM
G-HSBC	Became OE-SDH
G-IIDD	Builder officially changed to D De Boer, S Birt & DJC Davidson 11.11.16
G-JWEB	Became N85VG 10.11.16
G-MDJN	Became D-ISAW 02.09.16
G-MITY	Type officially changed to a Mole Mite (Modified) 02.11.16
G-MZGH	Type officially changed to a Hunt Wing/Avon 462(3) (Modified) 16.11.16
G-OMEC	Became D-HXRE 08.09.16
G-PETS	Became HS-BSP 08.06.16
G-SBII	Builder officially changed to just PD Begley 01.11.16
G-STUE	Builder officially changed to F Xuereb 07.11.16
G-SVEY	Became F-HVEY 17.11.16
G-TAFI	Became D-EEEP
G-WYNE	Became XA-KVD
M-FAHD	Became 2-MMTT 01.11.16
M-IRON	Became UP-EM017

AIR BASE MOVEMENTS

A selection of the most interesting aircraft to visit air bases in the UK recently.



RAF BRIZE NORTON

1/11 252 CN235-100MPA 101 Sqn, Irish Air Corps; EC-406 A400M Airbus Defence and Space. 3/11 E37/705-NL & E67/705-TB Alpha Jet Es EAC00.314, French AF both n/s; 4/11 50+51 Transall LTG61, German AF; HZ-124 A340-211 Royal Embassy of Saudi Arabia. 7/11 RA-26226 An-30B Russian AF Open Skies. 8/11 E153/705-RU Alpha Jet E EAC00.314, French AF. 10/11 MM62167 VC-180A 28° Gr, Italian Army. 24/11 CE-02 ERJ 135ER 15 Wing, Belgian Defence – Air Component. 25/11 0454 C-295M 242.tsl, Czech AF. 28/11 54+04 A400M LTG62, German AF.

RAF CONINGSBY

6/11 86 Falcon 7X ET00.060, French AF. 7/11 287/F-RAFD Falcon 2000LX ET00.060, French AF.

RAF CRANWELL

8/11 E115/705-MR, E153/705-RU & E28/705-AB Alpha Jet Es EAC00.314, French AF. 21/11 G-CGKA Tutor T1 dep on delivery to Finland.

RNAS CULDROSE

3/10 CH-04 C-130H 15 Wing, Belgian Defence – Air Component o/s. 31/10 N-318, N-325 & N-088 NH90-NFHs 860 Sqn, Royal Netherlands AF all dep 20/11.

9/11 CE-02 ERJ 135ER 15 Wing, Belgian Defence – Air Component.

RAF FAIRFORD

2/11 80-1081 U-2S 99th RS, 9th RW, USAF dep 3rd; 80-1086 U-2S 99th RS, 9th RW, USAF dep 4th. 3/11

French Air Force Transall C-160R R204/64-GD at RAF Lossiemouth on December 5. It was picking up support equipment following a deployment to the base of a French Navy Atlantique 2 in November. Niall Patterson

80-1073/BB & 68-10336/BB U-2S 99th RS, 9th RW, USAF both n/s. 4/11 68-10337/BB U-2S 99th RS, 9th RW, USAF n/s. 9/11 10 95-00123 UC-35A E/1-214 Avn, US Army. 18/11 84-0096 C-21A 76th AS, 86th AW, USAF.

RAF LAKENHEATH

31/10 62-3534 KC-135R 22nd ARW, USAF dep 7/11; 58-0094 KC-135T 100th ARW, USAF. 17/11 84-0096 C-21A 76th AS, 86th AW, USAF. 18/11 89-0484/SJ, 89-0477/SJ, 87-0199/SJ & 88-1708/SJ F-15Es 335th FS, 4th FW all dep 23rd.

RAF LOSSIEMOUTH

27/9 140118 CP-140 14 Wing, RCAF dep 20/10.

3/10 165151/151 C-20G VR-58, USN. 7/10 18 Atlantique 2 21F, French Navy dep 28th. 10/10 165829 C-40A VR-58, USN also 13th. 11/10 168980 C-40A VR-61, USN. 14/10 168997 P-8A VP-26, USN also 18th. 15/10 85 28F, Xingu French Navy. 25/10 146/XR TBM 700A ET00.060, French AF.

1/11 165314/JW C-130T VR-62, USN. 3/11 140106 CP-140 14 Wing, RCAF. 7/11 130605 CC-130J-30 8 Wing, RCAF. 9/11 168859 P-8A VP-45, USN dep 17th; 140118 CP-140 14 Wing, RCAF. 14/11 168858 P-8A VP-45, USN dep 18th. 22/11 ZZ334/334 Voyager KC3 10/101 Sqns, RAF.

RAF MILDENHALL

4/11 95-00123 UC-35A E/1-214 Avn, US Army. 7/11 14-0028 A400M 221 Fio, Turkish AF n/s. 9/11 9-0511 AC-130U 4th SOS, 1st SOW, USAF n/s. 10/11 161410 EP-3E VQ-1, USN n/s. 17/11 75-0557/OK E-3B 552nd ACW, USAF dep 22nd. 19/11 73-1675/OK E-3B 552nd ACW, USAF dep 22nd. 20/11 15-1584 Beech 350 US Army. 30/11 94-6707 & 94-7321 C-130Hs 158th AS, Ga ANG both n/s.

RAF NORTHOLT

4/10 160/ABV TBM 700B EAAT, French Army. 5/10 020 C-295M 13 ELTr, Polish AF dep 7th; 038 & 049 PZL.130TC-11s 4.SLSz/42.BLSz, Polish AF both dep 7th. 6/10 14+01 Global 5000 FBS, German AF; 3862/GAL & 4059/GBF SA342Ms 3 RHC, French Army both n/s; 888 PC-6/B2-H2 ETCM, French Army n/s; 252 CN235-100MPA 101 Sqn, Irish Air Corps n/s also 31st. 10/10 MM62210 Falcon 900EX 31° St, Italian AF also 30th; 4/F-RAFQ Falcon 900 ET00.060, French AF. 11/10 274 AW139 301 Sqn, Irish Air Corps. 14/10 T-729 Beech 1900D LTDB, Swiss AF also 26th. 16/10 002/F-RAFP Falcon 900 ET00.060, French AF. 17/10 ZZ503 Avenger T1 705 NAS, Royal Navy. 20/10 95-00123 UC-35A E/1-214 Avn, US Army. 30/10 165151 C-20G VR-51, USN n/s. 31/10 MM62029 Falcon 50EX 31° St, Italian AF.

3/11 H-18 A109BA 1 Wing, Belgian Defence – Air Component. 8/11 95-00123 UC-35A E/1-214 Avn, US Army. 9/11 ZZ528 Wildcat HMA2 825 NAS, RN, 14/11 MM62210 Falcon 900EX 31° St, Italian AF. 16/11 17403 Falcon 50 Esq 504, Portuguese AF; 168204 UC-12W, VMR-4, USMC n/s. 22/11 166378 C-37B VR-1, USN; ZJ690 Sentinel R1 5(AC) Sqn, RAF. 23/11 CE-02 ERJ 135LR 15 Wing, Belgian Defence – Air Component. 28/11 016 C-295M 13 ELTr, Polish AF; SP-LIH E175LR Polish Government.

RNAS YEOVILTON

25/11 AT-19 Alpha Jet 1B+ ETO02.008/11 Sqn, Belgian Defence – Air Component. 28/11 0454 C-295M 242.tsl, Czech AF.

Key: n/s night stop; o/s overshoot



Italian Army Aviation Dornier 228-200, MM62158/EI103 of Squadrone Aerei da Collegamento Trasporto Leggero on approach to RAF Mildenhall on December 9. It departed the next day. Calum Ross

AIRPORT MOVEMENTS

A round-up of notable aircraft visiting UK airports.



ABERDEEN

2/10 RA-04393 Robinson R-44. 6/10 LX-WEB CitationJet 525B CJ3. 9/10 OY-JTF 737-382QC Jetttime op for British Airways; 9H-AHA 737-505 Air X Charter; T7-IGO Citation 550 S/II. 10/10 D-BADA Do.328JET ADAC. 11/10 I-DELO Gulfstream G550. 15/10 LN-ONM S-92A Bristow Helicopters. **16/10 OO-PCI PC-12.** 17/10 OK-PBT CitationJet 525A CJ2. 21/10 OO-TLB Diamond DA-42. 28/10 **OK-PRG Beech C.90A.** 29/10 F-HCEI H175 on demonstration to Babcock MCS Offshore.

3/11 OO-FPC CitationJet 525B CJ3. 6/11 9H-MTF 737-329 Multiflight Ltd. 8/11 ZM409 Atlas C1 70 Sqn, RAF; LN-ONH S-92A Bristow Helicopters. 14/11 PH-RLG Citation 680 Sovereign+. 19/11 YR-FZA Fokker 100 Carpatair. 20/11 ZM403 Atlas C1 70 Sqn, RAF. 21/11 ZH005 Defender AL2 651 Sqn, AAC; 144615 CC-144B 412 Sqn, RCAF. 24/11 LZ-CGS 737-4Q8(SF) Cargo Air; OY-CKN Falcon 2000. **26/11 OO-NSI EC175B NHV,** aircraft swop with OO-NSF. 29/11 EI-RJN RJ85 CityJet. 30/11 EC-MNM 737-4Y0(SF) Swiftair.

BIRMINGHAM

1/11 T7-GQM Global XRS. 2/11 D-ASPG A320-214 Small Planet Airlines Germany also 9th & 23rd; D-EKEU PA-46-350P also 12th. 3/11 D-AGWL A319-132 Germanwings f/v; F-HKIL Citation 510 Mustang. **4/11 OE-GLS Citation 650 VII.** 5/11 YR-BAO 737-42C Blue Air f/v; F-HERE Citation 510 Mustang. 6/11 N315UP 767-34AF UPS f/v, also 26th; N359UP 767-34AF(ER) UPS; OE-GPS Citation 550 Bravo. **7/11 CS-TLZ 767-375ER/BDSF** EuroAtlantic Cargo op for Star Air f/v, also 21st; OY-SRN 767-219ER/BDSF Star Air; HB-JSG Challenger 605. 8/11 OO-KOR CitationJet 525A CJ2+. 10/11 YR-BAQ 737-4D7 Blue Air f/v; **VT-GHF 737-86N Air India Express on delivery.** 13/11 N334UP 767-34AF(ER) UPS f/v. 14/11 N314UP 767-34AF UPS f/v; 54+05 A400M LTG62 German AF type f/v; TF-WOW A330-343E WOW air f/v; OY-CKN Falcon 2000 also 16th. 15/11 HA-LXI A321-321(SL) Wizz Air f/v; EI-LEO Citation 750 X. 16/11 OE-GBC CitationJet 525B CJ3. 17/11 54+05 A400M LTG62 German AF f/v; D-AGWA A319-132 Germanwings f/v; F-HAHA Citation 510 Mustang. 18/11 OE-GBE Astra SPX. 20/11 N314UP 767-34AF UPS;

The first ATR 42-600 for Mexican airline Aeromar, XA-UYK, at Glasgow Airport on December 21 during its delivery flight. Two days later another example, XA-UYL, and the carrier's initial ATR 72-600, XA-UYM, also passed through the airport. Aeromar has another five ATR 72-600s on order and six options. Lewis Macdonald

N357UP 767-34AF(ER) UPS f/v; A6-EPR 777-31HER Emirates f/v; D-AINB A320-271N Lufthansa type f/v. 21/11 OY-SRF 767-219ER/BDSF Star Air; OO-JAY 737-8K5 Jetairfly; EI-DMG Cessna 441; F-HLPN Falcon 2000EX also 24th. 22/11 D-ISCH CitationJet 525A CJ2. 23/11 D-CLMS Learjet 45. **26/11 CS-TPS E190LR TAP Express** Manchester diversion; CN-TLA Citation 680 Sovereign; D-CAPO Learjet 35A. 27/11 N316UP 767-34AF & N336UP 767-34AF(ER) UPS both f/vs. 28/11 OY-SRK 767-204ER/BDSF Star Air. 29/11 D-ALSC A321-211(SL) Air Berlin f/v; HA-LXJ A321-211(SL) Wizz Air f/v; D-CKHG Citation 560XLS.

BLACKPOOL

2/10 LX-JFW PC-12 also 28th. 4/10 D-CFOR Learjet 35A; OE-GBE Astra SPX n/s. 8/10 N120TN S-76C dep 29th. 11/10 EI-EHV CZA W SportCruiser. **12/10 N430V Bell 430** dep 13th; N7TK Citation 501 1/SP dep 17th. 17/10 D-CEFO Citation 560XLS+ n/s. 21/10 N816MG Gulfstream G550 dep 23rd. **22/10 D-CITY Learjet 35A n/s;** N310AJ Cessna 310R. 24/10 C-FEMT Learjet 36A dep 27th. 29/10 2-BOYS Commander 114B n/s.

BRISTOL INTERNATIONAL

1/10 D-CTWO Learjet 35A. 7/10 SP-KHK Citation 510 Mustang dep 9th; 9H-AMW 737-4Q8 VVB Aviation op for WOW air. 9/10 SP-KOW Citation 525 M2 on delivery, n/s. 11/10 ZZ383 Wildcat AH1 1 Regt, AAC. 12/10 D-CLBM Phenom 300. 13/10 EI-ICD S-92A Irish Coast Guard; F-HINC Learjet 75; LX-GVI Gulfstream G650. 14/10 D-BEEP Citation 750 X also 16th. 17/10 D-CNUE Learjet 60. 18/10 OE-GGK Citation 560XL. 24/10 D-ITRA CitationJet 525 CJ1. 25/10 9H-AEM A319-111 Air Malta, Exeter diversion. 29/10 D-CHIP CitationJet 525B CJ3; PH-NDK Falcon 900B n/s. 30/10 D-AERO Legacy 650 n/s; OE-HAS Gulfstream G200 dep 3/11.

DURHAM TEES VALLEY

2/10 OO-PCI PC-12 dep 4th; OO-FPC CitationJet 525B CJ3. 4/10 D-CTWO Learjet 35A. 5/10 EI-GJL AS365N2; **SP-MMS Beech C.90GTi dep 7th;** D-COBI Citation 560XLS dep 7th. 7/10 OE-FGI CitationJet 525 CJ1 dep 9th. 10/10 9H-WII Citation 650 VII also 14th n/s. 11/10 D-CHDC Citation 680 Sovereign. 12/10 D-CCCA Learjet 35A n/s. 16/10 EC-HVQ CitationJet 525 CJ1. 17/10 G-988 C-130H 336 Sqn, Royal Netherlands AF. 24/10 D-CAWX Citation 680 Sovereign+ dep 26th; D-CTTT Citation 560XLS dep 27th. 26/10 OO-PCI PC-12 n/s. 27/10 F-GULY Beech C.90B.

EAST MIDLANDS

1/11 A6-DDE 777-FFX Etihad Cargo also 22nd; F-HDPY Citation 510 Mustang. 3/11 D-CLAM



Philippines-registered Dassault Falcon 900EX, RP-C9018, at London Luton Airport on December 19. Gary Claridge-King



Lockheed Martin C-5M Super Galaxy, 86-0025, of the 436th Airlift Wing from Dover AFB, Delaware, diverted to Birmingham Airport on December 17 due to fog at RAF Mildenhall.
Thomas Nicklin

Phenom 300. 4/11 RA-82042 An-124-100M Volga-Dnepr Airlines; OO-SSV A319-111 Brussels Airlines for painting. 8/11 A6-DDA 777-FFX Etihad Cargo; N881TS Global Express. 9/11 D-CPMU Learjet 60; HB-IGV Falcon 50EX. 10/11 G-DHCK 757-256PCF DHL Air on delivery; HB-JRC Challenger 604; EW-328TG An-26B Genex. 12/11 OO-SSG A319-111 Brussels Airlines for painting. 15/11 OY-JRY ATR 42-300 Danish Air Transport for painting; D-AOLG Fokker 100 Avanti Air; A6-DDD 777-FFX Etihad Cargo also 29th. 16/11 LX-VCI 747-8R7F Cargolux; D-AGEL 737-75B Germania; OE-GRA CitationJet 525B CJ3. 18/11 UR-CKM An-12BP Cavok Air. **19/11** OO-SSQ A319-112 Brussels Airlines for painting. 22/11 SE-RMR Citation 560XLS; OO-TUV 737-86J Jetairfly. 23/11 UR-11819 An-12BP Motor Sich Airlines; OO-JEF 738-8K5 Jetairfly; OO-SKY Citation 525A CJ2. 26/11 EC-LZE A320-232 Vueling for painting; 2-CAPE ATR 42-320 for painting, ex HR-AVA of TACA Regional. 29/11 OO-THC 747-4HAF(ER) Emirates Sky Cargo, F1 charter; LX-VCE 747-8R7F Cargolux, F1 charter; OO-TFC 757-222PCF TNT Airways. 30/11 LX-VCK 747-8R7F Cargolux, F1 charter; G-DHKG 757-236 DHL Air on delivery flight.

JERSEY

1/11 D-CJET CitationJet 525B CJ3; D-CSUN Citation 560XLS+. 3/11 F-HEND Citation 510 Mustang. 4/11 185 Falcon 10MER 57S, French Navy. 8/11 D-CEFD CitationJet 525B CJ3; ZZ500 Avenger T1 750 NAS, RN. 11/11 F-GYGM Diamond DA-42; ZZ501 Avenger T1 750 NAS, RN. 13/11 2-GOLF CitationJet 525A CJ2+; EI-WFI Challenger 605. 14/11 ZK032 Hawk T2 IV(R) Sqn, RAF. 16/11 OK-BII Beech 400A. **17/11** OK-PBT CitationJet 525A CJ2. 18/11 OO-PRM Citation 510 Mustang. 21/11 F-HOLI PC-12. **22/11** D-IKBO CitationJet 525A CJ2+. 23/11 ZK016 Hawk T2 IV(R) Sqn, RAF. 28/11 9H-BSA Hawker 750XP; OE-DDC Diamond DA-40NG. 29/11 ZK033 Hawk T2 IV(R) Sqn, RAF. 30/11 ZM409 Atlas C1 70 Sqn, RAF.

LEEDS BRADFORD

4/10 N75TP Citation 560XL. 5/10 D-INDY Eclipse EA.500. 6/10 D-CAHO Citation 560XLS+. 10/10 D-CSUN Citation 560XLS+. 11/10 OK-TVY 737-86N Travel Service, refugee flight from Beirut. 12/10 OK-EAS Beech 400A; OE-GXL Citation 560XLS+; F-HMED BAe.1000B; 9H-ALL CitationJet 525A CJ2. 13/10 G-JZHK 737-8MG Jet 2 on delivery. **14/10** D-IAKN CitationJet 525A CJ2+. 17/10 D-ITIP CitationJet 525 CJ1. 20/10 LY-VTA CRJ200LR Klasjet. 26/10 HB-VTS Premier 1A. 27/10 YU-SVL

Citation 560XLS+;. 28/10 D-CTIL & D-CTWO Learjet 35As. 31/10 0455 CASA 295M 41.dlt, Czech AF, Linton on Ouse diversion; D-CTTT Citation 560XLS+.

LIVERPOOL

5/10 SP-NWM PC-12. 6/10 D-IPCC CitationJet 525A CJ2 also 10th. 7/10 F-HBTV Citation 525 M2; OM-GTB 737-49R Go2Sky op for CSA also 10th. 9/10 D-CFOR Learjet 35A. 11/10 D-CEXP Learjet 35A. **12/10** D-IVIN Avanti; SP-MRB SAAB 340A Sky Taxi; LZ-FLL An-26B Bright Flight also 13th. 14/10 PH-JUR PA-32R-201T n/s. 15/10 LN-WDL Dash 8-Q402 Widerøe. 17/10 EI-WXP Hawker 800XP; ZM406 Atlas C1 70 Sqn, RAF o/s; LN-WDF Dash 8-Q402 Widerøe n/s. 23/10 SP-AST CitationJet 525 CJ1; F-HIJD CitationJet 525A CJ2 n/s; LX-LAA Learjet 45. 24/10 D-CMHS CitationJet 525B CJ3. 25/10 9H-SFA Falcon 2000EX. 27/10 D-FSTB TBM 850 n/s. 28/10 **EC-GIJ Beech B.90 n/s**; OY-NPF Metro 23 North Flying also 30th n/s. 29/10 OO-ASL Beech 200C n/s; D-IADV Citation 551 S/II. 30/10 **N467KS Basler BT-67.**

LONDON GATWICK

3/11 LN-LNL 787-9 Norwegian f/v. 4/11 **XA-CHR Gulfstream G550 f/v.** 8/11 EC-MNZ A320-232 Vueling f/v; OY-SWO Falcon 2000S f/v. 9/11 B-LRF A350-941 Cathay Pacific f/v. 10/11 EI-FJY 737-8JP Norwegian f/v. 11/11 HB-JXG & HB-JXH A320-214(SL)s easyJet Swiss both f/v. 12/11 OK-NEP A319-112 CSA Czech Airlines op for Travel Service f/v. 13/11 HA-LPX A320-232 Wizz Air f/v; TC-NBA A320-251N Pegasus Airlines f/v. 15/11 HA-LPY A320-232 Wizz Air f/v; VQ-BBB A320-214 Aeroflot f/v; TC-ENK Hawker 900XP f/v. 16/11 EI-FWB Sukhoi 100-95B CityJet f/v; HA-LPU A320-232 Wizz Air f/v; VP-BID A320-214 Aeroflot f/v; M-ISTY Gulfstream G280 f/v; OE-LUV Lineage 1000 f/v. 17/11 VQ-BCN A320-214 Aeroflot f/v; **EC-MHX Beech C.90 f/v.** 18/11 HA-LYC A320-232 Wizz Air f/v; OE-LVM Fokker 100 Austrian Airlines f/v; VQ-BIR A320-214 Aeroflot f/v. 20/11 VP-BME A320-214 Aeroflot f/v;

N818LF Gulfstream G550 f/v. 21/11 VQ-BHN A320-214 Aeroflot f/v; TF-WOW A330-343E WOW air f/v. 22/11 VQ-BHL A320-214 Aeroflot f/v. 25/11 VP-BZQ A320-214 Aeroflot f/v; D-CFAX LearJet 60 f/v. 26/11 HA-LWQ A320-232 Wizz Air f/v; VQ-BIW A320-214 Aeroflot f/v; N560GT Citation 560 Encore f/v; N815PA Global 5000 f/v. 28/11 HB-JXF A320-214 easyJet Swiss f/v. 29/11 VP-BKC A320-214 Aeroflot f/v. 30/11 VQ-BAY A320-214 Aeroflot f/v; **PP-VDR Global XRS f/v.**

LONDON LUTON

2/11 N221DG Gulfstream G650; OO-KOR CitationJet 525A CJ2+; N801KF Global Express; N898CC Global 5000. 3/11 N500QA Global 5000; N618L Learjet 60. 4/11 OM-GTB 737-49R Go2Sky. **5/11** C-FLKY CRJ200ER Novajet. 7/11 F-HFKG ERJ 145EP Kiss Air, new service to Strasbourg, Brest & Clermont Ferrand; YL-LCP A320-232 SmartLynx. **9/11** VP-CPG Gulfstream G650. 10/11 T7-EAA Challenger 604. 11/11 CS-TRO A320-214 White; N277FL Gulfstream G650; VP-CPM Gulfstream G650. 15/11 D-IGST Premier 1A; C-GDPF Global XRS; EC-MKL 737-85P Air Europa, football charter. 16/11 N333GW Gulfstream G450; D-AZZA Challenger 605. 17/11 D-AAHB Global Express; CS-TFZ A330-243 HiFly op for EI Al. 19/11 N251GV Gulfstream G550. 20/11 N154FV Gulfstream G450; N56UH Gulfstream G500. 21/11 N570FX Challenger G350; C-GLXC Falcon 7X; D-AVPB Challenger 605. 22/11 D-IARI CitationJet 525 CJ1. **23/11** N724MV Global Express; D-AGEC 737-76J Germania for maintenance with Thomson. 25/11 N348RS Gulfstream G450; D-BFIL Legacy 450; OE-IIM Legacy 650. 27/11 N347BD Falcon 7X. 28/11 016 CASA 295M 13.eltr, Polish AF. 30/11 N728FJ Falcon 2000S.

LONDON SOUTHEAST

2/11 ZS-DEX Beech 200. 3/11 HA-TVJ SAAB 340A Fleet Air International f/v, dep 9th. 8/11 T7-RSN Falcon 2000 f/v. 9/11 LX-TAC Phenom 300 n/s. 12/11 D-INCS CitationJet 525 CJ1. 17/11 N788DP 737-79U BBJ1 n/s. 22/11 D-ENBR Ruschmeyer R90-230R. 26/11 D-CRAS SD.360-300 Nightexpress; LX-ART Mooney M.20N. 28/11 **SP-MED Beech 58.** 30/11 D-CJET CitationJet 525B CJ3.

MANCHESTER

1/11 YU-PMK Citation 560XL f/v; RA-09000 Falcon 900B f/v; S5-ZFL Global 6000 f/v. 2/11 VP-BDD A330-343X Aeroflot f/v, Man United to Istanbul; OE-GBE Astra SPX f/v. 3/11 OO-SNH A320-214 Brussels Airlines f/v. 4/11 VQ-BMX A330-343X Aeroflot f/v, Manchester United from Istanbul; PH-CDF 737-804 Corendon Dutch Airlines f/v; EC-JQG A330-202 Air Europa f/v, for painting at Air Livery.



Gulfstream G550 XA-BUA was at Edinburgh Airport between December 4-7.

5/11 EI-FJW 737-8JP Norwegian f/v. 7/11 D-AEWN A320-214(SL) Eurowings f/v; CS-TPO E190LR TAP Express f/v; D-ALEO 757-2Q8(PCF) DHL Worldwide f/v. 8/11 EI-FJS 737-8JP Norwegian f/v; CS-TPS E190LR TAP Express f/v. 9/11 I-TCGR Falcon 900B. 10/11 SP-KPG SAAB 340A Sprint Air f/v. 11/11 B-5979 A330-243 Hainan Airlines f/v; OE-LBV A320-214 Austrian Airlines f/v; D-AIAE A321-211(SL) Condor f/v, for maintenance. 12/11 SP-WOI Global Express f/v. 13/11 CS-TPU E190LR TAP Express f/v. 14/11 EC-JZL A330-202 Air Europa f/v, for painting at Air Livery. 16/11 D-AINA A320-271N Lufthansa f/v, and first NEO to visit; B-HUJ 747-467 Cathay Pacific, transit for customs en-route to Bruntingthorpe for scrapping, n/s; F-HBTV Citation 525 M2 f/v. 18/11 CN-TLA Citation 680 Sovereign f/v. 19/11 A6-EPS 777-31HER Emirates f/v. 21/11 TF-ISR 757-256 Icelandair f/v; HZ-SKY3 A320-214X Sky Prime Aviation Services f/v, Luton diversion. 22/11 VP-CDP Falcon 7X f/v. 23/11 D-AEWP A320-214(SL) Eurowings f/v; EI-FWC Sukhoi 100-95B CityJet f/v. 24/11 G-ZBKG & G-ZBKO 787-9s British Airways both f/v for parking during Thanksgiving, both dep 26th. 25/11 EI-FJX 737-8JP Norwegian f/v. 26/11 EC-KOM A330-202 Air Europa f/v, for painting at Air Livery; YR-BAS 737-430 & YR-BMF 737-8Q8 Blue Air both Liverpool fog diversions. 27/11 HZ-AK34 777-3FGER Saudia f/v; D-AINB A320-271N Lufthansa f/v; N348RS Gulfstream G450 f/v. 29/11 EI-FJY 737-8JP Norwegian f/v; F-HRPN Cirrus SR-22T f/v. 30/11 D-AEWQ A320-214(SL) Eurowings f/v; LY-SPF A320-214 Small Planet Airlines f/v.

NORWICH

1/10 EI-RJE RJ85 CityJet dep ex KLM Maintenance. 2/10 OO-FPC CitationJet 525B CJ3; F-GZHE 737-8K2 Transavia France to KLM Maintenance dep 7th. 3/10 TC-YAL E190LR BoraJet to KLM Maintenance. 4/10 HB-IYS RJ100 Swiss to KLM Maintenance dep 20th; 9M-CJG Global Express. 6/10 N796DH 757-23N/PCF to Air Livery for painting. 8/10 CP-3020 737-37Q Boliviana de Aviacion dep ex KLM Maintenance, ex SX-BDW. 10/10 F-GZHI 737-8K2 Transavia France to KLM Maintenance dep 15th; F-GZJH 737-8K2 Transavia France to KLM Maintenance dep 15th. 11/10 D-CHRA CitationJet



US Army Beech 300 s/n 07-61015 on approach to Belfast International Airport on December 20. Paul Harvey

525C CJ4; OE-GNP Citation 560XLS+. 12/10 A6-RJU 737-77W BBJ1 Royal Jet to Air Livery. 13/11 9H-BOM Challenger 605; YR-BMG 737-86N Blue Air to KLM Maintenance dep 17th. 15/10 PH-IAM E190LR ex BoraJet to Air Livery for painting in Air Moldova livery; F-GZHN 737-8K2 Transavia France to KLM Maintenance dep 26th. 17/10 OK-TVY 737-8Q8 Travel Service to KLM Maintenance. 19/10 OO-CIV CitationJet 525A CJ2 also 20th; TF-FIT 757-256 Icelandair to Air Livery for painting dep 30th. 20/10 OY-CYV Citation 550 II. 24/10 OE-GBE Astra SPX. 25/10 TF-JMK Dash 8-Q202 Air Iceland to Air Livery for painting. 28/10 D-FBRS Extra 500; F-HCEI EC175B. 29/10 G-JMCT 737-3Y0/SF Atlantic Airlines to KLM Maintenance. 30/10 PH-EXB E190STD KLM Cityhopper to KLM Maintenance; TF-FIJ 757-208 Icelandair to Air Livery for painting. 31/10 G-GDFH 737-3Y5 Jet2 to KLM Maintenance.

PRESTWICK

1/10 62-3542 & 62-3580 KC-135Rs 77th ARS, AFRC, USAF; 177701 CC-177 429 TS, RCAF n/s; C-GTSY A310-304 Air Transat. 3/10 99-0102 UC-35A E/1-214 Avn, US Army. 5/10 168980 C-40A VR-61, USN also 7th, 85-0027 KC-10A 305th/514th AMW, USAF n/s. 6/10 KAF342 C-17A 41 Sqn, Kuwait AF n/s also 10th-12th; 164996/BD C-130T VR-64, USN. 8/10 06-6163 C-17A 60th/349th AMW, USAF; 164386 E-6B VQ-4, USN dep 10th. 9/10

168204 UC-12W SPMAGTF-CR; 130336 CC-130H 413 TS, RCAF. 10/10 HB-FQC PC-12 c/n 1662; N930KA TBM 930; 910502 C-26D AOD Sigonella. 13/10 HB-VXB PC-24 Pilatus Flugzeugwerke. 15/10 N919CA 747-428/BCF National Air Cargo; 165314/JW C-130T VR-62, USN n/s. 17/10 130616 CC-130J 436 TS, RCAF dep 18th; HB-FQE PC-12 c/n 1664. 18/10 177702 CC-177 429 TS, RCAF present rest of month after birdstrike; 87-0118 KC-10A 305th/514th AMW, USAF. 19/10 79-1712 KC-10A 305th/514th AMW, USAF. 20/10 177703 CC-177 429 TS, RCAF; ZM406 Atlas C1 70 Sqn, RAF. 21/10 130609 CC130J 436 TS, RCAF; UR-CKM An-12BP Cavok Air. 22/10 OY-GRG Dash 8-202 Greenlandair. 23/10 N737ER 737-7CJ BBJ1; LZ-FLL An-26B Bright Flight. 24/10 VT-IDZ A320-232 Indigo; RA-82044 An-124-100 Volga-Dnepr Airlines; ZM410 Atlas C1 70 Sqn, RAF. 25/10 N793CK 747-222B/F Kalitta Air; 177705 CC-177 429 TS, RCAF n/s. 26/10 N512JN MD-11F Western Global Airlines; HB-FQG PC-12 c/n 1666. 27/10 ZM409 Atlas C1 70 Sqn, RAF. 28/10 XA-VLX A320-233(SL) Volaris escorted to land after comms failure by ZJ916/S Typhoon FGR4 II(AC) Sqn, RAF. 30/10 85-0007 C-5M 436th/512nd AW, USAF, Mildenhall diversion n/s. 31/10 VT-IHA A320-232 Indigo; RA-82074 An-124-100 Volga-Dnepr Airlines.

Key: f/v first visit; n/s night stop; o/s overshoot.



Piaggio Avanti D-IJET visiting Birmingham Airport on December 18. Gary Claridge-King

With thanks to: D Apps, D Banks, D Bougourd, S Boyd, J Brazier, N Burch, P Claridge, A Clarke, I Cockerton, KW Ede, M Farley, N French, P Gibson, D Graham, A Greening, J Gregory, I Grierson, D Haines, M Harper, K Hearn, G Hocquard, B Hunter, S Lane, G Morris, S Morrison, R Richardson, R Roberts, E Russell, RJ Sayer, M Shepherd, A Smith, D Turner, JA White, G Williams, Blackpool Aviation Society, Manston Movements, Solent Aviation Society/Osprey, South Wales Aviation Group, CIAN, GSAE, The Aviation Society, EGPE ATC, www.dtmovements.co.uk, Aerodata Quantum Plus and RHADS.

SOCIETIES

Air-Britain
The leading Aviation Enthusiasts & Historians Society for nearly 70 years Over 3,500 members worldwide
Membership from £24-£71 UK
www.air-britain.co.uk **JOIN NOW**

Choice of 4 magazines in 8 combinations - all illustrated

Air-Britain News monthly, 164-196 pages per month, providing worldwide register updates, Commercial Airline News, Airliner and Biz-Jet/Biz-Prop registration news, Military Aviation, and much much more. Printed &/or Electronic

Aeromilitaria - 48 pages quarterly of historical military content

Archive - 48 pages quarterly of historical civil content

Aviation World - 48 pages quarterly of current civil and military aviation articles

ALL SUBSCRIPTIONS include additional membership benefits including up to one-third off all Air-Britain Book prices + e-mail information exchange group

PHOTOS

MILITARY AVIATION REVIEW

Movements and news from across the world of military aviation. Published every month in print and digital formats.

In depth coverage from the UK, Europe, the USA and Asia.

Visit our new website

www.militaryaviationreview.com

Westfield Lodge, Aveland Way, Aslackby, Lincs, NG34 0HG, United Kingdom

WANTED

COLOUR SLIDE AND B&W PHOTO/NEG COLLECTIONS
WANTED - TOP PRICES PAID

- all other aviation related items considered, will collect.

Contact Chris Tel: 0208 422 5899

Email:chrisknott.api@icloud.com

UNMADE PLASTIC KITS, bought and sold. All subject, all scales. Kingkit (AN) Unit 8, Halesfield 17, Telford, Shrops. TF7 4PF Tel: 01952 586457

WEB

Air Photographic International
TOP QUALITY
Colour Slides/Colour Photos/
B&W Photos
Check out our website
www.airphotographicinternational.com

The Guild of Aviation Artists
The premier society for the promotion of Aviation Art
www.gava.org.uk
e-mail: admin@gava.org.uk

AVAILABLE NOW

REUNION OF GIANTS
There are only two Avro Lancasters left flying in the world today and when they joined and flew together, it was...
HISTORY IN THE MAKING

DVD £19.99
CODE: DVD728

BLU-RAY £23.99
CODE: BR062

THE OFFICIAL LANCASTER UK TOUR DOCUMENTARY
Region-Free, Running time 83 mins

ORDER DIRECT

Free P&P* when you order online at www.keypublishing.com/shop OR Call UK: 01780 480404 043/16
Overseas: +44 1780 480404
Monday to Friday 9am-5.30pm

*Free 2nd class P&P on all UK & BFPO orders. Overseas charges apply. Postage charges vary depending on total order value.

To advertise here please contact
Andy Mason 01780 755131 or email:
andrew.mason@keypublishing.com

It's easy to advertise with classifieds



Rate only £1 per word (inc. VAT) Minimum booking of 14 words. *E-mail and web site addresses £1.50 each. *Cheques/POs payable to Aviation News. All copy and box number replies must be addressed to: **Production, PO Box 100, Stamford, Lincolnshire, PE9 1XQ.** Phone 01780 755131 or Fax 01780 751323. E-mail: production@keypublishing.com Please note that we cannot accept advertisements without the name and address of the sender (for reference only). We also reserve the right to edit or amend copy as appropriate.

PLEASE INSERT FOR ☐ MONTHS, STARTING WITH ISSUE

Payment by cheque ☐ (payable to Aviation News)

Visa ☐

Mastercard ☐

Switch ☐

Card No ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Expiry date ☐ ☐ ☐

Issue No ☐

Name

Address

Postcode Tel Signature

MAIN HEADING						



EMIRATES

AVIATION EXPERIENCE

Spencer Bennett experienced the thrill of 'flying' an A380 simulator at this unique London attraction and gained a fascinating insight into the world of modern commercial aviation.



Above: Hong Kong's old Kai Tak Airport is a popular destination for visitors flying the A380 or Boeing 777 simulators.

Left: Part of a Rolls-Royce Trent 900 engine has been built into the exterior wall of the Experience.

London offers a dazzling variety of attractions to entertain the most demanding of tourists but with my love of aviation there was one that I just had to visit – the Emirates Aviation Experience in Greenwich. Its four flight simulators – two Boeing 777-300s and a pair of Airbus A380s – provide a great opportunity

to slip into the hot seat and become an airliner pilot.

The building, which sits on the banks of the River Thames, once housed gondolas for the Emirates Air Line cable car that opened in 2012. The airline saw the venue's potential and decided to open an attraction to offer visitors an insight into the world of modern

commercial aviation. It opened in 2013 and was updated in 2015.

The Experience, which is spread over 3,229 sq ft (300m²) and occupies two floors, makes full use of state-of-the-art technology, interactive displays and life-size models.

You are greeted on arrival by a mock-up of an A380 nose. This impressive display immerses visitors into flight from a pilot's perspective. A surrounding video wall beneath the cockpit shows a fascinating film that tracks a piece of luggage from check-in to loading on to an Emirates aircraft at Dubai International Airport. Also on the ground floor is a Rolls-Royce Trent 900 engine (as used on the airline's A380s), which was installed in July 2015. The engine is built into the wall so from the exterior it appears as it would look on an aircraft. Inside, the cowling has been removed so visitors can see the inner workings.



An Emirates Air Line terminal is next to the Experience.

Another large video wall reveals the processes involved in turning an A380 around between flights, along with interactive displays and games for children.

There is a row of A380 Economy seats where people can sit and take in the in-flight entertainment Emirates offers on its long-haul flights. It was clearly popular with children on the day I visited and the attraction is hoping to add Business and First-Class seats.

SIMULATORS

The flight simulators are not included in the entrance price to the exhibition. The 30-minute Simulator Experience is £60 and also covers the admission charge for one person, while the 1-hour Ultimate Simulator Experience is £90 and includes two admission tickets. All simulator sessions can be shared by up to four people in your group, just make sure you also have enough entrance tickets for everyone to enter the exhibition.

During your session an instructor is on hand to give advice and assistance to help novice 'flyers' make the most of their time in the simulators. An airport-style boarding screen showing visitors' names and the time of their slot is a nice touch.

I tried the simulators of both aircraft types and while they do not move like professional ones, they are extremely realistic. It was exhilarating to get an idea of what it must be like to fly and land these



Airbus A380 and Boeing 777 simulators are available to visitors at a cost of £60 per 30-minute session or £90 for 60 minutes.

large airliners. I also enjoyed noting the difference between the two aircraft, as the Boeing 777 features the traditional yoke-type column, whereas the A380 has a side-stick controller.

Visitors can choose from several airports to fly from as well as stipulate the weather conditions. They can try taking off, landing or simply flying around the

sights of the world. I attempted the famous curved approach at the now closed Hong Kong Kai Tak Airport in an A380. It was a great experience turning at the famous checkerboard and watching the skyscrapers slide past the cockpit windows. I managed a smooth landing but then had a slightly bumpy touchdown in the 777 at Singapore Changi Airport. ▶



The Experience features several interactive exhibits including a video wall displaying the turnaround of an A380 in Dubai.



Visitors can see the inner workings of Rolls-Royce Trent 900 engine – the type that is used to power Emirates A380s.



The Emirates Aviation Experience also caters for corporate functions and school visits as well as hosting special events throughout the year. The simulators have proved popular with some companies for team bonding. The simulators give a score based on accuracy of take-offs and landings so it is an ideal activity to help foster the competitive spirit within companies – and groups of families and friends. All four simulators can be privately hired at £360 per hour which includes a landing competition where the winner receives an award certificate.

For those who want to take home a memento there is a small shop selling Emirates branded models and gifts, plus a café.

The Emirates Air Line cable car gives great views of the O2 Arena and Canary Wharf.

EMIRATES AIR LINE

Slightly more sedate, but nonetheless spectacular, is the Emirates Air Line cable car that runs from the south side of the River Thames, next to the Emirates Aviation Experience, to the Royal Docks near the London ExCel Arena. The journey takes around ten minutes, although between 7am and 9am from Monday to Friday it is reduced to five minutes for commuters. After 7pm it is extended to 12-13 minutes so that people can enjoy the night-time cityscape. The trip offers stunning views including those of the O2 Arena

and the Canary Wharf complex. Aviation enthusiasts will have the extra thrill of seeing aircraft from a far closer perspective arriving or departing from London City Airport to the east.

Emirates' vision, to provide an attraction to educate and entertain, has been realised and can be enjoyed by the whole family as well as aircraft enthusiasts.

More information and ticket prices for the Emirates Aviation Experience can be found at www.aviation-experience.com/ while for the Emirates Air Line check out www.emiratesairline.co.uk/ **AN**

The next issue is an English Electric Lightning special and will be on sale on February 16, 2017*

*UK scheduled on sale date. Please note that the overseas deliveries are likely to be after this date.



February 2017
Volume 79 No 2.

Founded in 1939 as
Air Defence Cadet
Corps Gazette.

EDITOR: Dino Carrara
E-mail: dino.carrara@keypublishing.com

CONTRIBUTING EDITOR:
Stephen Bridgewater

GROUP EDITOR: Nigel Price

General enquiries to:
Tuesday Osborne,
Aviation News incorporating Jets,
PO Box 100, Stamford, Lincs,
PE9 1XQ, UK
Tel: +44 (0)1780 755131
Fax: +44 (0)1780 757261
www.aviation-news.co.uk
DESIGN: Froggatt Designs

COVER DESIGN: Tracey Croft
PRODUCTION MANAGER: Janet Watkins

ADVERTISING AND COMMERCIAL:
Commercial Director: Ann Saundry

Advertisement Manager:
Andrew Mason
E-mail: andrew.mason@keypublishing.com

Advertising Production Manager:
Debi McGowan

Advertising Production Controller:
Sophie Studd
E-mail: sophie.studd@keypublishing.com

Group Marketing Manager: Martin Steele

MANAGING DIRECTOR AND PUBLISHER:
Adrian Cox

EXECUTIVE CHAIRMAN:
Richard Cox

SUBSCRIPTIONS / MAIL ORDER:
See the subscriptions advertisement in this issue
for details of current offer rates. Copies can also
be obtained by placing a standing order with your
newsagent.

Contacts: PO Box 300, Stamford, Lincs, PE9 1BR, UK.
Tel: +44 (0)1780 480404. Fax: +44 (0)1780 757812.
E-mail: Subscriptions: subs@keypublishing.com.
E-mail: Mail Order: orders@keypublishing.com.
www.keypublishing.com/shop

Readers in the USA can place subscriptions by visiting
www.aviation-news.co.uk or by calling toll free
800-428-3003 or fax 757-428-6253 or by writing to
Aviation News incorporating Jets, 3300 Pacific Ave,
Ste 500, Virginia Beach, VA23451-9828.

Aviation News incorporating Jets (ISSN: 2047-7198),
is published monthly by Key Publishing Ltd, PO Box
100, Stamford, Lincs, PE9 1XQ, UK and distributed
in the USA by Mail Right Int., 1637 Stelton Road B4,
Piscataway, NJ 08854.

Periodicals Postage Paid at Piscataway, NJ and
additional mailing offices

POSTMASTER: Send address changes to: Aviation News incorporating
Jets, Key Publishing Ltd C/o Mail Right International Inc. 1637 Stelton
Road B4, Piscataway NJ 08854

DISTRIBUTED BY: Seymour Distribution Ltd, 2 Poultry Avenue, London,
EC1A 9PP, UK. Tel: +44 (0)20 7429 4000 Fax: +44 (0)20 7429 4001

PRINTED BY: Warner's (Midland) plc, The Maltings, Bourne,
Lincs. PE10 9PH

Key PUBLISHED MONTHLY BY: Key Publishing Ltd,
address as Editorial. Printed in England ISSN 2047-7198

The Editorial team is always happy to receive correspondence. It is all read
and appreciated, but we cannot always guarantee a reply. While every care is
taken with material, the Publisher cannot be held responsible for any loss or
damage incurred. All items submitted for publication are subject to our terms
and conditions. These are regularly updated without prior notice and are freely
available from Key Publishing Ltd or downloadable from www.keypublishing.com. We are unable to guarantee the bona fides of any of our advertisers. Readers
are strongly recommended to take their own precautions before parting with any
information or item of value, including, but not limited to, money, manuscripts,
photographs or personal information in response to any advertisements within
this publication. The entire contents of Aviation News incorporating Jets is ©
Copyright 2016. No part of it can be reproduced in any form or stored on any form
of retrieval system without the prior permission of the publisher.

Note to contributors: Please note that images published on the Air Forces Daily
website do not attract a fee, though they will be credited appropriately. If such
images are also published in our printed titles, they will be paid at the appropriate
usual rate.

Follow us on Facebook at www.facebook.com/aviationnewsmagazine  or on Twitter @AvNewsMag 



ROYAL AIR FORCE 2017

Produced by Key Publishing with exclusive access to the Royal Air Force, and featuring articles written with and by RAF personnel, *The Official RAF Annual Review 2017* is a 132-page special magazine that provides behind the scenes insight into the aircraft, equipment and people of one of the world's premier air forces.

Featuring

Lightning

Lightning Force Commander Air Commodore Harv Smyth talks about the changes happening at RAF Marham ready for the Lightning's arrival in 2018, aircraft carriers, Harrier flying and the step change in capability that the F-35 is bringing to UK Defence.

Watching the World

After a difficult few months without a runway, RAF Waddington is on a high, with its ISTAR assets expanding. At the same time, it maintains an intensive operational tempo, supporting the insatiable demand for its intelligence product.

Joint Helicopter Command

Major General Richard Felton CBE, Commander of Joint Helicopter Command, describes JHC's equipment recapitalisation and future plans, with Chinook Mk 6, Puma Mk 2, Watchkeeper, Wildcat and Merlin iMk 3 entering service, and AH-64E Apache on the horizon.

Typhoon Times

With the promise of two new squadrons and upgrades to come, Typhoon Force has been exceptionally busy with operations, an intensive series of exercises and the constant duty of quick reaction alert.

AND MUCH, MUCH MORE!



JUST
£5.99

LIGHTNING: FLYING & FIGHTING THE FIFTH GENERATION
JOINT HELICOPTER COMMAND OPERATION SHADE
TYPHOON TIMES SILVER SPITFIRE TORNADO ON TOP
WADDINGTON WATCHING THE WORLD OP SHAKU:
CHINOOK FLOOD RELIEF MARHAM CENTENARY



AVAILABLE NOW FROM **WHSmith** AND ALL OTHER LEADING NEWSAGENTS

ALTERNATIVELY, ORDER DIRECT

JUST £5.99+FREE P&P*

*Free 2nd class P&P on all UK & BFPO orders. Overseas charges apply.

Free P&P* when you order online at
www.keypublishing.com/shop

OR

Call UK: 01780 480404
Overseas: +44 1780 480404
Monday to Friday 9am-5:30pm

SUBSCRIBERS CALL FOR YOUR £1.00 DISCOUNT! SUBSCRIBERS CALL FOR YOUR £1.00 DISCOUNT!

FLIGHT SIMULATOR **XPLANE11**

