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Welcome

Four anniversaries leap out in this issue of *FlyPast*. It's 75 years since the first flight of the DHC Chipmunk, in which thousands of pilots gained their 'wings'. I've always been fond of the type, having spent time in it as an Air Cadet four decades ago, but also more recently when I had the exciting opportunity to fly with David Petters and Jon Higgins of the Vintage Pair display team. There's a huge amount of love for this aircraft and we devote eight pages to it in this edition.

Combat flying comes to the fore, as we explore the careers of five P-47 Thunderbolt aces to mark 80 years since the type's first flight. Moving to the Korean War, it's 70 years since F-86 Sabre pilot James Jabara became the first jet ace, and we tell his fascinating – yet ultimately tragic – story.

We are also immensely proud of the fact that *FlyPast* is 40 years old this year, and to celebrate this milestone we are offering a reprint of the rare first issue (which had a limited print run), and you also have the chance of winning a flight in a two-seat Spitfire! (see pages 52-53).

It's pleasing to see warbird activity blossoming after so many months of lockdown, and we have colourful photo reports from events 'down under'. Be sure not to miss forthcoming issues of *FlyPast* because we have some superb air-to-air features on the cards and will be reporting on the first of the UK's airshows.

Now, though, it is with a tinge of sadness that I must bid you farewell in this, my last edition as editor of the world's biggest-selling heritage aviation magazine.

I'm returning to the world of plastic modelling as editor-at-large across the keymodelworld.com website and *Airfix Model World* magazine. It's been a rollercoaster three years, especially lately due to the COVID-19 pandemic, which has made magazine production 'interesting' to say the least! I will leave you in the capable hands of deputy editor Steve Beebee and our caretaker editor, John Sootheran, who will be at the helm for several months until a permanent editor takes post.

I wish to say a very big thank you to Steve, Jamie Ewan (recently appointed editor of *Aviation News*), former editor Ken Ellis, all my contributors and the warbird operators with whom I've had contact during my *FlyPast* tenure.

And finally, heartfelt thanks go to you, the readers, who have shown such wonderful support for your favourite heritage aviation monthly. It's been a heck of a ride!

Chris

Chris Clifford - Editor

The Old Warden-based Chipmunk WD286, operated by a syndicate, sports classic RAF training colours. For our 75th anniversary focus on this legendary type, turn to page 54
DARREN HARBAR

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Official note: We are able to report that, at the time of going to press, production and despatch of our magazine is currently unaffected by the ongoing coronavirus pandemic. We will continue to update you as best we can, should this change. Some postal services may be delayed. You can keep in touch with our latest updates and see what we are doing to keep distribution as normal as possible by visiting: *www.keypublishing.com/FAQs*.

FRONT COVER: **The Shuttleworth Collection's 1942-built Westland Lysander V9367. Our 'Classics' section reflects on the type's origins and service – see page 66** DARREN HARBAR

FlyPast, ISSN 0262-6950 (USPS 6118) is published monthly by Key Publishing, PO Box 100, Stamford, Lincolnshire, PE9 1XQ, United Kingdom.
The US annual subscription price is $72.99. Airfreight and mailing in the USA by agent named World Container Inc, 150-15, 183rd Street, Jamaica, NY 11413, USA.
Periodicals postage paid at Brooklyn, NY 11256
US Postmaster: Send address changes to FlyPast, World Container Inc, 150-15, 183rd Street, Jamaica, NY 11413, USA
Subscription records are maintained at Key Publishing, PO Box 100, Stamford, Lincolnshire, PE9 1XQ, United Kingdom.
Air Business Ltd is acting as our mailing agent.

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The Buzz

News from the World of Aviation Heritage

steve.beebee@keypublishing.com

Spitfire Mk.IX PT879 airborne recently with replica bombs in place DARREN HARBAR

'Bombed up' Russian Spitfire gets airborne

The Hangar 11 Collection's Supermarine Spitfire Mk.IX PT879 (G-PTIX), which flew for the first time in 75 years last October, has now been fitted with replica bombs.

Owner Peter Teichman reports that the fighter – which has been painted in its original Soviet markings – is attracting a lot of attention. "As far as I am aware, no other Spitfire has flown fully 'bombed up' since World War Two, and she certainly looks fabulous and very different in her original Russian squadron identity," he told *FlyPast*.

"Regarding the dummy bombs, the process was long, complex and expensive, but I have to give a 'shout out' to Dave Starkey and his team for their support. Initially, we were lucky to be loaned an original (and deactivated) 250lb GP bomb by RAF Museum Cosford from which we were able to engage the services of an expert moulder. Then we designed an interior construction which would satisfy the regulator (the CAA) and ensure the level of security and strength required. The replica bombs hang on her original 1944 pylons, and recent test flights have shown little effect on flight characteristics." Look out for more on this superbly restored warbird in a future issue. **www.hangar11.co.uk**

Debut UK flight for well-travelled Ryan

Ryan ST-A N7779 lifts off from Old Warden on March 8 DARREN HARBAR

Ryan ST-A N7779 has made a successful first flight from Old Warden, Bedfordshire in the hands of Jean Michel Munn. The aircraft, owned by Arnaldo Leon, got airborne on March 8 following some light restoration work.

Built in 1940, it joined the Netherlands East Indies Air Force before moving to the RAAF in August 1942 as A50-31. It subsequently entered private ownership, registered VH-AGZ in Australia. In 1969 it was exported to the US flying as N288Y before gaining its current ID.

The Ryan was acquired by Arnaldo in 2019: "I first saw a Ryan in the 'flesh' almost 20 years ago," he told *FlyPast*. "I eventually found this one in California and sprang into action, closing the deal [quickly]. The owner bought it at Oshkosh in the early 2000s but never flew it. He also had an incredible personal collection of naval aircraft, but as he was pushing 90, he wanted to find a good home for his collection." An air-to-air feature on N7779 will be in next month's *FlyPast*.

Lockheed L.1649 Starliner N7316C has been moved to Paderborn-Lippstadt Airport
DLBS-DEAN RAINERI

Starliner moved to new German hangar

The Deutsche Lufthansa Berlin Stiftung (DLBS) successfully transported Lockheed L.1649 Starliner N7316C from a warehouse in Bremen to a hangar at Paderborn-Lippstadt Airport, during the last week of February.

DLBS believes the huge aircraft can be better preserved at its new home – the company is currently deciding how to present the exhibit in future.

The previous plan, from 2007, was to restore the airliner to flying status for Deutsche Lufthansa in the US, and use it for passenger flights.

Unfortunately, this ambitious project was terminated three years ago – partly due to the excessive cost – and the Starliner was dismantled and shipped to Germany.

Four examples of the 44 that were built were used by Lufthansa between 1958 and 1964 – the type was commonly known as 'Super-Star' in Germany. The aircraft were withdrawn in the mid-1960s due to the emergence of jet airliners.

Paderborn's machine is the oldest of the four Starliners that remain worldwide.

STEFAN SCHMOLL

Mustang added to Flying Bulls fleet

Austria's Flying Bulls collection acquired North American P-51D Mustang 'Nooky Booky IV' on March 6. The aircraft – F-AZSB – was flown from Melun Villaroche, France to its new home at Salzburg by George Perez. It represents the wartime mount of Maj Leonard 'Kit' Carson of the USAAF's 362nd FS, 357th FG. **@ZAJCMASTER www.flyingbulls.at**

ABOVE: **US Navy Intruder veterans Gary Poe (left) and Greg Smith – with A-6E 157579 at Castle Air Museum**
WITH THANKS TO JOE PRUZZO

California museum receives Grumman Intruder

The last Grumman A-6E Intruder to be retired from US Navy service was delivered to the Castle Air Museum in Atwater, California, on March 5. Intruder 157579 was withdrawn from use on March 4, 1997, and is the last of its kind to be acquired from the 'boneyard' at Davis-Monthan in Tucson, Arizona, after several sister aircraft were scrapped.

Among those seeing the jet's arrival were A-6 bombardier /navigator Gary Poe and pilot Greg Smith who flew 157579 on its last flight to the Arizona facility. The acquisition was enabled by a partnership between the museum and the A-6 Intruder Association – the exhibit will now be restored and preserved at its new home. It was retired in US Navy unit VA-196 colours, as in Stephen Coonts' novel *Flight Of The Intruder*.

Spitfire's maiden flight from Sywell

Lifting off from Sywell airfield in Northamptonshire, Supermarine Spitfire Mk.IX MH415 made its first post-restoration flight on April 8. The 1943-built combat veteran flew in the 1960s films 'The Longest Day' and 'Battle of Britain', subsequently becoming part of 'Connie' Edwards' warbird collection in Texas. In 2014 in Australia, it was refurbished by Vintage Fighter Restorations, before being completed by Air Leasing at Sywell.

PHOTO PAUL TREADAWAY www.airleasing.co.uk

Auster Mk.III NX537 has been acquired by Arnhem's Museum Deelen
NEDERLANDS TRANSPORT MUSEUM

Dutch Auster on the move

Auster Mk.III NX537 was moved from the Nederlands Transport Museum in Nieuw-Vennep near Schiphol Amsterdam Airport to Museum Deelen near Arnhem on March 6. The aircraft had been on show at Nieuw-Vennep for three years.

The 1943-built machine served with 658 and 485 Squadron before being purchased by the Dutch government for use in the liberated Netherlands. It was fitted with a long range fuel tank to complete the crossing from the UK. It flew with 1316 Flight Metropolitan Communications Squadron (later No.6 Dutch Communication Flight) from November 5, 1944, and joined the Netherlands Air Force as X-7 in May 1946. It flew in civilian hands as PH-NIN from 1958, but suffered an accident six years later. Volunteers have restored the Auster to static display condition and have returned it to its wartime military livery.

IN BRIEF

Spanish aviation museum Fundación Infante de Orleans (FIO) held a successful training display day on March 7 as it anticipates a return to public shows later this year. DHC Chipmunk EC-LVH (pictured) was among the aircraft involved. FIO also confirmed that it will shortly add a CASA-built Bücker Jungmann and a Beechcraft F33A Bonanza to its expanding collection of historic aircraft. ROBERTO YÁÑEZ

Caribou destined for museum display

The last DHC-4 Caribou in open storage at Cuatro Vientos MAESMA (Maestranza Aérea de Madrid, an aircraft maintenance centre) was transported to the nearby Base Aérea de Getafe on March 9 to be preserved at the Ala 35 squadron museum. Caribou T.9-5/372-05 served in Spain from 1968 until 1991 in a variety of roles, and while it never flew with Ala 35 its arrival enables the unit's museum to expand its collection of types once flown from Getafe. ROBERTO YÁÑEZ

'Brisfit' airborne at Old Warden

The Shuttleworth Collection's Bristol F.2b Fighter made its first flight since being restored into 22 Squadron colours (see January issue) on March 25. It represents B1162, an aircraft based at Villeneuve-des-Vertus, France in March 1918. Pilot Paul Stone reported no major snags with the illustrious biplane. www.shuttleworth.org DARREN HARBAR

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Australia marks air force centenary

The March 31 centenary flypast included (l-r) a Harvard, Hudson, Boomerang and Wirraway PETE WOODING

The Royal Australian Air Force (RAAF) marked its centenary on March 31 with a flypast over Canberra featuring 60 aircraft. A crowd of several thousand observed the aerial procession as it passed over the capital's Lake Burley Griffin.

Several heritage types were among the mostly modern aircraft, including the Temora Aviation Museum's CAC Boomerang and Wirraway, as well as Lockheed Hudson VH-KOY, a Spitfire, Kittyhawk, Mustang, Catalina, Dakota and Neptune. A spirited display by the RAAF's Pilatus PC-21-equipped Roulettes aerobatic team provided a fitting finale.

The nation's air arm has also recently reactivated 100 Squadron as the Air Force Heritage Squadron. It will fly historic aircraft from the RAAF Museum in Point Cook, Victoria, and the civilian airfield at Temora, New South Wales. Ownership of 11 historic aircraft was transferred from the latter to the RAAF during 2019, including the Hudson and two Spitfires, Mk.VIII VH-HET (A58-758) and Mk.XVI VH-XVI (TB863). The aircraft remain at Temora and are flown by museum-based personnel. The RAAF is also restoring Curtiss P-40E A29-90, formerly operated by 76 Squadron and credited with the unit's first 'kills'. WITH THANKS TO PAUL HASTINGS AND PETE WOODING

RIGHT: **The RAAF Museum's Mustang VH-SVU is among aircraft likely to be flown by the Air Force Heritage Squadron** PAUL HASTINGS

IN BRIEF DHC-1 Chipmunk pilot David Petters, part of the Fenland-based Vintage Pair, is now offering Chipmunk experience flights plus tailwheel conversion and formation instruction from the Lincolnshire airfield. Formation experience flights will also be available with the Vintage Pair – currently only one passenger can be taken on these. Prices start at £100 for a 20-minute introductory flight. Contact Fenland Flying School on 01406 540461 or info@fenland-flying-school.co.uk

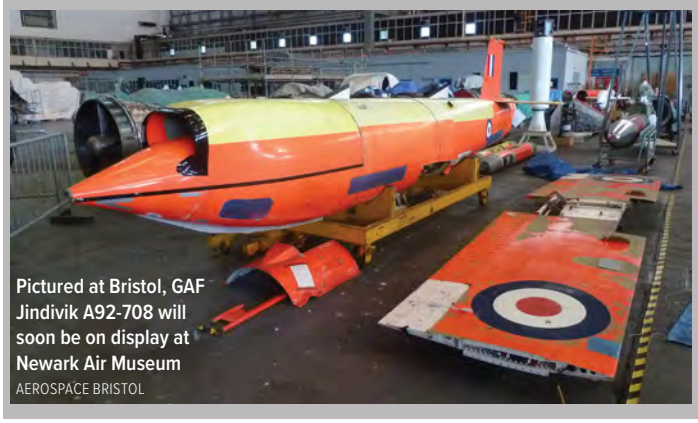
GAF Jindivik moving from Bristol to Newark

Newark Air Museum in Nottinghamshire is due to take ownership of GAF Jindivik A92-708. The radio-controlled target drone is currently in storage with Aerospace Bristol and will be transported when restrictions allow.

Newark trustee Colin Savill said: "We are extremely grateful to Aerospace Bristol [and the collection's manager Stefanie Vincent] for helping us to complete this latest acquisition. Due to its use as a target drone the Jindivik lies within two of our collecting remits and will also complement the museum's UAV [Unmanned Aerial Vehicle] display. It fits within our training collection and also complements our munitions display."

The first flight of the Jindivik Mk.I took place in August 1952. Newark's example crash-landed on August 20, 1990, while making its 125th flight. It was being used for trials in the build up to the first Gulf War.

After being stored at Llanbedr in Wales it was acquired by the Bristol Aero Collection in 1997. **www.newarkairmuseum.org** HOWARD HEELEY



Pictured at Bristol, GAF Jindivik A92-708 will soon be on display at Newark Air Museum AEROSPACE BRISTOL

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Retired Spanish Falcons arrive at new homes

Dassault Falcon 20E TM.11-1/47-21 arriving at Albacete where it will be used as an instructional airframe ROBERTO YÁÑEZ

The last two Spanish Air Force 'VIP' Dassault Falcon 20s have recently been transported to two aviation technical schools. The aircraft have been in storage at Torrejón Air Base, Madrid, since being withdrawn from use with 47 Grupo in November 2015.

Falcon 20D TM.11-2/47-22 was moved by truck to CIFP As Mercedes at Lugo in northwest Spain at the end of 2020, while Falcon 20E TM.11-1/47-21 arrived at CEFAAL Aguas Nuevas in Albacete on February 2. Both aircraft entered air force service in the 1970s as VIP transports with Torrejón-based 45 Grupo. Following modifications, they ended their careers performing flight inspection services with 47 Grupo.

A third former military Falcon, the grey-painted TM.11-4/472-04, was received at Cuatro Vientos Air Base in January, prior to delivery to the Spanish Air Force Museum where it will be put on static display.

In the latter part of its service, this aircraft was modified to perform electronic countermeasures and communications signals intelligence operations.

ROBERTO YÁÑEZ

Skymaster anniversary marked in the Netherlands

Two Cessna Skymasters were brought together on February 28 to mark the 60th anniversary of the type's first flight. The Postbellum Foundation's military O-2 (N590D) wearing a USAF scheme was photographed with the Dutch Electric Aviation Centre's N4207X for the first time. Both machines are based at Teuge in the Netherlands. www.deac-teuge.nl

IN BRIEF A project funded by Historic England has been set up to promote English aviation heritage and establish regional 'peer to peer' support groups among aviation-related sites. The networks will give those who manage memorials, museums and attractions devoted to aviation history the opportunity to discuss common issues, develop mutually beneficial projects and share best practice, and promote their activities on a website: ***www.mahn.org.uk***

Tempest drop tanks unearthed at Volkel

Three World War Two drop tanks – believed to be from Hawker Tempests – have been discovered during construction work at Volkel Air Base in the Netherlands. The example deemed to be in best condition has been put on display at the airfield's museum. Tempests of the RAF's 122 Wing were stationed at Volkel from late 1944. WITH THANKS TO HENK TALEN

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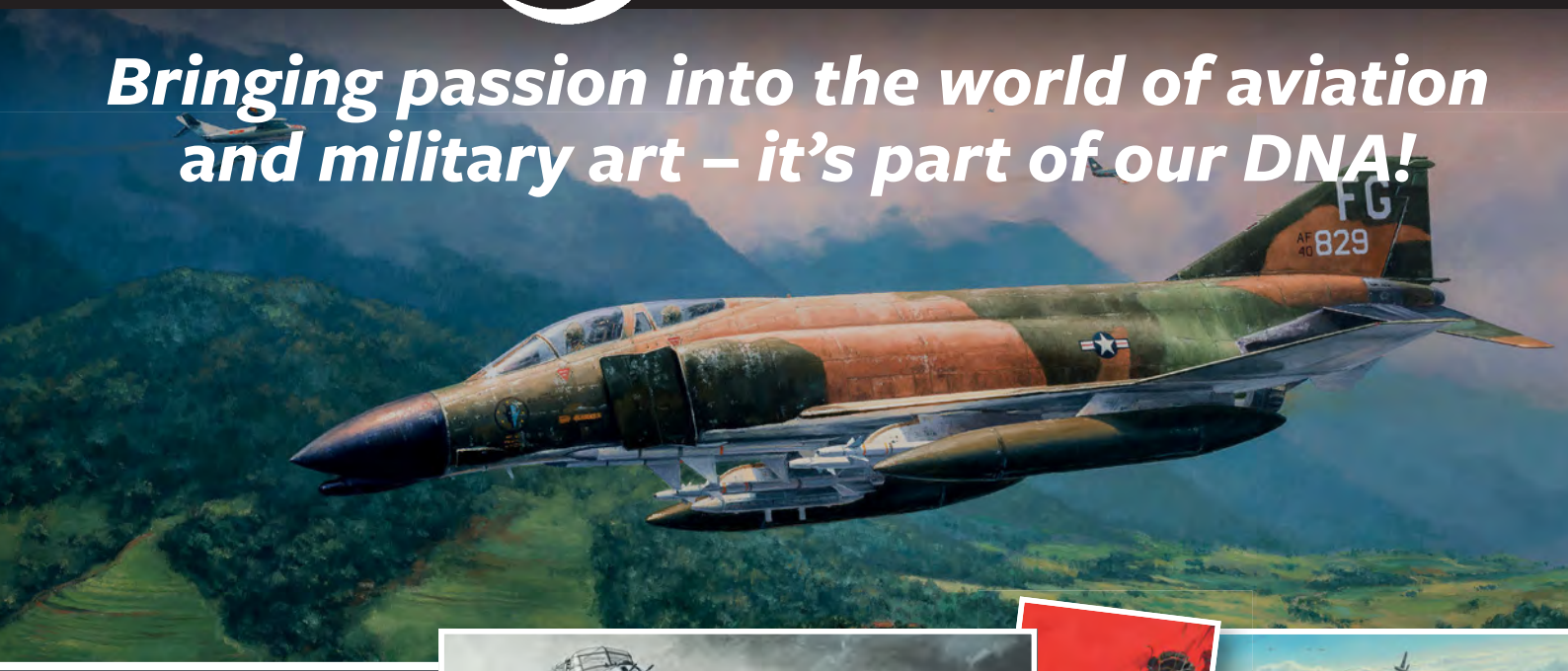

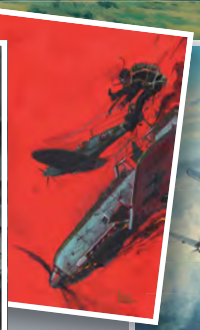

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Aviation museum stars in TV series

Brooklands Museum in Weybridge, Surrey, is currently the focus of a ten-part television series on the Yesterday channel. *Secrets Of The Transport Museum*, narrated by Sanjeev Bhaskar, began on March 30 and is also available on catch-up via UKTV Play.

The series follows the dedicated band of staff and volunteers as they devote their time and skills to maintaining the collection.

As well as its assortment of historic vehicles, Brooklands has an impressive array of aircraft, including Concorde G-BBDG, a Vickers VC10, Vimy and Wellington, and Hawker Hurricane Mk.IIa Z2389.

Museum director Tamalie Newbery said: "At Brooklands Museum we tell the stories of the pioneering men and women who risked it all in pursuit of their dreams of speed and flight in the 20th century. I'm delighted the TV series is giving more people the chance to find out about this inspiring place, and how we care for it today."

Brooklands personnel with the attraction's Vickers Vimy reproduction 'NX71MY' www.brooklandsmuseum.com BROOKLANDS

We Salute You

Lt Col **Mel Corley** DFC – flew Mustangs in Korea and later F-104s, surviving a bale-out in the former and ejection from the latter – died on January 18, aged 94; Staff Sgt **Jim Hooper** – Horsa glider pilot who was captured at Arnhem – on February 11, aged 98; Sqn Ldr **'Mac' McIlroy** – flew 24 bombing sorties before being shot down in 408 Squadron Halifax then PoW in Stalag Luft III – on January 13, aged 99; WO **Charles William Murray** – mid-upper gunner who served on India-based B-24s with 356 Squadron, completing 64 'ops' – on February 19, aged 96; Flt Lt **Tom Payne** – pilot with 90 and 15 Squadrons with whom he flew both Wellingtons and Lancasters – on February 7, aged 95; Wg Cdr **Eddie Rigg** MBE AFC – flew fighters then became test pilot at Boscombe Down, later leading Argosy-equipped 105 Squadron in the Middle East – on Jan 19, aged 94; Gp Capt **Bill Sykes** – flew Vampires and Hunters with Royal Rhodesian Air Force before converting to Alouette III helicopters in Bush War – in February, aged 78; Sqn Ldr **John 'Peter' Wright** – served in 60 and 39 Sqns, completing 30 'ops' on Blenheims and the same number on Marylands in North Africa – on January 15, aged 100; **Wilhelmina 'Min' Wright** – wife of John 'Peter' Wright, she was a corporal in Bomber Command in World War Two – on January 2; WO **Jan Baxter Zablocki** – flew Wellingtons with 300 Sqn before piloting Halifaxes dropping supplies to the Polish Home Army, later completing 242 Berlin Airlift flights – on March 12, aged 100.

Support sought to keep historic helicopter in the skies

Westland Wasp HAS.1 XT787 is maintained in airworthy condition KS AVIATION

With the 40th anniversary of the Falklands conflict next year, the Westland Wasp Historic Flight (WWHF) is seeking ways to help it keep Wasp HAS.1 XT787 flying.

The helicopter entered Royal Navy service in 1967, flying with 829 Naval Air Squadron (NAS) from HMS *Leander* and HMS *Rhyl*, before joining 703 NAS. After a stint in the Royal New Zealand Navy, it passed into private ownership and today flies in a Falklands colour scheme. The type's most famous engagement was a successful attack on the Argentine submarine *Santa Fe* with AS.12 missiles.

"WWHF also owns a non-airworthy Wasp and Scout, and we have also recently commissioned two replica AS.12 missiles for these," reports Westland Light Helicopter Heritage Group director Ian Prescott. "As the 40th anniversary of the Falklands campaign is nearing, we are keen to promote XT787 and are looking for support. We are also open to exploring sponsorship possibilities."

www.historicwasp.com

Restoration Scene

"News and narrative on the latest heritage aircraft rejuvenation"

steve.beebee@keypublishing.com

Help needed in Jetstream restoration bid

Sywell Aviation Museum in Northamptonshire is appealing for help with its bid to refurbish Handley Page Jetstream Mk.I G-RAVL.

In what's described as the biggest project it has ever undertaken, the museum successfully moved the 1969-built airframe from Cranfield in Bedfordshire to Sywell on March 23. Sadly – and partly due to theft – several components are missing. The attraction is seeking Jetstream passenger seats, interior panels and fuselage windows. It's also looking for help to re-fit and trim the interior – the latter was largely stripped out during the machine's use as a training aid.

Victor-Lima is believed to be the third oldest Jetstream extant. The museum hopes to use the finished aircraft as a classroom, and will paint it as G-RAVL on one side and as G-AWVK on the other, the alternate identity representing its days in service with Racal Decca. If you can assist, please contact: sywellaviationmuseum@gmail.com WITH THANKS TO BEN BROWN

Jetstream G-RAVL is the latest project at Sywell Aviation Museum DAMIEN BURKE VIA BEN BROWN

CAF Avenger receives refurbished engine

The Commemorative Air Force's Rocky Mountain Wing has successfully reunited Grumman TBM-3E Avenger BuNo 53503 with its Wright R-2600 powerplant. The unit has been rebuilt by Anderson Aeromotive of Idaho following a successful fundraising drive. The 1945-built aircraft has been flying with the Colorado-based Wing since 1990 and formerly served with US Navy units VT-17 and VT-82. www.rockymountainwingcaf.org COURTESY CAF-RMW

Warbirds receive fresh livery for 2021

Skyraider F-AZHK in its previous paint scheme VIA CHRISTOPHE BRUNELIÈRE

France-based Douglas AD-4N Skyraider F-AZHK has recently been given a new paint scheme. Previously finished in Armée de l'Air colours, owner Christophe Brunelière chose to represent a 1st Air Commando Squadron machine serving in Southeast Asia between 1965-72. Based at Avignon, Christophe has dubbed the aeroplane *Sandy* in salute to one of the type's many nicknames. The new-look machine was rolled out in its pristine scheme during late February.

The Yankee Air Museum's North American B-25D Mitchell 43-3634 was also unveiled in new colours recently. The aircraft, which formerly flew in an overall silver scheme as *Yankee Warrior*, is now named *Rosie's Reply* and has been returned to the colours it wore with the USAAF's 57th Bomb Wing, 340th Bombardment Group, 489th Bomb Squadron.

The AD-4N undergoing transformation on February 2 VIA CHRISTOPHE BRUNELIÈRE

The B-25's new 'Rosie's Reply' nose art
VIA DAVE CALLANAN-YAM

The Mitchell completed eight missions over Italy with this unit while based in Corsica. A special livery was chosen to combine historically accurate colours with a contemporary addition. The aircraft's name and nose art are a tribute to 'Rosie the Riveter', a wartime recruitment character that today serves to represent the many female workers who laboured in aircraft factories and shipyards during the conflict.

Following its assignment in Italy, the aircraft was returned to the States and subsequently passed to the British as part of the Lend Lease arrangement.

This well-travelled machine subsequently flew with the Royal Canadian Air Force as KL148 before entering private hands. It was purchased by the Michigan-based museum in 1987 and took to the air again in 2003 following a three-year restoration. **www.yankeeairmuseum.org**

'Hotel-Kilo' now represents a 1st Air Commando Squadron machine
VIA CHRISTOPHE BRUNELIÈRE

Sea Harrier FA.2 ZH798 after being reassembled at Church Fenton
ALL COURTESY CHRIS WILSON

Restored Sea Harrier could 'breathe again' at new home

Yorkshire-based restoration specialists Jet Art Aviation (JAA) has delivered BAe Sea Harrier FA.2 ZH798 to Leeds East Airport, formerly RAF Church Fenton.

Despite adverse weather, the JAA team managed to fully reassemble the aircraft and have returned it to its 801 NAS markings with the side code 002, in a process that was filmed for a TV documentary.

"From the initial inspections and survey, ZH798 appeared to be very complete and in great order," JAA boss Chris Wilson told *FlyPast*. "As such, dry storage in a suitable hangar was deemed the only really responsible option. Local to us, Church Fenton was chosen as ZH798's new home with hangarage kindly provided by Makin Air." It was delivered on February 1.

The jet is one of three Sea Harriers dismantled and extracted by JAA from RNAS Culdrose in Cornwall in January. The trio – completed by ZH811 and ZH804 – were disposed of by the MOD via competitive tender at the end of 2020. Sea Harrier FA.2s were retired from Fleet Air Arm service in March 2006.

After a long but uneventful trip north, both ZH811 and ZH804 were safely unloaded at JAA's base. The aim is to restore them to museum-standard static display condition. The former was the last ever Sea Harrier to land at Yeovilton – it had only been in service for eight years when it touched down for the final time on March 28, 2006.

The Sea Harriers stripped down at Culdrose prior to removal. ZH804 is in the foreground with ZH811 at rear

ZH798, previously kept in taxiable condition, was last run in 2019, but JAA has not ruled out bringing it back to life. Chris said: "Having... restored a Harrier GR.3 back to ground-running standard in 2016 the temptation to attempt the same thing with a Sea Harrier is significant. After initial investigations, '798 seems the perfect candidate. If all the stars align and the team can source some missing parts, this one may well be making jet noise again some time in 2021!"

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WITH THANKS TO CHRIS WILSON

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Yak-3 and Spitfire for Aero Legends

Aero Legends' Yak-3 undergoing refurbishment with Vintage Aero KEY-JAMIE EWAN

British flight experience company Aero Legends is to add a Yakovlev Yak-3 to its expanding fleet. The aircraft (G-CDBJ, which is currently undergoing restoration with Kent's Vintage Aero following a 2008 landing accident) will be used for customer flights from Aero Legends' North Weald base.

The machine is one of 19 new-build examples manufactured by the Strela Aircraft Company in Russia during 2003.

"This is a very attractive aircraft that fits our fleet well," managing director Ben Perkins told *FlyPast*. "It is very fast, having the Allison V-1710 engine, and is one of the rare factory-built dual control models, so we expect it to prove incredibly popular. This particular aircraft has only flown 27 hours since new and we anticipate having her back flying sometime this year."

The company also revealed that it has acquired the substantial remains of Supermarine Spitfire Mk.IX MJ444 following its recovery from Belgium last year. The 1943-built fighter ended its days with 443 Squadron RCAF, when it was shot down by anti-aircraft fire over St Vith, Belgium, on January 18, 1945. Flt Lt Edmund Fairfield managed to bale out and successfully evaded capture. The aircraft, which has been registered G-LEGD, will be restored as a two-seat Spitfire T.9 in a project overseen by Duxford's Aircraft Restoration Company. It is expected to return to the skies in May 2023.

www.aerolegends.co.uk

Work completed on Greek Starfighter

The Hellenic Air Force Museum is due to display Lockheed F-104G Starfighter 7151 at Tatoi-Dekelia, after around a year of restoration and maintenance work. The exhibit has been given a new coat of paint and continues to sport special 336th 'Olympus' Squadron 50th anniversary colours. Prior to withdrawal, the jet toured several air bases wearing this distinctive scheme. TONY SACKETOS

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Hangar Mice

A group of volunteers known as 'Ratones de Hangar' works tirelessly to maintain the aviation history of Uruguay. **Ramiro S Piacenza** explores their restoration efforts

Restoration of Curtiss Falcon SNC-1 'E-205' was challenging and demanded many hours. It's now one of the jewels of the museum's collection ANTONIO BILHOTO

The Tiger Moth restoration is entering the painting phase, starting with the tailplanes ANTONIO BILHOTO

Founded in 1941, the Museo Aeronáutico Coronel Aviador Jaime Meregalli is dedicated to preserving Uruguay's aviation heritage. During its lifespan it has changed venues four times before settling on its current location in the premises of Carrasco International Airport, almost 17 miles from Montevideo, the country's capital. It has a collection of 30 aircraft, together with related objects and an archive that represents the history of aviation in Uruguay. It also owns the only flyable warbird in the country: a FAU T-6 Texan, which takes to the air during official ceremonies and airshows.

Its facilities also serve as the base of operations for the Asociación Amigos del Museo Aeronáutico (AAMA), but they called themselves Ratones de Hangar (Hangar Mice, after the expression 'Ratón de Biblioteca', which translates as Library Mice – equivalent to the term 'bookworm'). These enthusiasts and volunteers devote their time to preserving the museum's vast collection.

Founded in 2005, the Ratones de Hangar don't just work on the aircraft, but also advise on historical accuracy and curate the material preserved in the archives, in co-ordination with the Fuerza Aérea Uruguaya (FAU; Uruguayan Air Force). In the words of their vice-president, Ricardo Varela: "Our objective is to divulge, discuss and preserve the Uruguayan and international aeronautical historical material we have."

The AAMA comprises volunteers of different ages and backgrounds, as Varela explains: "We have physicians, lawyers, retired military pilots, aeronautical technicians, bus drivers, engineers, college students, advertisers and meteorologists. Everyone brings their best to the group, and that could be manual or intellectual skills. That's how we count on specialists in the aeronautical history of our country, [such as] model

The COVID-19 pandemic has forced the team to take protective measures in order to continue their activities
ALL EDUARDO LUZARDO UNLESS STATED

RIGHT: Materials for the Tiger Moth's fabric covering were purchased in the US and ferried to Uruguay by the South American nation's air force

Work on Focke-Wulf Fw 44 CX-AEI will start as soon as the team clears its queue of tasks. It also still needs to collect some missing parts

ABOVE: **The Tiger Moth's original wings were missing, but fortunately an owner of the type from São Paulo, Brazil donated a pair** ANTONIO BILHOTO

BELOW: **Two volunteers of the AAMA team working on a de Havilland Gipsy III engine**

builders, carpenters, welders, painters and restorers. It doesn't matter where they come from, all the 'Ratones' are united in their passion for aviation and history."

Busy rodents

Every weekend, the group collaborates on multiple projects. Currently the members' attention is divided between the restoration of three different flying machines: a Beechcraft AT-11, a de Havilland Canada DHC-1 Chipmunk and a DH.82 Tiger Moth, the last of which is at an advanced stage of preparation. More recently, a former FAU tow-tractor from the late 1970s has been added to the restoration work list.

When the AAMA conducted its first meeting in 2005, it agreed to take on three restoration projects. The first would be 1948-built Stinson 108-3 Voyager CX-ALL, followed by a 1942 Curtiss SNC-1 Falcon, heavily damaged by a fire in 1997, and finally Tiger Moth 3619. The last of these was registered '17' from 1937 to September 1941, before becoming 'B2-604'. It was decided to revive the biplane's original paint scheme and '17' designation.

This particular Tiger Moth was one of the 18 purchased by Uruguay in 1935 to replace the country's fleet of Avro 504K primary trainers assigned to the FAU's Escuela Militar de Aviación (Military Flight School). The type had a distinguished career before being replaced in 1949. So far, this project has been the longest and most difficult for the group, but also one of the most rewarding.

ABOVE: **All members of the AAMA offer their services for free. "Everyone brings their best to the group," explained vice-president Ricardo Varela**

Plans to refurbish Tiger Moth '17' go back a long way. It was first attempted in 2003 by Walter Da Silva, a retired aircraft technician who requested period photos from one of the volunteers at the museum's archives. This prompted six aviation enthusiasts – five Uruguayans and one American – to collaborate with the museum in June that year. Interestingly, this initial gathering was the first to refer to themselves as Hangar Mice, and they became the foundation stone of the AAMA.

At the start of the project, the Tiger Moth amounted to little more than a tubular fuselage structure, an engine and a selection of loose parts. It was estimated that just 35% of the aircraft was present.

The first step was to procure replacements for the missing items. A thorough sweep of the museum resulted in the sourcing of seats, a rear windshield, tailplanes, a rudder, pedals, control columns, a propellor and an airspeed indicator. However, many important components were still absent.

At this point, the project became an international effort. Uruguayans living abroad, who were aware of the quest, started searching for parts. As Varela recalls: "Their support was crucial, and we were able to finish the airplane thanks to them." Technical information came from as far afield as Australia and the UK, while the engine cowling and fuel tank were sourced from Chile and the wings from Brazil. The wooden struts were manufactured in New Zealand.

It was the wings that were a particular preoccupation at the beginning of the venture. The museum had a pair from a de Havilland DH.60 Moth in a warehouse and the team seriously considered making use of these. However, thanks to international contacts, the owner of an airworthy Tiger Moth in Brazil donated a discarded set of mainplanes.

Acquiring these was one thing, but getting them to Uruguay was a different matter, especially as the former owner asked that they be collected as soon as possible. Thankfully, the AAMA was able to execute a truly international logistical feat. Thanks to their contacts and the support of the FAU, they were able to transport the wings to a hangar within the Brazilian Air Force Academy located at Pirassununga Air Base. After two weeks, an FAU C-130 Hercules, returning from overseas deployment, was able to collect and transport them to Montevideo. The FAU helped the group in other ways too, thanks to the air arm's contacts with the Fuerza Aérea de Chile (FACh; Chilean Air Force), which was able to obtain glassfibre copies of the engine cover and fuel tank of an FACh Tiger Moth preserved in the Museo Nacional Aeronáutico y del Espacio of Chile (Chilean Air and Space National Museum).

"There is a lot of material salvaged from the unfortunate fire in 1997"

As the project draws to its conclusion, the aircraft is almost ready for painting. The team has used the museum's extensive archive, sourcing reference material such as photos and technical manuals from the FAU to ensure the result is as accurate as possible. The finished aircraft should faithfully represent the machine during its flying days in Uruguay.

To reduce the impact of the COVID-19 pandemic, the AAMA has taken measures to ensure continuity of work. As Varela explains: "We had to adapt according to the personal situation of each member. Some decided to change their working schedule at the museum, [some] preferred to work from home and others decided to take a pause until the situation settled." Ultimately, the team hopes to complete the biplane this year.

Once finished, Tiger Moth '17' will be displayed next to another project that is an enduring source of pride for the AAMA: Curtis Falcon SNC-1 'E-205', one of just four extant. As well as having suffered fire damage, the fuselage was cut in two when another aircraft suspended from the ceiling fell onto it.

The restoration was started by Rubens Cordero, a car mechanic, skilled metalworker and owner of a repair shop. He took the aircraft to his facility in 2004 and began the painstaking

"We have physicians, lawyers, retired military pilots, aeronautical technicians, bus drivers..."

process of recreating parts and joining the severed fuselage. The endeavor took him several years and finally, in 2014, the aircraft returned to the museum where the work was completed by the AAMA. Two years later, the Falcon again took its rightful place in the collection. For this, Cordero received a commendation from the FAU.

After the Tiger Moth, the team will focus on the AT-11 and DHC-1 Chipmunk 'FAU 607', the latter another victim of the fire. Luckily, this aircraft wasn't damaged as extensively and the team is already repairing the wings and tailplanes. Next on their list are two other aircraft, a Focke-Wulf Fw 44 Stieglitz (CX-AEI) and a Potez 25, the latter of which is one of the few remaining examples of the type. The team is not discouraged by the fact that both machines are damaged and have many missing parts.

Not all the aircraft are in such bad shape. As the museum changed location several times, certain components were lost or simply misplaced. Such is the case with the nose gear doors of Cessna OA-37B Dragonfly '284'. It was displayed without them for several years until an AAMA member stumbled across them in 2020 while looking for parts for a different project.

Meanwhile, the group offers continued support to the museum, restoring scale models from its collection and preserving historical artefacts. "There is a lot of material that we need to restore after it was salvaged from the unfortunate fire in 1997, with different degrees of damage," commented Varela. The group has around 30 members, with around half of that number actively involved in different projects at any one time. Varela said

BELOW: **Technical documents and photographs from the museum's archive have proved invaluable as reference during the Tiger Moth project. Here, an AAMA member works on the instrument panel**

the biggest obstacle is the lack of volunteers: "We are always open to new members. Our philosophy is that any volunteer, in whatever role suits best, can collaborate."

Conversely, the group's restoration projects have enabled it to forge closer links with similar enthusiasts and museums abroad. "We were able to acquire invaluable knowledge and material for projects that looked impossible," said Varela. "Maybe the difference sits on the resources available to other groups, similar to ours, in those countries where aviation is more developed."

The Mice tackle multiple projects at once. "We work in groups allocated to each project but many of us are involved in more than one at the same time," Varela explained. "It's arranged according to our skills and what work is required. Our motto is 'Restoration isn't a big effort, just the sum of smaller efforts'. The key is to approach each project step by step, slowly but surely." **FP**

• Thanks to Ricardo Varela, Antonio Bilhoto and Eduardo Luzardo. You can email the AAMA at aamameregalli@adinet.com.uy


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Gavin Conroy provides stunning photographic highlights from New Zealand's recent Wings Over Wairarapa airshow

Three very rare two-seat aircraft from The Vintage Aviator. Leading is a DH.4, on its left is the world's only flying BE.12 and opposite is an RE.8. The last two were built from scratch and fly with reverse-engineered powerplants

BELOW: Doug Batten leading the nine-ship Yak-52 team during a photo sortie after the show. This team has gained a loyal following around the world, not just due to the number of aircraft it flies, but also through the impressive opening nine-strong loop manoeuvre ALL GAVIN CONROY

ABOVE: Yakovlev Yak-3M 'Full Noise' roaring down the runway with owner Graeme Frew at the controls. Graham has twice shipped this aircraft over to the United States to compete in the Reno Air Races –as such, it is often affectionately referred to as the 'Yak in a box'!

ABOVE: Brett Emeny leading Peter Vause during an aerobatic pairs routine. Both pilots and their aircraft are based at New Plymouth and this was their first public display flying together, highlighting the performance and power of the North American T-28 Trojan

Getting Closer WINGS OVER WAIRARAPA

BOTTOM: **Mark O'Sullivan takes to the skies in his modified Yak-3U 'SteadFast' (nearest to the camera) during the lead up to the show. The event was held on February 26 to 28 and marked an impressive display flying debut for Mark. On his wing is newly-rated Spitfire pilot Bevan Dewes with instructor Frank Parker in the rear seat**

RIGHT: **John Luff puts his de Havilland Venom through its paces to the delight of many in attendance. This is a special display because the Venom is believed to be the last of its type flying anywhere in the world**

BELOW: **A lovely pair of Waco biplanes led by Marty Cantlon, flying his Taperwing, accompanied by seasoned display pilot Keith Skilling. Both aircraft are new builds, but two more Waco types (one original) are under construction in New Zealand, so we could soon see four in formation**

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Century Day

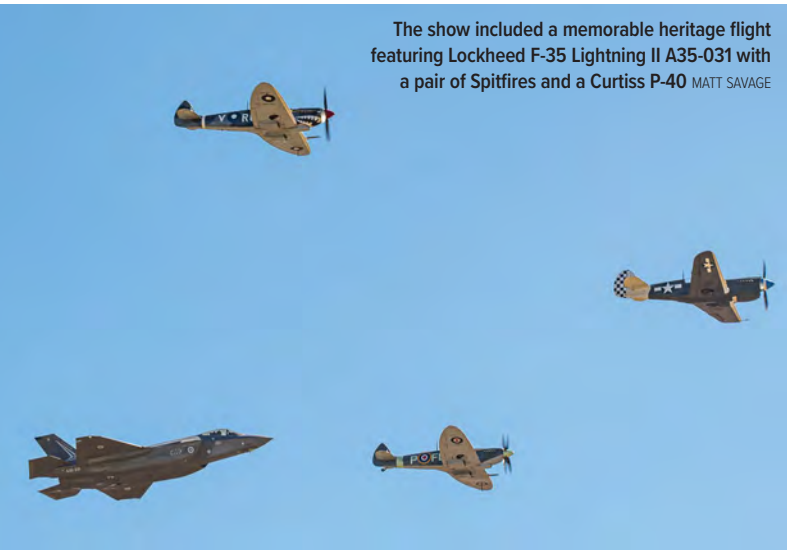
Australia's Temora Aviation Museum held its eagerly anticipated Centenary Showcase over the weekend of March 6-7. Phil Buckley provides words and images, with additional photography from Matt Savage

For an event boasting plenty of warbird participation, some 6,000 people were able to attend as the Australian state of New South Wales had finally lifted its COVID-19 restrictions. The focus was on the RAAF's 100th anniversary, with a total of 39 aircraft getting airborne in multiple displays.

Each morning began with the unmistakeable sound of TAM's English Electric Canberra TT.18 VH-ZSQ being fired up. The bomber, formerly designated WJ680, has been undergoing restoration for the last few years, but it was exciting to hear those Avon engines running again. It's hoped that the jet will return to the air later this year.

In the flying display, the Southern Knights impressed in their T-6 Harvards, and classic trainers performed, including examples of the Tiger Moth, Ryan PT-22, CAC Wirraway and Vultee BT-13 Valiant. Among the warbird formations were a pair of CAC Boomerangs flying with TAM's Lockheed Hudson VH-KOY, and a real highlight came in the form of three Spitfires airborne together. It is believed to be the first time that a trio of Spitfires has shared the sky in Australia since the 1940s.

The HARS Aviation Museum's Consolidated PBY-6A Catalina (A24-362) made an appearance, commemorating the long wartime missions flown by the RAAF's 'Black Cats' in southern Asia. A thrilling Vietnam-era segment was conducted using assorted O-1 Bird Dogs, TAM's 1968-built A-37B Dragonfly,



The show included a memorable heritage flight featuring Lockheed F-35 Lightning II A35-031 with a pair of Spitfires and a Curtiss P-40 MATT SAVAGE

Supermarine Spitfire Mk.XVI TE392 flies in the colours of Australian ace Sqn Ldr Tony Gaze MATT SAVAGE

An impressive array of warbirds on the flightline at Temora. Spitfire Mk.VIII A58-758 is nearest the camera PHIL BUCKLEY

A dramatic view of Lockheed Hudson A16-112 peeling away from a pair of CAC Boomerangs MATT SAVAGE

"It is believed to be the first time that a trio of Spitfires has shared the sky in Australia since the 1940s"

Ryan PT-22 VH-RSY was among a segment dedicated to classic trainers PHIL BUCKLEY

Cessna A-37B Dragonfly 68-10779 (VH-XVA) participating in a Vietnam-themed section PHIL BUCKLEY

and a Bell 47 helicopter flown by Brett Leech. HARS also contributed a former Royal Australian Navy UH-1B Huey and an ex-RAAF DHC-4 Caribou. The air force provided attractions both in the air and on the ground to help mark its centenary. This included an unforgettable 'heritage flight' comprising a Lockheed F-35 Lightning II in the company of a Curtiss P-40N and two TAM Spitfires.

This long-awaited event certainly showcased the immense diversity of warbirds 'down under' and served as a timely reminder that the freedom we enjoy today has not been won easily. **www.aviationmuseum.com.**

English Electric Canberra VH-ZSQ ran its engines on both days. It's painted to represent A84-234 as used by 2 Squadron RAAF in Vietnam MATT SAVAGE

Grumman TBM-3 Avenger VH-MML with its bomb bay doors open at Temora MATT SAVAGE

A pair of CAC Boomerangs – 'Miss Imogen' (left) and 'Suzy-Q' – on March 7 PHIL BUCKLEY

A trio of Spitfires displaying at Temora. Spitfire Mk.VIII A58-758 leads the formation, with Mk.XVI TB863 (bottom) and Mk.XVI TE392 MATT SAVAGE

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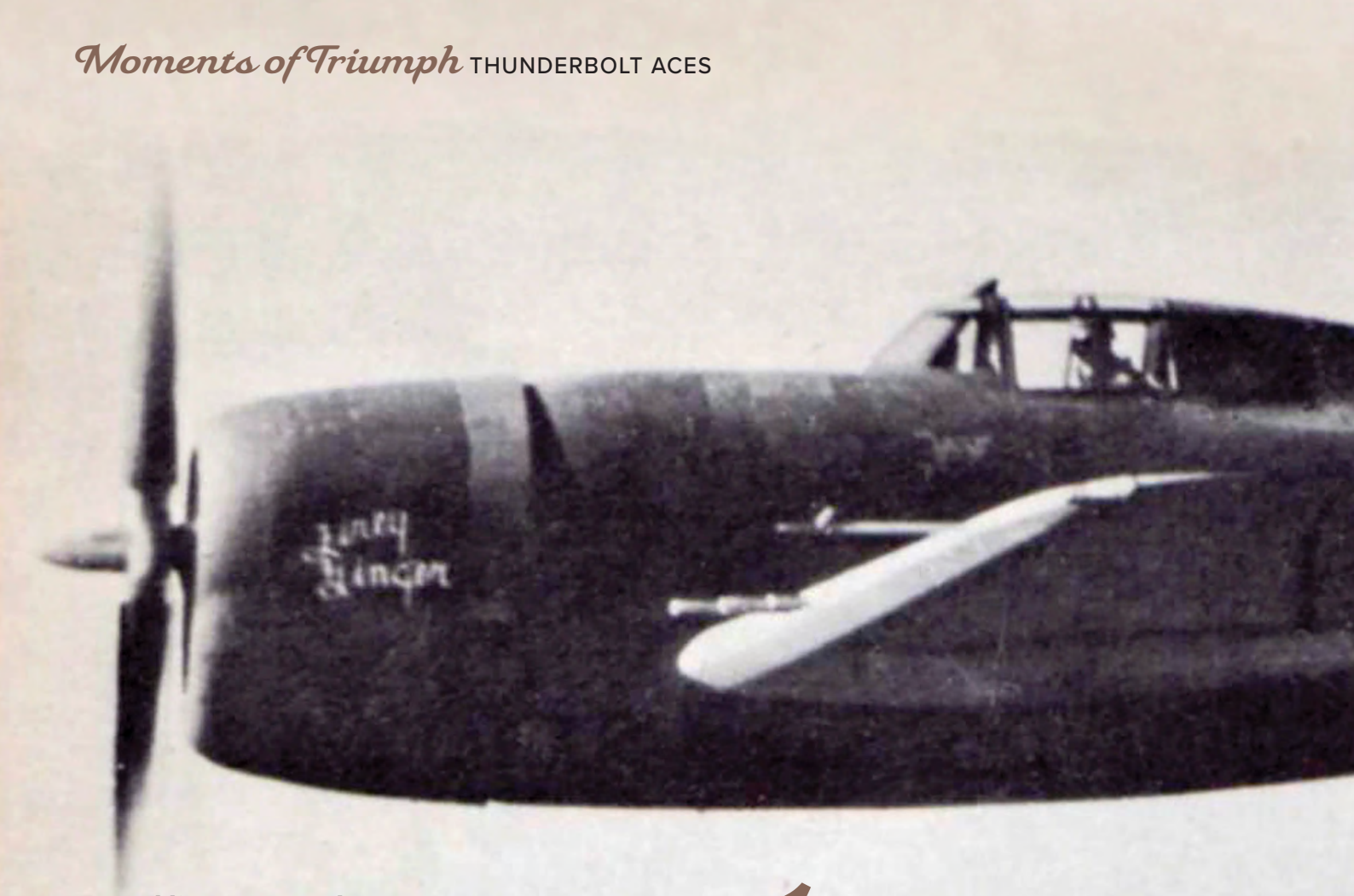


Republic's P-47 was the mount of many high-scoring US fighter pilots during World War Two. As we approach the 80th anniversary of the type's aerial debut, **Malcolm V Lowe** examines the careers of five particularly accomplished Thunderbolt exponents

'Jug' Masters

ABOVE: **Neel Kearby flew several 348th FG Thunderbolts bearing the name 'Fiery Ginger', his last being 'Fiery Ginger IV'. This one was an early 'razorback' version** ALL MALCOLM V LOWE COLLECTION UNLESS STATED

Powerful, fast, well-armed and generously proportioned, Republic's P-47 Thunderbolt appropriately earned the nickname 'Jug', short for juggernaut. By far the largest single-engined land-based American fighter of World War Two, the type achieved considerable success with the US Army Air Forces worldwide, with a significant number of pilots amassing impressive 'kill' tallies in air-to-air combat.

Not surprising then that the type equipped many of the USAAF fighter groups during the war, principally over northern and southern Europe, the Mediterranean and the Pacific. The majority of these converted to the North American P-51 Mustang later in the conflict. During its time in combat the Thunderbolt proved to be a rugged, hard-hitting warplane equally at home as a fighter at high and low levels, and as a 'mud mover' in air-ground operations.

It gradually came to the fore during 1943 as a growing number

BELOW, LEFT: **Visiting film star John Wayne chats with Neel Kearby (right) while seated in a P-47D. Many celebrities called on frontline units during the war, which was good for morale… and ensured excellent photo and publicity opportunities**

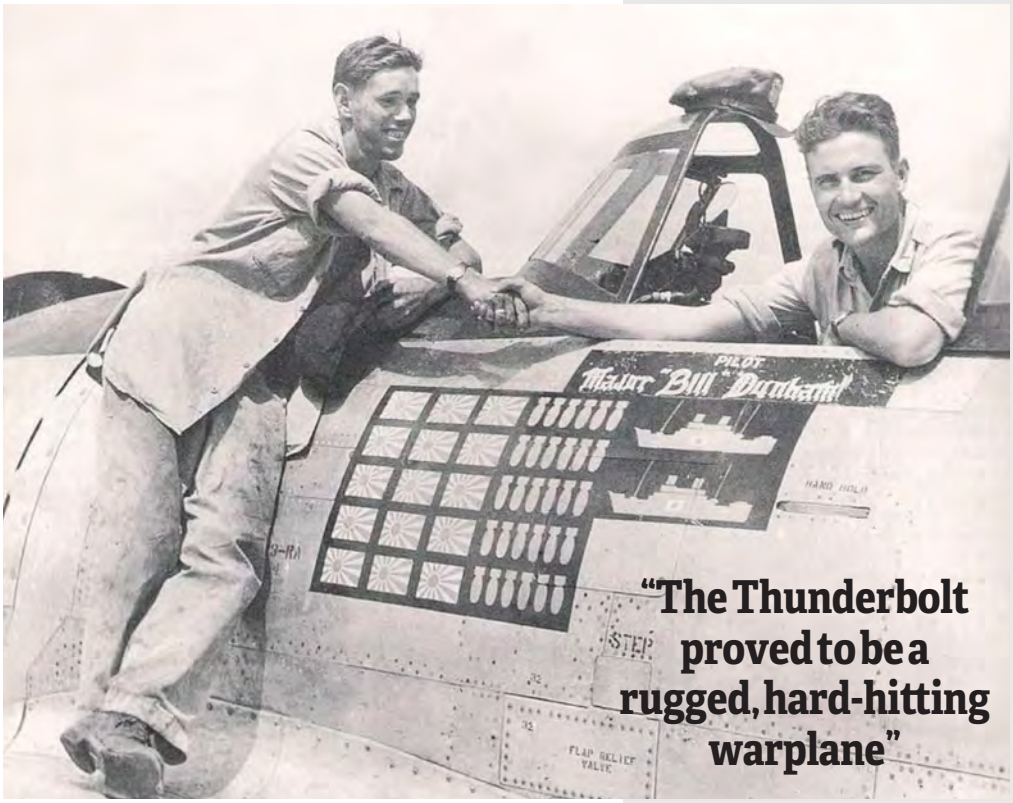
of USAAF fighter units took the P-47 to war across the globe, often in very different operating environments. With its impressive battery of eight .50 cal machine guns (four in each wing) the type proved to be a formidable opponent for any Axis aircraft it encountered. Pilots of the USAAF also employed P-47s for attacking enemy airfields and achieving 'strafing' victories, the latter being held in equally high regard by the US authorities.

Pacific prowess

One of the battlegrounds in which the P-47 was put to good use was the vast Pacific theatre of operations. In that challenging arena, which pushed men and machines to the limits in often primitive operating and maintenance conditions, a USAAF aviator gained much success. He was Neel Earnest Kearby – an already seasoned pilot and ranking officer when he entered combat with the Thunderbolt during 1943.

Born in June 1911 at Wichita Falls, Texas, Kearby began flight training during 1937, gaining his 'wings' and commission early

ABOVE: **Neel Kearby was the highest-scoring P-47 Thunderbolt pilot in the Fifth Air Force, being credited with 22 aerial victories before his death in combat during March 1944**



"The Thunderbolt proved to be a rugged, hard-hitting warplane"

ABOVE: **Seated in his colourful P-47D Thunderbolt 'Bonnie', the 348th FG's 'Bill' Dunham poses for a publicity photo. His aircraft bears its final tally of 15 'kills'**

RIGHT: **A fine portrait of Neel Kearby seated in a P-47D. During early 1944 he was able to compete with aerial victory totals from equally high-scoring P-38 Lightning aces in the Pacific**

the following year in the then US Army Air Corps (USAAC), duly serving mainly in the Panama Canal Zone. With the rank of major he became commander of the newly formed 348th Fighter Group (FG) which had been activated at the end of September 1942. This unit moved to New Guinea in May-June 1943 as a part of the US Fifth Air Force, with Japan as its opponent.

Kearby's first two aerial victories were scored on September 4, 1943, and he became a full colonel later that month. He gained his fifth credit, attaining ace status, on October 11 that year. In fact, on that day he achieved the then remarkable feat of shooting down *six* Japanese aircraft. This success resulted in him being awarded the Medal of Honor, America's highest military decoration. It also granted him considerable fame in the US, although subsequent assessments of Japanese losses for October 11, 1943 have cast some doubt on these claims.

He subsequently scored regularly against Japanese aerial opposition, even though he was transferred for a time to V Fighter Command headquarters. However, unlike many of the top-scoring US fighter pilots, he did not survive the war. Near Wewak on March 5, 1944, he achieved his 22nd aerial victory but was subsequently shot down while dogfighting with a Nakajima Ki-43 'Oscar' from the Imperial Japanese Army Air Force's 77th Sentai. It is speculated that he died from injuries having bailed out of his stricken Thunderbolt. Tragically, his remains were not identified until several years after the war.

Japanese opposition

Kearby's standards in combat were matched by other accomplished pilots, and eventually the high-scoring 348th FG came to include many other aces in its ranks. One that almost reached Kearby's impressive 22 victories against the Japanese was William Douglas 'Bill' Dunham.

Born in Tacoma, Washington State, during January 1920, Dunham performed his flight training in 1941, achieving his 'wings' in December and being commissioned in the USAAF (which had been created that summer). He was assigned to the 348th FG in November 1942 and moved to New Guinea with the unit the following year.

His first aerial victory came on October 11, 1943, and he continued scoring into the new year of 1944. On March 5 he participated in the same dogfight that claimed the life of Neel Kearby.

There was then a long gap before his next victories in late 1944, his 'kill' on December 14 being

RIGHT: **'Bill' Dunham flew at least three different P-47Ds with the 348th FG, this example being the last and most famous. There is speculation that it underwent several changes of colour, finally having a black rear fuselage spine and anti-glare panel ahead of the cockpit**

his 15th and last in a P-47. By that time, he had reached the rank of major, and was variously commanding officer of two of the group's component squadrons.

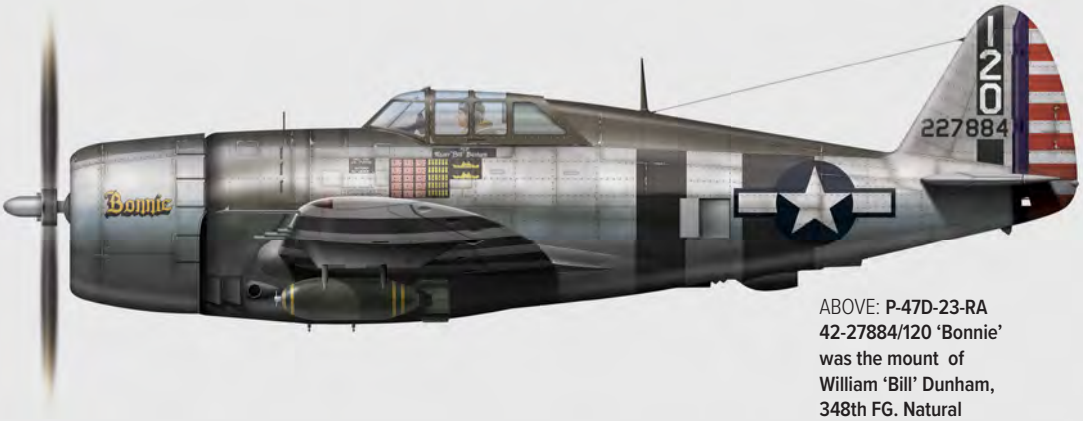
Dunham was assigned three different Thunderbolts during his time in combat, each being named *Bonnie*. Ironically, considering his obvious prowess in shooting down Japanese aircraft, Dunham returned to the US during early 1945 for gunnery classes.

Returning to the Philippines in May 1945, he rejoined the 348th FG. The unit had by that time transitioned to the North American P-51D/K Mustang.

Dunham named his shiny new Mustang *Mrs Bonnie* and achieved one further aerial victory during this second tour of duty, bringing his total score by the end of the war to 16. By this time he had become deputy commander of the 348th FG.

Post-war, Dunham remained in the USAAF, and transitioned to the US Air Force upon its formation in 1947. He subsequently held several ranking assignments as deputy commander/commander of various frontline fighter units, and for a time during the Vietnam War he was on the staff of the US Seventh Air Force headquarters at Tan Son Nhut Air Base.

Dunham retired from the USAF in February 1970 with the rank of brigadier general. This distinguished officer passed away in March 1990, aged 70.



ABOVE: **P-47D-23-RA 42-27884/120 'Bonnie' was the mount of William 'Bill' Dunham, 348th FG. Natural metal finish, with 15 aerial victories shown beside the cockpit, illustrating Dunham's final tally of air-to-air 'kills' in Thunderbolts. This was his last and most famous P-47D ALL PROFILES ANDY HAY-FLYING ART**

Mediterranean 'kills'

The air war over the Mediterranean and southern Europe often seems overlooked in comparison to the northern Europe and Pacific battlegrounds, but in that theatre the Thunderbolt also made a major contribution to the USAAF. The 325th FG was among the more accomplished fighter units that fought the Luftwaffe and other Axis air arms over North Africa, the Mediterranean and southern Europe. Writing during the 1960s about this unit's exploits, American historians Ernest McDowell and William Hess gave it the nickname 'Checkertail Clan' – owing to the distinctive yellow and black pattern that adorned the aircraft tailplanes.

During its time in combat the 325th FG achieved considerable local fame, although the unit does not appear to have received the post-war acclaim that it deserves. Nevertheless, one of its pilots did become a high-scoring air ace. His name was Herschel Harper Green, and one of his claims to fame was to have achieved air-to-air victories at the controls of all three types of combat aircraft that

"Ironically... Dunham returned to the US during early 1945 for gunnery classes"

ABOVE: **348th FG ace 'Bill' Dunham is seen here with the last of his three Thunderbolts named 'Bonnie'**

ABOVE: **Maj Herschel Green photographed in Italy with his P-47D 'White 11' of the 325th FG. This unit fought a long and hard war, starting in North Africa with P-40 Warhawks and continuing in Italy while flying Thunderbolts and then Mustangs** USAAF

ABOVE, RIGHT: **'Herky' Green was the second highest-scoring ace of the Fifteenth Air Force (behind John Voll – 21 'kills' – of the Mustang-operating 31st FG), with 18 aerial victories and apparently ten ground successes**

BELOW: **All fighters assigned to Glenn Duncan were named 'Dove of Peace'. This airframe, 'Dove of Peace VI' was P-47D-21-RE 42-25506/LH-X. It was belly-landed after a loss of power in April 1944 at Copdock, near Raydon airfield, while being flown by Lt Carl Mueller**

the group flew during its time in the front line.

The 325th FG deployed from the US to North Africa during January and February 1943. It was initially equipped with the Curtiss P-40 Warhawk, before transitioning to the Thunderbolt later that year. The unit moved to the Italian mainland in December 1943 and stayed at various Italian airfields until the end of the war in Europe, eventually converting to the P-51 Mustang. It was one of the component units of the US Fifteenth Air Force.

Born in July 1920 at Mayfield, Kentucky, Green gained his 'wings' during 1940 as a part of the civilian training scheme that existed in the US prior to that country's entry into World War Two. He was commissioned in the USAAF during April 1942 and, following assignment to the 325th FG, he moved with the unit to North Africa in early 1943. His first three aerial victories were achieved while flying P-40s, the first on May 19, 1943 in a P-40L during the Mediterranean air war. Piloting the P-47D from late 1943, Green opened his score card on the type in what turned out to be an exceptional day shooting down *six* enemy aircraft on January 30, 1944. He claimed four Junkers Ju 53/3m transports, a Macchi C.202 and a Dornier Do 217 all while flying a fellow pilot's Thunderbolt (his usual aircraft bore the fuselage number '11') .

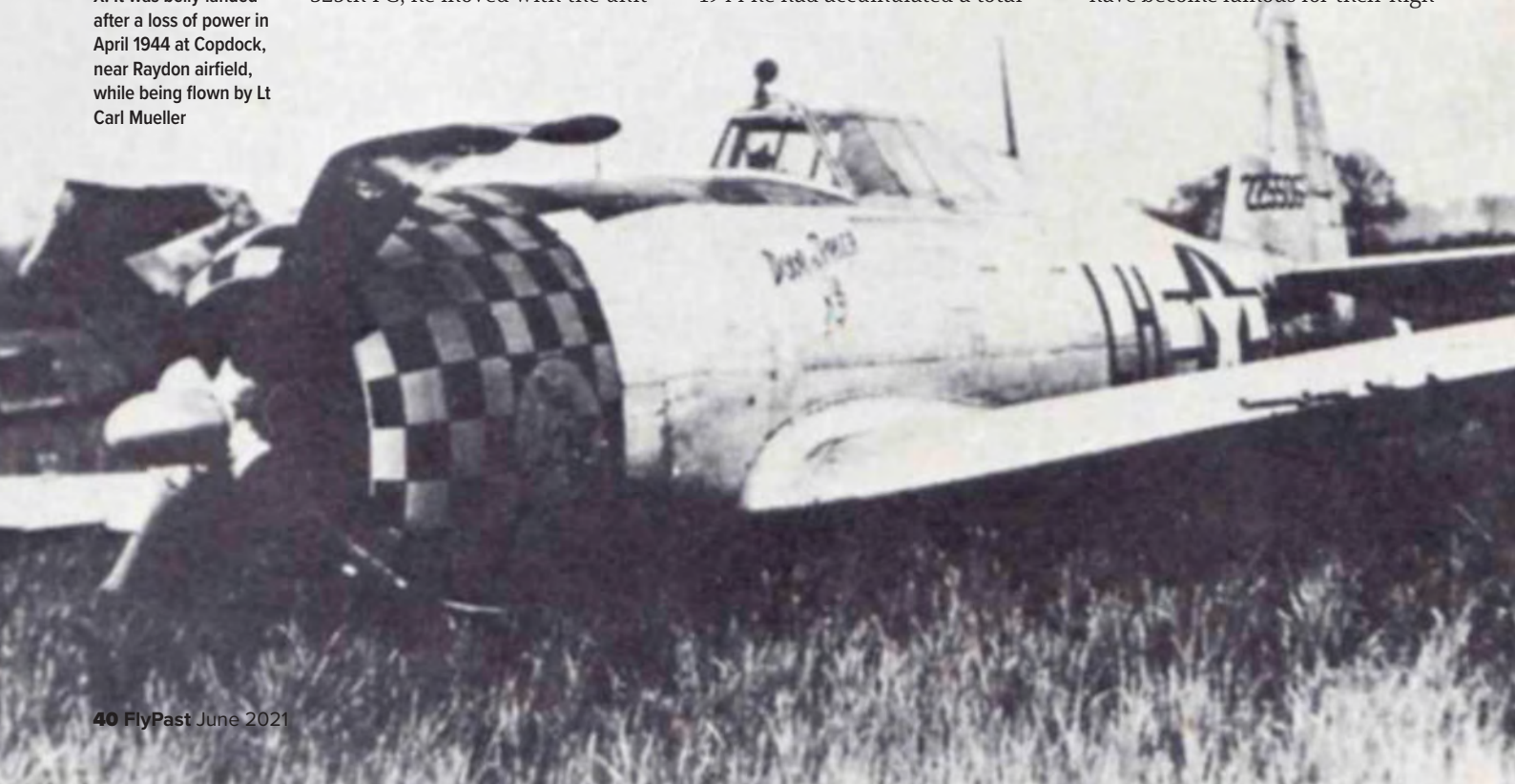
From March 1944 Maj 'Herky' Green commanded the 325th FG's 317th Fighter Squadron (FS). He is credited with ten Axis aircraft destroyed while flying the Thunderbolt. From mid-1944 he continued to score in the P-51 Mustang, the unit's new mount.

On completion of his tour later in 1944 he had accumulated a total of 18 aerial victories, making him the leading Fifteenth Air Force ace at that time. He also apparently destroyed ten enemy aircraft on the ground. Green was eventually overtaken by John Voll (21 aerial victories) of the Mustang-operating 31st FG.

Following World War Two, Green remained in the USAAF and its successor the USAF, eventually reaching the rank of colonel. He retired from the service during 1964, subsequently working for the Hughes Aircraft Company. He passed away at Torrance, California in August 2006. A decade earlier he had chronicled his career in *Herky! The Memoirs of a Checkertail Ace.*

European success

The fighter units of the US Eighth Air Force based in England during the later years of World War Two have become famous for their high-



altitude bomber escort missions. Massed formations of B-17 Flying Fortresses and B-24 Liberators proved vital in the USAAF's daylight strategic bombing of Axis industrial targets. Initially, many Eighth Air Force groups flew the P-47 before converting to the P-51, with the exception of the 56th FG.

The 353rd FG moved to Britain from the US during May-June 1943. The unit was initially stationed at RAF Goxhill, Lincolnshire and then at Metfield in Suffolk, before moving in April 1944 to the air base with which it is most closely associated, RAF Raydon, also in Suffolk.

During the summer of 1943, the 'D' version of the P-47 was reaching Eighth Air Force units in England. Considerable work was undertaken in the latter half of that year to give the Thunderbolt sufficient range, enabling it to provide fighter escort cover for the Eighth's heavy bombers on their far-flung missions across Germany and occupied Europe.

ABOVE: **P-47D 'White 11' was assigned to Herschel 'Herky' Green of the 317th FS, 325th FG, Italy, 1944. Green achieved ten aerial victories in various Thunderbolts, and 18 overall. Olive Drab (officially 'Dark Olive Drab')/Neutral Gray colour scheme with the 325th FG's distinctive yellow/black chequerboard tail markings**

With greater range and endurance available, the Thunderbolt grew into an excellent bomber escort, and a burgeoning number of P-47D pilots began taking a heavy toll on the defending Luftwaffe fighters. Among them was the 353rd FG's Glenn Duncan, who came into the world in Bering, Texas, in May 1918. Glenn Emile Duncan began his military flight training in 1940, being commissioned in the USAAC during October of that year. He was eventually assigned to the 353rd FG in England during March 1943.

Duncan chalked up his first confirmed aerial victory on September 23, 1943, a Focke-Wulf Fw 190 over Nantes in France. His fifth 'kill' – which bestowed 'acehood' upon him – was achieved on December 20 that year. By then he had become the 353rd FG's commander.

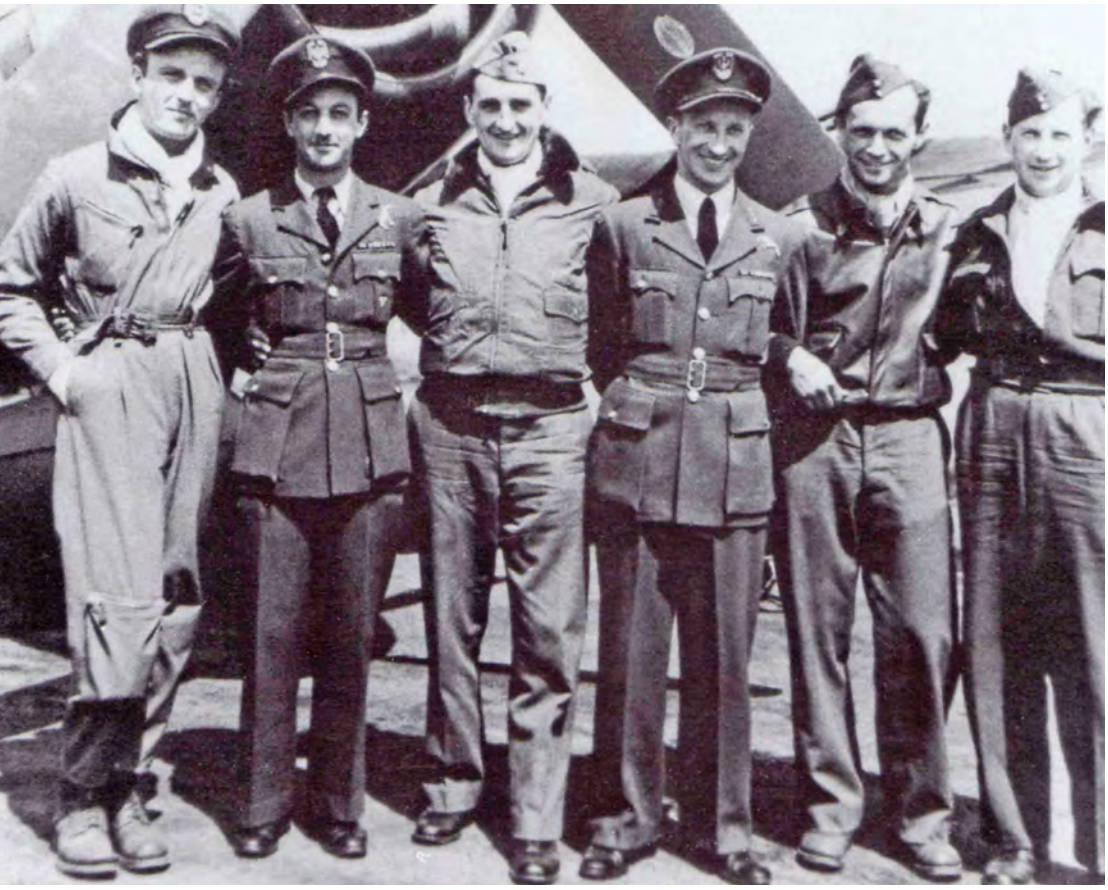
Thereafter Duncan made a steady stream of claims, becoming one of the Eighth's most successful Thunderbolt pilots. When the US fighters began to add attacks on Luftwaffe airfields to their list of assigned tasks, he also started to achieve ground 'kills'. But the strafing of heavily defended air bases was hazardous and, on July 7, 1944, Col Duncan was shot down while attacking Wesendorf airfield in Germany. He managed

"Duncan scored a steady stream of aerial victories, becoming one of the Eighth's most successful Thunderbolt pilots"

BELOW: **Although USAAF fighter pilots were usually assigned a particular aircraft, they did not always fly that specific machine. In this image Glenn Duncan converses with a groundcrew member while seated in a P-47 with a 'bubble' canopy. This version was never assigned to him personally**

FAR LEFT, TOP: **P-47D 'White 11' of 'Herky' Green featured artwork echoing that seen on at least one other 325th FG Thunderbolt, a 319th FS aircraft named 'Dallas Blonde'. The female figure was also painted on P-47D-4-RA 42-22762/UN-S 'Tinkle' of the 56th FG, among others**

FAR LEFT, BOTTOM: **Glenn Duncan was the highest-scoring ace of the 353rd FG, Eighth Air Force, with 19 1/2 aerial victories all achieved in Thunderbolts. The pace of air operations during 1944 was frantic and Duncan, in this formal portrait, looked much in need of rest USAAF**



ABOVE: **The 61st FS of the 56th FG featured a Polish contingent of accomplished pilots, including Polish nationals as well as US citizens with Polish ancestry. In this grouping, Gabreski is third from left, with the tall Bolesław Michal 'Mike' Gładych (18 aerial victories, ten in Thunderbolts) far left**

RIGHT: **'Gabby' Gabreski was the subject of much publicity due to his air combat successes, and was often photographed with an impressive scoreboard well to the fore. He flew a number of different Thunderbolts, culminating in the 'bubble' canopy version** USAAF

to evade capture and made his way to the Netherlands, where he was successfully hidden from the Germans. He also worked with Dutch resistance personnel, but was finally liberated by Allied forces during April 1945, and rejoined the 353rd FG at Raydon, which by then had taken delivery of Mustangs.

His score of 19 1/2 aerial victories in Thunderbolts was one of the highest in the Eighth Air Force, and he was also credited with just short of seven ground victories (including shared claims).

Post-war, Duncan remained in the USAAF and transitioned to the USAF on its formation, finally retiring from the service in February 1970. He died at the age of 80 in July 1998.

Poland's pride

One of the P-47's greatest wartime exponents was the 56th FG of the Eighth Air Force, based in England. The unit arrived in Britain from the US during January 1943, and – uniquely within the Eighth – throughout its time in combat it only flew the Thunderbolt. It eventually counted many aces among its ranks and famously vied with the Mustang-equipped 4th FG for the accolade of being the Eighth's top-scoring fighter outfit.

"Gabreski later flew combat during the Korean War, achieving 6 1/2 aerial victories in F-86 Sabres"

Following several initial base assignments, the group settled at RAF Halesworth, Suffolk, during July 1943, and was later. and more famously, stationed at RAF Boxted near Colchester, Essex, from April 1944. Among its top aces was one of its commanders, Col David Schilling (22 1/2 aerial victories), as well as Robert S Johnson (27), and Frederick Christensen (21 1/2).

Chief among them all, though, was the Eighth's top-scorer, Col Francis 'Gabby' Gabreski. His achievements came not just on Thunderbolts – he also earned the distinction of being the overall highest ranked USAAF ace in the European Theatre of Operations (ETO).

Gabreski was born to Polish immigrant parents in Oil City, Pennsylvania, on January 28, 1919. While at university in Notre Dame, Indiana, 'Gabby' took flying lessons but did not initially appear to be a good student. Nevertheless, he joined a pilot programme in the USAAC during 1940, eventually gaining his 'wings' and a commission in March 1941. Stationed on Hawaii later that year with the 45th Pursuit Squadron, Gabreski was involved in the attempt to counter the Japanese attack on Pearl Harbor.

Later sent to Britain for liaison with Polish RAF units, Gabreski flew several combat sorties with 315 (Dęblin) Squadron in Spitfire Mk.IX fighters. He was posted to the 61st FS of the 56th FG in February 1943, and took to flying the Thunderbolt. He achieved his first 'kill' on August 24, 1943.

Gabreski gained ace status on November 26, 1943 during a heavy bomber escort mission, and thereafter scored steadily, also being made the squadron commander of the 61st FS and reaching the rank of lieutenant colonel. Occasionally unpopular with some colleagues, he became involved in a growing rivalry of aerial 'scores' within the 56th FG, coupled with the 'race' to exceed the 26 'kills' achieved by US pilot Eddie Rickenbacker during World War One.

Highest scores

In the event, Robert S Johnson was the first to achieve the Rickenbacker yardstick over Europe. But the increase of Gabreski's score to 28 on July 5 during a dogfight over northern France made him the ETO's leading USAAF ace. It was a status he never lost.

On July 20, 1944 he was due to begin the voyage home at the end of his allotted USAAF combat hours – but could not resist taking part in one more bomber escort mission. Unfortunately, he was shot down while strafing a Luftwaffe airfield, and spent the rest of the conflict as a prisoner of war.

Remaining in the USAAF and then the USAF following World War Two, Gabreski later flew combat during the Korean War, achieving 6 1/2 aerial victories in F-86 Sabres. He thereby joined a select group of pilots who were aces in two separate wars.

He finally retired from the USAF during November 1967, and later held executive positions with the aerospace company Grumman. Some of his nine children became ranking USAF officers. Tragically, his wife died in a car accident in 1993 following the annual EAA air show at Oshkosh, Wisconsin.

Gabreski passed away on January 31, 2002 at the age of 83. He was afforded a funeral with full military honours, and his fame continues to this day with the Suffolk County Airport in Westhampton Beach, New York, being renamed the Francis S Gabreski Airport in 1991 in a lasting tribute. **FP**

• Author's Note: The aerial victory scores related in this article are the officially recognised achievements of USAAF fighter pilots as published by the Albert F Simpson Historical Research Center/Air University at Maxwell AFB, Alabama, and in writings based on official documents by Frank Olynyk of the American Fighter Aces Association.

ABOVE: **P-47D-25-RE 42-26418/HV-A of Francis 'Gabby' Gabreski, 61st FS, 56th FG, July 1944. It displays one of the many unique 'in the field' camouflage variations worn by 56th FG Thunderbolts, comprising dark green and dark grey patches on the upper surfaces, and apparently unpainted undersides**

BELOW: **A conversation between Gabreski and his crew chief, Ralph Safford. A total of 27 'kill' markings can be seen on the side of the former's Thunderbolt. This could be the aircraft 'Gabby' was flying when shot down on July 20, 1944**

A PT-17 Stearman, B-219, in flight from Ponca City while attached to 6 British Flying Training School sometime in 1941. Bill flew more than 60 hours in the type as part of his flying training ALL BILL WILLIAMS UNLESS STATED

Unpressurised cockpits, freezing temperatures, merciless monsoons, perilous altitudes and flights to the extremes of their machines' abilities were some of the issues faced daily by RAF photo reconnaissance unit (PRU) pilots in Burma.

Men like Bill Williams.

Born in the north London village of Hampstead in May 1921, Bill volunteered for aircrew as World War Two erupted and, in May 1941, reported to the Recruit Depot at RAF Cardington, Bedfordshire. After graduating from the Initial Training Wing at the Lincolnshire seaside town of Skegness, he was shipped to Canada for pilot training, sailing from Scotland's River Clyde in September.

On arrival at the Moncton transit camp, he was allocated to a group earmarked for training under a bilateral US-UK agreement to provide flying instruction to both RAF and Royal Navy aircrew. As a result, he was sent to Oklahoma's Ponca City in America to join 6 British Flying Training School. Although the CO and adjutant were RAF officers, the instructors, technicians and administrative staff were Americans.

With elementary training carried out in the Boeing PT-17 Stearman, Bill flew 66 hours in the sturdy type, before converting to the BT-13 Valiant. After 48 hours, he progressed to the AT-6 Texan for 56 hours of advanced instruction. During his training, Bill also 'flew' 23 hours of instrument flying exercises and blind approaches in the ground-based Link Trainer. Then graduating as a sergeant, Bill received his 'wings' on June 19, 1942 – 31 out of the entry's 50 students completed the course. After returning to the UK soon after, Bill was sent to 17 (Pilot) Advanced Flying Training Unit at Watton, Norfolk, where he flew more than 30 hours in the Miles Master, adjusting to European conditions, particularly the weather. One morning while waiting to fly, Bill sat in the crew room with five colleagues when an orderly appeared and announced six volunteers were needed for a

Eye in the Sky

Graham Pitchfork relates just some of the fascinating flying career of former photo-recce pilot Bill Williams, who will celebrate his 100th birthday in May

PRU. Looking at each other, no-one seemed to know exactly what that was. After being told that it flew blue Spitfires, they all volunteered.

Following decompression tests, the pilots headed to 3 School of General Reconnaissance at Squires Gate near Blackpool, Lancashire. With the unit in question part of Coastal Command, the fliers had to complete a complex course in navigation, which involved flying in the back of a Blackburn Botha – which didn't impress Bill, as a PR Spitfire pilot only had his knees for a map table.

At the beginning of January 1943, Bill arrived at 8 (Coastal) Operational Training Unit at Fraserburgh in northeast Scotland. It was there he was introduced to the PR Spitfire and the art of long-range navigation, photography and high altitude flying.

Having successfully completed his training, Bill was posted to Oxfordshire's RAF Benson, home of the RAF's photographic reconnaissance force, on March 1. Expecting to join a home-based PR unit, he was soon told he was in fact being posted to 680 Squadron, based close to the Egyptian capital of Cairo.

Indian improvisation

Tasked with delivering Spitfire PR.IV BR654 to the unit, he flew the aircraft to Portreath in Cornwall on April 15. Arriving at the airfield, he found it packed with both twin-

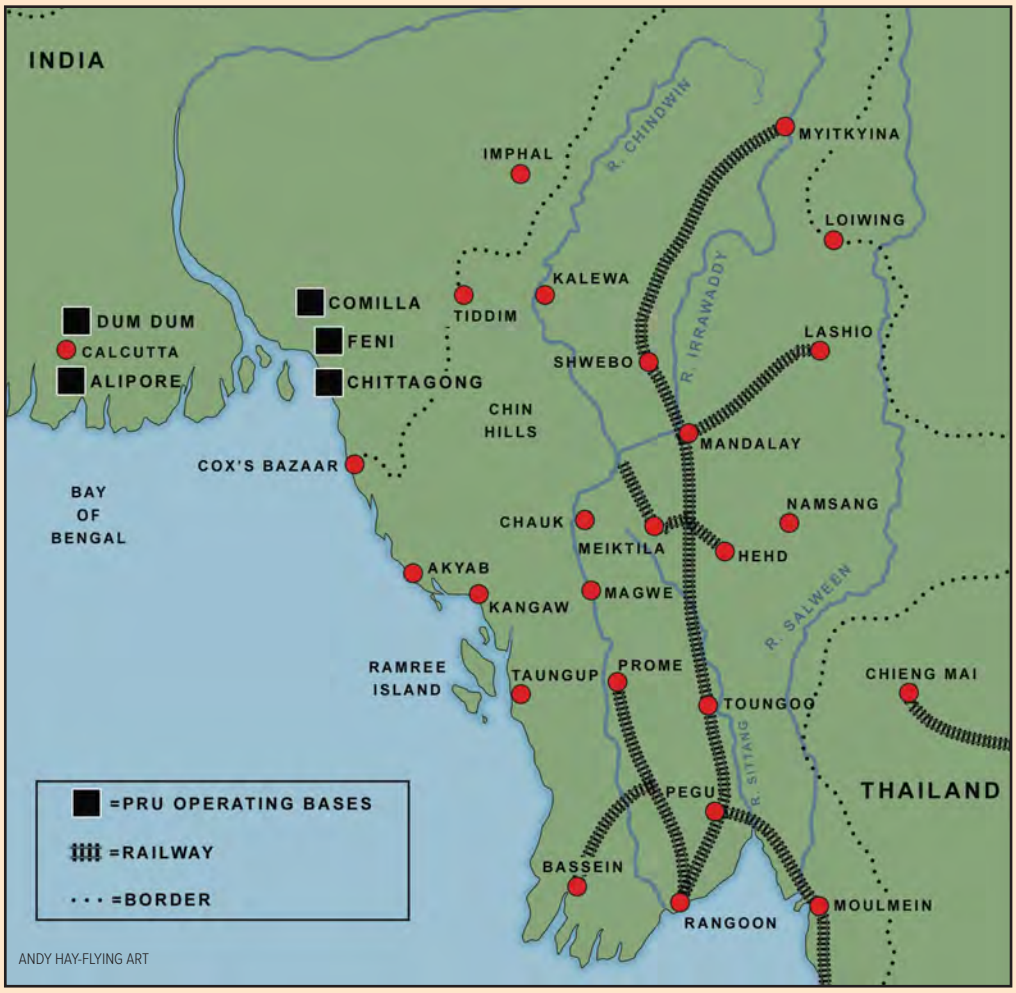
and four-engined aircraft waiting for good weather. One of just two single-engine-rated pilots there, Bill's plan was to climb to 30,000ft and head directly to Gibraltar across the Bay of Biscay and Spain. On April 18, he was ready to go, but forecasts indicated solid cloud over Spain, so he was delayed. Eventually, told the cloud had broken, Bill took off alone, pointed his nose out over the Bay of Biscay and on towards Spain, only to find it still 'socked in'. However, his reckoning was perfect and, after almost five hours, he spied the south of Spain through the cloud and made for Gibraltar.

The following morning, he was due to leave for an airfield near Oran in Algeria, although a shortage of maps meant he had to use a school atlas. With a blanket of solid cloud, Bill crossed the Mediterranean at 300ft. After a two-day stopover in Oran to repair the aircraft's battery, he headed to Egypt, landing at Castel Benito, 'Marble Arch' and El Adem in Libya before finally arriving in Cairo. His journey had taken ten days, with almost 20 hours in the air – quite a feat for someone with just 300 hours in his logbook. However, plans for Bill to join 680 Squadron had changed and he was left killing time in Egypt, before finally sailing for India on September 1. There he joined 681 Squadron at Dum Dum near Calcutta (now Kolkata).

At that time, the unit operated a mixed bag of four B-25 Mitchells, six Hurricanes and four Spitfire PR.IVs, although it wasn't long before the Mitchells were transferred to the newly formed 684 Squadron, while the Hurricanes were replaced by Spitfires. While the majority of those arriving were PR.IVs, far more capable PR.XIs were also beginning to appear. As a result of 684's formation on September 29, 1943, 171 Wing was rebranded a PR wing under the aegis of Wg Cdr S G Wise DFC that November.

RIGHT: **Bill Williams shortly after joining 8 (Coastal) Operational Training Unit at Fraserburgh in January 1943. Part of Coastal Command's 17 Group, the unit was responsible for training aircrew on a mix of types, including the Spitfire and Mosquito**

"His journey had taken ten days, with almost 20 hours in the air"



Into action

Settling into squadron life, Bill's first operational sortie with the unit – a recce over a possible landing zone ahead of the planned

airborne invasion of Burma – took place on October 4. This was followed by flights over Arakan and Toungoo, the latter along the main railway line running out of Rangoon. Completing a short familiarisation trip in a B-25 soon after, on October 12 Bill flew as co-pilot to photograph the coastal town of Taungup in western Burma, before heading east to conduct a reconnaissance over the village of Prome. Ten days later, he flew a second Mitchell sortie, this time to the docks at Bassein, before reconnoitring a Japanese airfield close to Prome.

In November, Bill was primarily tasked with photographing Burma's railway and road system, both of which were vital to Japan's forward resupply efforts. He also flew several sorties over the Irrawaddy River to monitor shipping traffic.

In January 1944, the RAF turned its PR efforts to surveying Burma in preparation for its reoccupation. Centred around two campaigns, plans called for the British/Indian XV Corps to move south into the Arakan, a long narrow strip of land along the country's east coast, while US forces led by Lt Gen Joseph Stilwell advanced to take the northern city of Myitkyin. However, the provision of accurate maps was crucial for success. In other operational theatres, the availability of good mapping was taken for granted, but that was far from the case in Burma. With the Mosquitos of 684 Squadron undertaking smaller-scale surveys, 681 concentrated on attaining larger-scale photography to provide intricate details of the immediate battle areas in northern Burma.

In February, 171 PR Wing (still under the command of Wise, by then a group captain) became 171 PR Force, with 684 and 681 squadrons being joined by the three units making up the USAAF's 8th PR Group.

Long range warrior

Continuing to operate from Dum Dum, the Spitfires flew as far south as Rangoon, east to the Chinese border and Bhutan in the north. To increase the aircraft's coverage, pilots would land at either Chittagong or Ramu in India's southeast to refuel, before heading to their designated target area. By landing again at these forward airfields on the return trip, it extended their range even further. Enemy airfields, railways and other lines of communication, including river traffic, were photographed during these flights, which were often more than four hours long. Anti-aircraft fire was a major threat over some targets, particularly Rangoon and the oilwells at Toungoo.

Throughout February, Bill photographed various airstrips

LEFT: **Spitfire PM512/N heads a line of 681 Squadron PR.XIXs at Singapore's RAF Seletar in 1945. The aircraft was struck off charge in March 1947**

ABOVE **A 681 Squadron Spitfire PR.XI undergoes servicing at a forward airfield in Burma circa 1944** ROSSOR FAMILY

MIDDLE: **An official RAF portrait of Bill Williams, then a warrant officer, at the end of the war**

across Burma's Central Plain, including the large complex at Meiktila. He also flew a recce over an airfield near Myitkyina, which threatened the northeast Indian cities of Imphal and Kohima.

With the Spitfires often flying to the extreme limits of their range, Bill and his fellow pilots feared engine failure and the violence of the frequent monsoons far more than enemy fighters.

There were no navigation aids either, apart from the aircraft's radio. This meant pilots had to fly compass courses over the jungle-clad Chin Hills while attempting to identify various pinpoints around the Chindwin and Irrawaddy Rivers. All of this was done while constantly monitoring the aeroplane, the weather and map reading. If there was cloud on the return leg, the pilots allowed more time to clear the high ground, before hoping to pick up a visual fix to descend afterwards.

During April, Bill was photographing the enemy's communication lines, including the road from Tamu to Imphal, which was being used by the Japanese to resupply their forces advancing on Imphal and Kohima. On April 7, 1944, Bill made two runs at 21,000ft to photograph the enemy airfields around Rangoon.

The biggest fear

The following month, 171 PR Force relocated to Alipore, southeast of Calcutta, but continued to stage through forward airfields, including Feni, Comilla, Chittagong and Ramu. With the monsoon beginning in early May, photo opportunities were severely curtailed, as there were countless days when flying was impossible.

Bill's flight on May 21 is a good example of the problems faced by recce Spitfire pilots while flying alone. Taking off from Alipore at 0630hrs, he landed at Chittagong to refuel approximately an hour later. Although his aircraft's radio transmitter had failed and could not be repaired, he took off and headed for his target at Myotna in central Burma. Flying over almost total cloud cover, his engine began to misfire eight minutes from his objective. Checking the magnetos, he discovered the port unit had failed. As he did this, the engine cut out. Abandoning the sortie, Bill coaxed the engine back to life and turned for home, reaching Chittagong two hours later.

Poor weather interfered on June 1. Arriving at Ramu from Alipore at 0800hrs in heavy rain, Bill was advised to get airborne as soon as possible because the base was expecting the runway to flood. Taking off, he set a course for Toungoo and flew through cloud for an hour, before making the decision to abandon the trip. However, as he started to descend through the clag, Bill spotted a gap at 10,000ft and made two runs over the coast in the hope of getting something from the sortie.

In due course, the Japanese offensive into Assam through Imphal failed because of the Allies' near-constant air strikes on their supply routes, all of which were identified by 681's Spitfires.

Dogged determination

With a severe monsoon hitting the region in July and August that year, the squadron was seldom able to fly. The worst was over by September, but conditions were often still difficult for the Spitfire pilots, especially flying alone and so far from their home airfields.

On September 26, Bill, who had been promoted to warrant officer, was tasked to fly a recce over the strategically important Tiddim Road, which stretched north from

BELOW: **Supermarine Spitfire PR.XI PL863/B 'Vewwy Funny' prepares to taxi at Dum Dum sometime in 1941. Note the member of groundcrew sitting on the tail to provide ballast in an attempt to reduce the possibility of the aircraft 'ground looping' while manoeuvring over uneven terrain**

"In January 1944, the RAF turned its PR efforts to surveying Burma in preparation for its reoccupation"

Tiddim to Imphal. Leaving Alipore for Comilla, where he refuelled, he then headed towards the objective. However, at the eastern end of the Chin Hills, he found a line of threatening cumulonimbus clouds covering the Chindwin river and Kabaw valley. Flying up and down from south of Imphal to east of Chittagong searching for any kind of gap, he spotted one at the northern end of the Kabaw valley and took photographs of the area. With no more breaks to be found, he returned to Comilla, where he waited see if there was an improvement to try again.

Defenceless, exposed, and vulnerable

The unarmed Spitfire PR.XI was fitted with the improved Merlin 61-series engine and modified to carry an additional 66 imp gal of fuel. Capable of carrying two vertically mounted, 14in lens F.24 cameras in the fuselage behind the cockpit, a port-facing oblique F.24 with an 8in lens could be mounted above them for low-level photography. When the aircraft was flown at low level in the tactical reconnaissance role, two F.8 cameras with a 5in lens were installed vertically in a fairing under each wing. Later, F.52 cameras with 36in focal length lenses replaced the F.24s.

The PR.XI was capable of exceeding 400mph at 24,000ft and could cruise at 395mph at 32,000ft. In an emergency, it could climb much higher, but in a non-pressurised cockpit with no heading, pilots could only withstand this for a very short period.

ABOVE: **Incredibly detailed recce image of the huge Japanese airfield at Meiktila in central Burma captured by one of the Spitfires of 681 Squadron**
GRAHAM PITCHFORK

However, on seeing the met officer's predictions, he returned to Alipore. Like all PR pilots, Bill was incredibly conscious of the urgent need to get photographs for the intelligence staff to advise on further operations.

By early October, Gen Slim's force was ready to begin its advance south. Initially pushing the Japanese towards the Chindwin river and into the Schwebo Plain, Slim prepared for a move towards

RIGHT ABOVE: **A 681 Squadron Spitfire PR.XI carrying the identifier 'A' in flight somewhere over Burma**

RIGHT: **Bill poses with Spitfire PR.XIX PM631 of the RAF Battle of Britain Memorial Flight at Coningsby, Lincolnshire in 2010 at the sprightly age of 89**

the Irrawaddy. Subsequently, the squadron primarily flew in support of this major, and eventually successful, action.

On November 24, Bill was tasked with a sortie south to reconnoitre the railway and road systems being used by the Japanese around Mandalay. Six days later, he was over the docks at Rangoon as part of an attempt to identify Japanese reinforcements arriving by sea. On the return leg, Bill photographed the railway running north from Rangoon to Prome.

Flying from Cox's Bazar (in the south of what is now Bangladesh) on December 4, Bill was tasked with a recce over the oilfields at Chauk and Yenangyaung. Two days later, he took off in Spitfire FL838 and headed for Taungup and Prome – it was his 44th and final operational sortie.

Heading home

The air commander in India described the development of the photographic reconnaissance organisation as "a notable feature of the period" and went on to say: "No 681 Squadron operated magnificently during the whole of the monsoon period of 1943 and 1944." This was reinforced by noted air historians Denis Richards and Hilary St George Saunders, who wrote in their three-volume *Royal Air Force 1939-1945*: "The hazards of flying in the monsoon were the worst that had so far been encountered by man in his conquest of the air, and of them all, the greatest was that created by the cumulonimbus cloud, which towered to over 30,000ft."

Bill agreed: "The worst problem was the weather – especially during monsoon season. Crossing the Chin Hills to get into Burma was no problem in the early morning, but coming back anytime from midday onwards could be distinctly dodgy. By that time, a barrier of cumulonimbus would normally have built up to 40,000ft or more – to try to get through them was asking to have your wings torn off. This happened to several people. Even going down to 500ft over the Ganges Delta was asking for trouble."

Shortly after his final sortie, Bill was posted to British Air Forces South East Asia Communications Flight at Delhi to fly VIPs and officers around northern India.

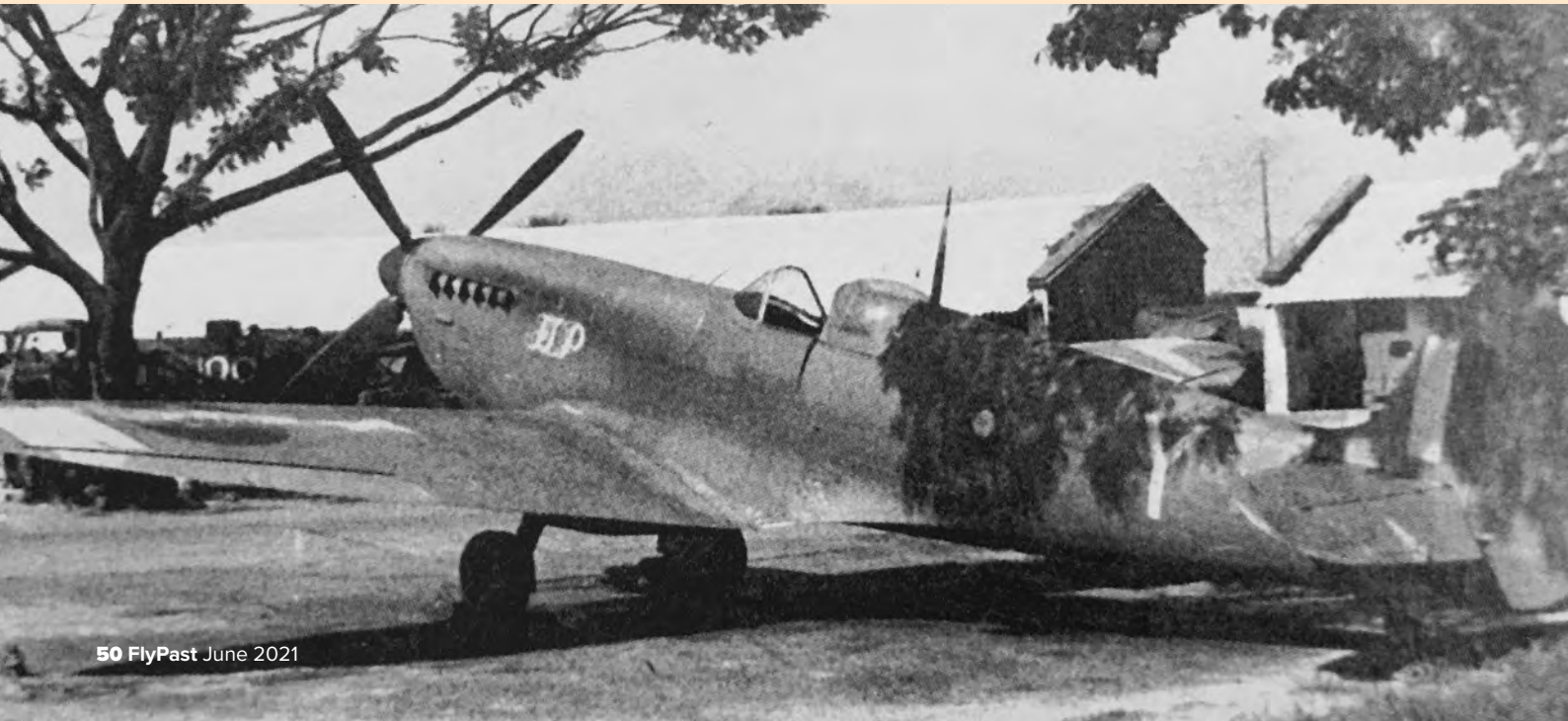
Bill returned to 681 Squadron, then based in Rangoon with Griffon-powered Spitfire PR.XIXs, in late 1945. By then the war was over. Soon after Bill's arrival, the squadron moved to Kuala Lumpur and plans were made for it to relocate to Hong Kong. However, political difficulties and the loss of several aircraft in ground accidents resulted in preparations being cancelled. Subsequently, the squadron moved to Seletar in Singapore – however, Bill's ability to double-declutch led him having to drive a Bedford 3-ton truck there instead of flying.

In early 1946, Bill was demobbed having amassed just over 1,000 hours flying time, much of it in the most hostile of skies. Happy 100th Birthday, Bill. We salute you. **FP**

• Thanks to Robert Glover and the Williams family for their help in preparing this article.

"Checking the magnetos, he found the port unit had failed. As he did, the engine cut out"

BELOW: **Seen here between sorties in early 1945, PR.IX MB776/Y 'FDP' was assigned to 681 Squadron's CO, Wg Cdr F D Proctor DFC**



BATTLE OF BRITAIN

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For further details on Aero Legends visit **www.aerolegends.co.uk**

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- Be able to recall emergency actions required in the event of the requirement to abandon the aircraft or to prepare for a forced landing.
- A good understanding of the safety equipment provided and its operation and use .
- An appropriate approach to the passenger experience, exhibiting maturity, stability of character and attitude consistent with the intended activity.
- Conversational English to an acceptable level for the intended activity.

Chipmunk T.10 WD331/W of RAF Birmingham UAS, Shawbury, in flight on September 19, 1971
ADRIAN M BALCH

Ask any British military pilot of a certain age in which aircraft they gained their 'wings' and a great many will answer "the Chipmunk". With 1,283 built and many still flying today, it was the first indigenous aircraft design to be produced by de Havilland Canada, hence its designation DHC-1. The prototype, CF-DIO-X, first flew on May 22, 1946 from Downsview, Toronto, piloted by Pat Fillingham, a test pilot seconded from the parent de Havilland company.

As a tandem, two-seat, single-engined primary trainer, it was developed shortly after World War Two and had prolific sales throughout the immediate post-war years, being typically employed as a replacement for the de Havilland Tiger Moth.

The design team was led by Wsiewołod Jakimiuk, a Polish pre-war engineer, originally chief engineer at Warsaw's National Aircraft Factory, who joined DHC in the summer of 1940.

The Chipmunk's fuselage was of an all-metal, stressed skin construction, as were the fin and tailplane. Two prototypes were built at Downsview, the main features including an enclosed cockpit with rear-sliding canopy, as well as various aerodynamic features assisting the aircraft's flight performance. Like the Tiger Moth, strakes were fitted to the rear fuselage to deter spin conditions. During trials, CF-DJS was lost in a spinning accident and CF-DIO was sent to the UK as a pattern aircraft.

This left CF-DJS (construction number – c/n – Canadian 6) to undertake much of the experimental flying, including trials on skis.

During the late 1940s-50s, the Chipmunk was procured in large numbers by air arms such as the Royal Canadian Air Force (RCAF), RAF and several other nation's air forces, where it was often utilised as their standard primary trainer.

Post-war production

It was the first post-war type to be produced by de Havilland Canada, which undertook its construction at the Downsview factory where it produced a total of 217 Chipmunks, the final example being completed during 1956. In addition, 1,000 Chipmunks were produced under licence in the UK by de Havilland; manufacturing was initially performed at the company's Hatfield, Hertfordshire facility.

British production of Chipmunks with the sectioned canopy started in late 1949, but by mid-December just 17 had been completed at Hatfield. Initial deliveries to Oxford and Cambridge University Air Squadrons began in the early spring of 1950.

It was later decided to transfer production to another of its plants, at Hawarden, near Chester.

Primary Perfection

Adrian M Balch outlines the history of the legendary DHC Chipmunk trainer in this, its 75th anniversary year

By the end of August 1950, production of the T.10 for the RAF had reached almost 150 aircraft.

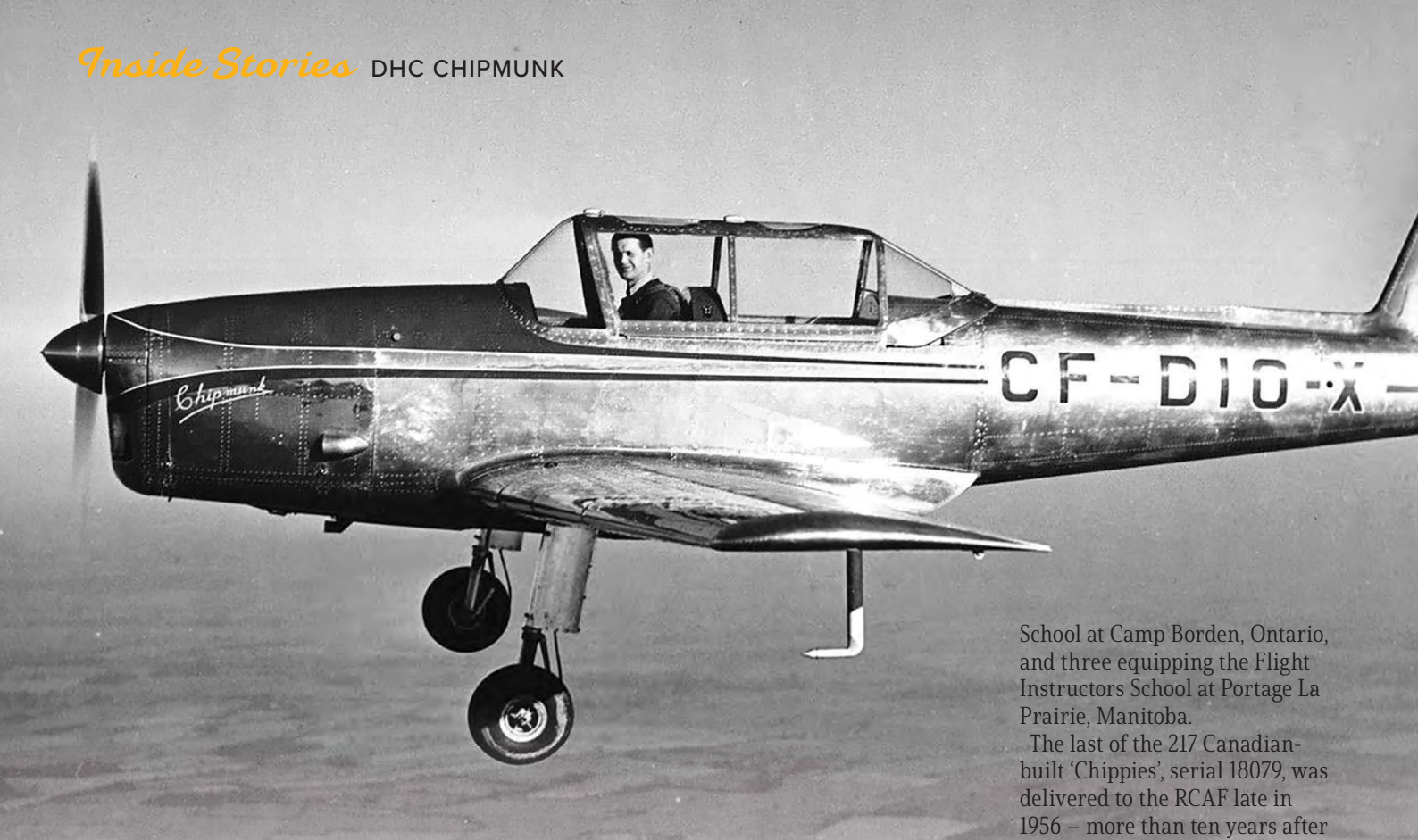
A further 66 Chipmunks were licence-manufactured by Oficinas Gerais de Material Aeronáutico, at Alverca in Portugal, between 1955 and 1961 for the Portuguese Air Force.

Canadian variants

Both British-built and early Canadian-constructed Chipmunks are notably different from the later RCAF/Lebanese versions of Canadian manufacture. Later 'Canuck-built' aircraft were fitted with a bubble canopy, which replaced the multi-panelled sliding unit used on early Canadian-produced Chipmunks, along with all of the Portuguese and British-built machines. The bubble canopy was used to make the DHC-1B-S3 familiar to North American student pilots, who would eventually move to the Canadair Sabre.

On the early-built canopy, the rear-most panels were intentionally bulged to provide the instructor's position with superior visibility. British-built Chipmunks also differed by several adjustments to suit RAF requirements. These included repositioned undercarriage legs, the adoption of a variable-pitch propeller, anti-spin strakes, landing lights and an all-round stressed airframe.

The reason why the British Chipmunk T.10 was not built to the same specification as its Canadian counterpart was also because those constructed in the UK (and



ABOVE: **The Chipmunk prototype CF-DIO-X DHC**

Portugal) were a 're-design' of the initial Canadian concept, to meet British requirements. Converting the DHC-1 into the T.10 for the RAF also meant dovetailing with ministry of defence (MOD) procurement policy – and de Havilland UK at Hatfield had to re-draw the blueprint using imperial (British) hardware and home-manufactured components – the new aircraft had to meet RAF/MOD standards.

The first three Chipmunks supplied to the RCAF had been designated 'Chipmunk 1'. Following the post-war system adopted at Hatfield, the next model became the T.10, with UK export examples being T.20s with electric starters. This accounts for why the subsequent DHC-1Bs for the RCAF were known as T.30s.

Two aircraft, G-AJVD (c/n Canadian 10) and G-AKDN (c/n 11) were sent to England as development examples for the RAF order. Extensive modifications occurred, including a change from the Gipsy Major 8 engine, altering the angle of the undercarriage legs, a redesigned instrument panel and coaming, and the fitting of electrical and vacuum systems.

The Downsview plant was not only fully occupied with its home order, but a request for 35 then came from India's director general of civil aviation to train pilots.

"...strakes were fitted to the rear fuselage to deter spin conditions"

The Canadian Chipmunk's main role was as a military primary trainer, just five being initially sold to civil owners in Canada. Students could start on the Chipmunk, advance to the Harvard and finally convert to the jet-powered T-33.

The RCAF took delivery of its first Chipmunks on April 1, 1948: three DHC-1A-1s (known as Mk.1s) with framed canopies, serialled 18001-18003, to be operated for elementary pilot training by 444 Squadron at the Canadian Joint Air Training Centre, Canadian Forces Base (CFB) Rivers, Manitoba, as well as for schooling pilots in ranging and directing artillery fire. Airframe 18001 was eventually purchased by world aerobatic champion Art Scholl and was converted to a 'Super Chipmunk'. It now hangs in the National Air and Space Museum at Washington DC.

In Canada, deliveries began in 1952, the majority going to the RCAF Primary Flying Training School at Camp Borden, Ontario, and three equipping the Flight Instructors School at Portage La Prairie, Manitoba.

The last of the 217 Canadian-built 'Chippies', serial 18079, was delivered to the RCAF late in 1956 – more than ten years after the first flight of the prototype – and continued to operate with the Canadian military until the end of 1971. The last example was retired from service by the Canadian Armed Forces during 1972. This was three years after the controversial unification of the country's military branches. The remaining aircraft were transferred to the flight training school at Portage La Prairie in March 1970 for a shortlived transition to the Beech Musketeer, ending more than 23 years of reliable Canadian military service

'Chippies' in Blighty

The RAF soon placed its order for Chipmunks. Accordingly, three airframes were transported to the UK, where they were evaluated by the Aeroplane and Armament Experimental Establishment at Boscombe Down, Wiltshire. Once evaluated, the British Air Ministry published specification T.8/48 for the Chipmunk to replace the Tiger Moth.

As such, the fully aerobatic Chipmunk served as an ab initio trainer for new pilots. The RAF received 735 Chipmunks, designated in British service as the T.10. These aircraft were manufactured in the UK by de Havilland at Hatfield and Chester, the parent company of de Havilland Canada.

Chipmunk overseas operators

The type served extensively around the world with the air forces of Belgium, Burma, Ceylon/Sri Lanka, Colombia, Denmark, Egypt, Ireland, Ghana, India, Iraq, Israel, Jordan, Kenya, Lebanon, Malaysia, Portugal, Saudi Arabia, Syria, Thailand, Uruguay, Zambia and Rhodesia/ Zimbabwe.

The Chipmunk T.10 initially operated with Reserve Flying Squadrons (RFS) of the RAF Volunteer Reserve, as well as University Air Squadrons (UAS). In January 1953, it was announced that seven of the 20 RFSs were to close and, by the end of 1954, all Chipmunk flying by the reserves ceased, with the aircraft mainly going into storage. However, those allocated to UASs continued and, in 1958, Air Experience Flights (AEF) were formed to provide flying for Air Training Corps (ATC) cadets.

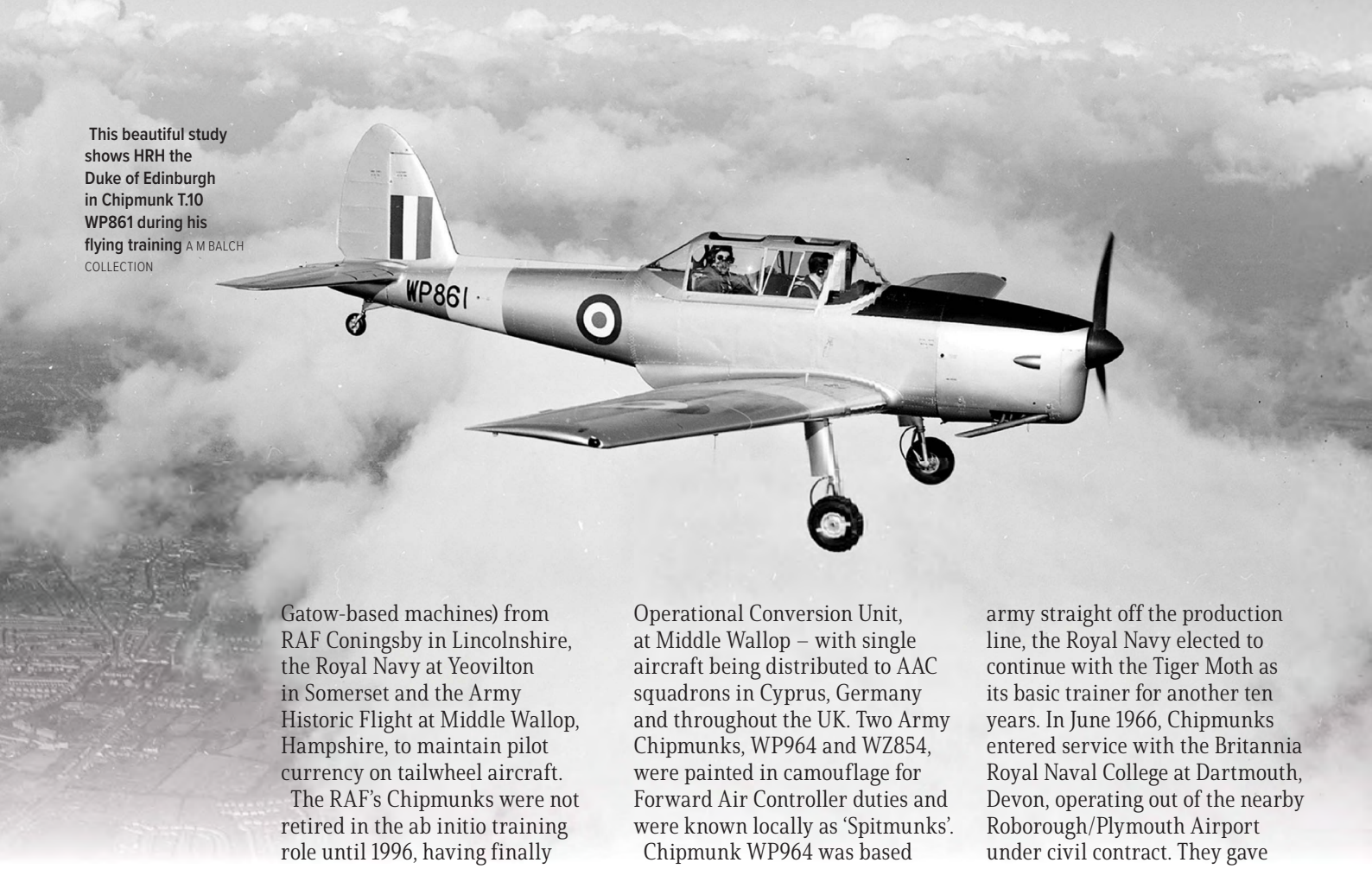
Two Chipmunks were also operated from RAF Gatow, Germany, on intelligence gathering missions patrolling the Berlin Corridor during the Cold War years, flown under the codename Operation Brixmis.

Chipmunks remained in service with the ATC until 1996, the last flight to use the type being 10 AEF at RAF Woodvale. They were replaced by Scottish Aviation Bulldogs. Chipmunks in military service are still operated by the RAF Battle of Britain Memorial Flight (including one of the

ABOVE: **A busy de Havilland Chester production line in 1950** VIA ROD BROWN

LEFT: **Airframes in varying states of completion on the Canadian production line** VIA ROD BROWN

LEFT: **Test pilot Pat Fillingham flying G-AKDN, the first UK-built Chipmunk** DH VIA PHILIP BIRTLES



This beautiful study shows HRH the Duke of Edinburgh in Chipmunk T.10 WP861 during his flying training A M BALCH COLLECTION

Gatow-based machines) from RAF Coningsby in Lincolnshire, the Royal Navy at Yeovilton in Somerset and the Army Historic Flight at Middle Wallop, Hampshire, to maintain pilot currency on tailwheel aircraft.

The RAF's Chipmunks were not retired in the ab initio training role until 1996, having finally been replaced by the Bulldog. The last RAF training unit to operate the Chipmunk was 1 Elementary Flying Training School at Newton, Nottinghamshire.

In line with the RAF Chipmunks, in 1953 the Army Air Corps (AAC) accepted the first of 21 examples. The bulk went to the Light Aircraft School, more correctly titled 227 Operational Conversion Unit, at Middle Wallop – with single aircraft being distributed to AAC squadrons in Cyprus, Germany and throughout the UK. Two Army Chipmunks, WP964 and WZ854, were painted in camouflage for Forward Air Controller duties and were known locally as 'Spitmunks'.

Chipmunk WP964 was based at Middle Wallop, while WZ854 flew with 1912 Flight from RAF Wildenrath in Germany, transporting senior officers until written off in a taxiing accident. Airframe WP964 still flies today in these colours but in civilian hands, registered G-HDAE.

Although Chipmunks had entered service with the RAF and army straight off the production line, the Royal Navy elected to continue with the Tiger Moth as its basic trainer for another ten years. In June 1966, Chipmunks entered service with the Britannia Royal Naval College at Dartmouth, Devon, operating out of the nearby Roborough/Plymouth Airport under civil contract. They gave good service training RN pilots until retirement from service in 1993, with single examples allocated to glider-towing duties at Yeovilton, Culdrose in Cornwall and Lee-on-Solent, Hampshire, and as station 'hacks'.

Chipmunk WK608 was later transferred to the Royal Naval Historic Flight at Yeovilton in July

RIGHT: **Two Chipmunk T.10s of Cambridge UAS, WZ868 nearest, over Wroughton on June 29, 1986** ADRIAN M BALCH

1993, thus becoming the last flying example of the type in RN service.

On November 12, 1952, HRH Prince Philip, the Duke of Edinburgh undertook his first flying lesson with London UAS at White Waltham, in Chipmunk T.10 WP861, followed by WP903, which was also used by the Duke of Kent and Prince Michael for training. Finally, Prince Philip soloed in WP912; WP861 remained with London UAS and was displayed at the RAF's 50th anniversary exhibition at RAF Abingdon, Oxfordshire, in June 1968.

Princely performance

That year, Chipmunk WP903 was taken out of store at RAF Shawbury, Shropshire, to assess HRH Prince Charles' aptitude for flying. For conspicuity purposes, the aircraft was repainted in overall gloss Signal Red and an occulting red beacon was fitted to the top of the front canopy frame. The first flights were from RAF Tangmere, West Sussex, on July 30, 1968 with Sqn Ldr Philip Pinney, a Central Flying School instructor from Little Rissington, Gloucestershire. These proved Prince Charles had the potential to follow his father. Flying lessons began, culminating on January 4, 1969, when the instructor climbed out after a flight and said to his pupil "you're on your own" and the Prince of Wales made his first solo at Bassingbourn, Cambridgeshire. Chipmunk WP903 was then returned to Shawbury and put into storage for four years in the care of 27 Maintenance Unit. It was finally offered for sale in March 1974 and purchased by Culdrose Gliding Club on realising that it had been aptly registered G-BCGC. Today it still flies in another private owner's hands, still proudly in its red hue.

HRH Prince Andrew also learnt to fly in a Royal Navy Chipmunk while with Britannia Royal Naval College at Dartmouth, flying from

ABOVE: **Chipmunk T.10 WP901/B of 6 Air Experience Flight out of RAF Abingdon, circa 1991. Note the unit's white horse badge** DARREN HARBAR

"...the instructor climbed out...and said to his pupil 'you're on your own' and the Prince of Wales made his first solo"

BELOW: **HRH Prince Charles in the front seat of Chipmunk WP903 at Tangmere in January 1969** A M BALCH COLLECTION

TOP: **Chipmunk exotica: Photographed in March 2018 at Don Muang Air Base, this Royal Thai Air Force airframe exemplifies the type's truly global service** ADRIAN M BALCH

ABOVE: **An ex-Portuguese Air Force Chipmunk T.20, '1365' (G-DHPM) at Kemble in Gloucestershire, on September 29, 2018** ADRIAN M BALCH

TOP MIDDLE: **The bubble canopy was a defining feature of Canadian Chipmunks, illustrated here by T.30 18026 of the Royal Canadian Air Force** VIA PAT MARTIN

RAF Benson, Oxfordshire, under the auspices of The Queen's Flight. The specific aircraft was WP904 coded '909' which, coincidentally, just happened to be in sequence with WP903 flown by both his elder brother and father. Prince Andrew completed his Royal Naval Pilot Grading in April 1979 supervised by his instructor, Lt Cdr A McK Sinclair MBE.

Metamorphosis

With the assistance of Fison-Airwork, an established agricultural spray operator, de Havilland at Leavesden, Hertfordhsire, devised a moderately priced crop-sprayer aimed at replacing Tiger Moths and helicopters. The first conversion was former Chipmunk T.10 WB680, which became G-APMN in May 1958. Unfortunately, this aircraft crashed during trials on July 27 that year and was written off. This was embarrassing for the company, which had been planning to show the aircraft at Farnborough that September. Another Chipmunk, WP983 (registered G-APOS) was hastily converted in time for the airshow. However, due to a lack of interest, the aircraft was put into storage at Panshanger, Hertfordshire, in June 1959. It was finally purchased by Bill Bowker of Farm Aviation in late 1962 with the rights to convert more Chipmunks to Mk.23s.

Despite modifications by Farm Aviation, the conversion failed to sell to other operators. Consequently, the company converted only two further Chipmunks for civilian use as crop sprayers, G-AOTF (formerly WB563) and G-ATVF (WD327). Each had a single cockpit and was fitted with a hopper, as well as spray bars to expel the contents. Designated Mk.23s, both later switched to glider-towing duties with the British Glider & Soaring Association, the latter airframe being de-converted to a two-seat Mk.22. Lycoming engines were installed in both.

In 1959, Sir Peter Masefield had former RAF Chipmunk WP988 modified with wheel spats and an anti-collision beacon, followed later by a Canadian-type bubble canopy and other minor modifications. This machine joined the UK civil register as G-AOTM. A few aircraft were then modified or converted by Bristol Aircraft to this standard. Other Chipmunk modifications included the installation of luggage compartments in the wings, a bubble canopy, landing gear fairings including wheel spats and enlarged fuel tanks. These examples were registered G-APOY, G-AOST and G-ARFW.

The 'Super Chipmunk' became one of the most modified and best-known aircraft in North America. A former RCAF Chipmunk (serial 18001) owned and flown for more than 25 years by display pilot Arthur Scholl, it was a single-seat aerobatic conversion with clipped wings, a new fin and rudder and a retractable undercarriage. It was powered by a 280hp Avco Lycoming GO-480-G1D6 piston engine, driving a variable-pitch propeller, which doubled its original power. It also had an autopilot and was fitted with a red, white and blue wingtip and tail smoke system. The control column received a 3in extension for greater leverage during extreme manoeuvres. Aerobatic pilot Harold Krier first revealed the Super Chipmunk at an air show in Fairview, Oklahoma, in 1970. Four Super Chipmunk conversions were duly undertaken, Scholl's N13A and N13Y, Harold Krier's N6311V and Scholl's friend and fellow flyer, Skip Volk's N1114V.

In 1965, following successful trials with a TP90 Gas Turbine

ABOVE: **This Super Chipmunk, N1114V, appeared at the Abbotsford Airshow, British Columbia, in August 1970** ADRIAN M BALCH

LEFT: **Resplendent in its silver finish, Chipmunk T.20 EI-HFB flying in the colours of '169', Irish Air Corps** IAC VIA A M BALCH

engine fitted into an Auster Autocrat by Viv Bellamy of the Hampshire Aeroplane Club, some 20 Auster conversions were envisaged, along with a number of Chipmunks replacing their Gipsy Major engines.

Hants and Sussex Aviation saw the potential in this idea and became interested in marketing it further afield. Former RAF Chipmunk WP895 was converted to Mk.22 standard, tested and flown with a 116-shp Rover 90 turboprop engine and extra fuel capacity, in August 1966 – just in time to be displayed at the 1966 Farnborough Air Show. Due to press reports branding it under-powered, any military interest waned and no further conversions were carried out, the aircraft being sold to the USA and re-engined with a 200hp Ranger powerplant. At Bankstown Airport, Sydney, one Australian Chipmunk was fitted with a 180hp Lycoming O-360 flat-four piston engine, wingtip tanks, a clear-view canopy and metal wing skinning, becoming the Sundowner touring aircraft. A further three 'Aussie' Chipmunks were converted to single-seat agricultural spraying aircraft known as Sasin Spraymasters.

The Supermunk was designed and produced by officers of the British Gliding Association – they were converted from Chipmunks by fitting 180hp Avco Lycoming O-360-A4A engines for use as glider tugs. These machines were mostly operated by the RAF Gliding & Soaring Association, and a handful continue to this day with gliding clubs.

After 75 years of versatile usage, there are estimated to be some 500 Chipmunks still in existence, 100 of which are in the USA and 138 in the UK. The remaining aircraft are spread worldwide, mainly in Australia, Canada, Europe and New Zealand, maintaining the type's status as a global aviation legend. Events are being planned to mark the 75th anniversary of the Chipmunk, at Old Warden, Bedfordshire, on Saturday May 22 and June 19, COVID rules permitting. **FP**

BELOW: **Displaying the low-level nature of its role, Farm Aviation's Chipmunk Mk.23 G-APOS is seen crop spraying in the 1960s** BILL FISHER VIA A M BALCH

DHC-1A-1 Chipmunk G-AKDN flying over Bedfordshire as part of celebrations for the breed's 70th anniversary in May 2016. Sonia Fillingham, whose husband Pat was the original Chipmunk test pilot, is enjoying the view from the rear seat. 'Delta-November' is the world's oldest flying example of the type
DARREN HARBAR

FlyPast

Above and Beyond

DISTINGUISHED FLYING CROSS **GEOFF FISKEN**

Graham Pitchfork recounts the remarkable career of New Zealand fighter ace Geoff Fisken in the Southwest Pacific

Born into a farming family on the North Island of New Zealand, Geoff Fisken enlisted in his country's air force as war broke out – and was posted to Singapore once he had completed his flying training.

To bolster the air defences of the Royal Navy's base in Singapore, several fighter squadrons had been established in the Far East in early 1941 manned primarily by Australian and New Zealand pilots. Fisken joined them in March that year to fly the US-built Brewster Buffalo fighter with 243 Squadron.

After the Japanese invaded northern Malaya in the early hours of December 8, 1941, Fisken and his fellow pilots were soon in action and suffering casualties. The following day, he responded to a message that the HMS *Prince of Wales* and *Repulse* were under attack. He was flying one of the first two Buffalos to arrive and later said: "I could see below me a grey metal bow sticking out of the sea, surrounded by an oil slick and many bodies."

After flying out of an airfield in northern Malaya, Japanese advances forced the RAF squadrons to retreat to Singapore. Large formations of enemy bombers attacked the island and overwhelmed the inadequate air defence forces; it was soon apparent that the Buffalo was outclassed. Fisken nevertheless achieved his first success on January 12 when he shot down a bomber, it exploded beneath his aircraft and Fisken had great trouble controlling his damaged fighter. Over the next few hectic days, he accounted for three more bombers and probably two others as the few fighters engaged formations sometimes over 100 strong.

By the end of January there were so few Buffalos left that 243 had virtually ceased to be and the remnants formed into a single unit. Fisken fought his last engagement on February 1 shooting down a Mitsubishi Zero; two others struck back and badly damaged his aircraft, wounding him in the arm and hip. His engine spluttered to a stop and the undercarriage wouldn't work, but he was able to crash land among the bomb craters on Kallang airfield. As he clambered from his wrecked aircraft his mechanic fainted at the sight of a large piece of shrapnel embedded in Fisken's hip. Displaying impressive grit, Fisken tried to extract it with pliers but was ultimately forced to go to hospital. Evacuated just before the fall of Singapore, he returned to New Zealand having shot down at least six enemy aircraft, making the former shepherd the first New Zealander to achieve 'ace' status in the Pacific. After recovering from his wounds, Fisken was commissioned and joined 14 Squadron to fly the Curtiss Kittyhawk fighter. His unit moved to Guadalcanal in the Solomon Islands in June 1943, where he flew an aircraft named *Wairarapa Wildcat*. He was in action immediately when his squadron was scrambled against a major Japanese attack. In a fierce engagement, Fisken shot down two of the escorting fighters.

As the action moved to New Georgia, Fisken was leading a formation when it was attacked by Zeros. During the battle he shot down two of them and then spotted some bombers. He dived to attack and destroyed one, before landing with the tailplane of his Kittyhawk in tatters. In September he was awarded the DFC having destroyed at least 11 enemy aircraft, then in December he was invalided from the air force.

In 2005, he and *Wairarapa Wildcat* were reunited at an airshow near his home at Masterton, New Zealand. **FP**

"Displaying impressive grit, Fisken tried to extract the metal with pliers"

FlyPast Classics

WESTLAND LYSANDER

No 19

Busy 'Lizzie'

The charismatic Westland Lysander performed many different and dangerous roles during World War Two. **Malcolm V Lowe** tells the story of this multi-tasking warplane

Lysander prototype K6127 in its original unmodified form during flight testing. Aerial images of this aircraft are rare, particularly at this altitude
MALCOLM V LOWE COLLECTION

For many years the name Westland was synonymous with the manufacture of helicopters, in which the company has specialised (under a number of recently changed names) since the 1960s to the present day. Up until then, the firm existed as Westland Aircraft, and was a major supplier of frontline combat types especially for the Royal Air Force.

During World War Two the company came to prominence through the varied exploits of arguably its best-known product, the Lysander.

Tracing its origins to 1915 and located at Yeovil in Somerset, over the years Westland produced a very eclectic selection of aircraft types mainly for military service, although its designers also dabbled with civil machines. The name Westland Aircraft came into being during 1935, and by that time the aircraft design that matured as the Lysander was already taking shape.

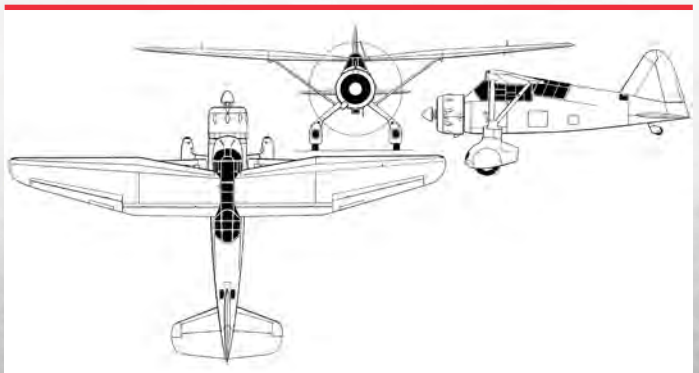
Important replacement

In 1934 Britain's Air Ministry issued Specification A.39/34 for a new army co-operation aircraft, preferably of monoplane configuration, intended to replace the existing operational Hawker Audax biplanes. An interim, the Hawker Hector biplane was being developed separately as an Audax replacement but was also a slow open-cockpit machine.

Several British companies, including eventually Westland, were asked to propose possible solutions to meet the A.39/34 criteria. Westland's design team for the new project included chief designer Arthur Davenport but with important input from a recently arrived aeronautical engineer who later rose to great fame, W E W 'Teddy' Petter. Westland took the right approach and conversed with both the British Army and RAF as to which type of aircraft would be best suited to meet the new requirement.

They learned that what was needed comprised a tactical recce and artillery-spotting aircraft to provide information about the battlefield, while obtaining details on the disposition of enemy forces in daylight. Obviously, field of view was highly important for pilot and observer, preferably from an enclosed cockpit (the Audax and Hector were open-cockpit relics of past days), and it needed excellent slow-speed handling at low level. Defensive armament was also important, including forward-firing fixed machine guns together with a gunner defending the aircraft's 'six o'clock'.

In effect the cross-section of the fuselage was determined by the intention to use the Bristol Mercury or similar radial engine, and clearly a high-wing configuration was needed for good visibility from the cockpit. Innovative high-lift devices were required to achieve excellent handling at comparatively slow loiter speed over the battlefield, and the new type's wing eventually featured full-span automatic leading-edge slats, coupled with Handley Page flaps. During that era such features were revolutionary, so the resulting design was ahead of its time, even though it looked rather pedestrian. In practice



Westland Lysander Mk.I Specifications

Powerplant	1 × Bristol Perseus XII radial engine, of 905hp (675kW) take-off power
Crew	2
Length	30ft 6in (9.30m)
Wingspan	50ft (15.24m)
Empty weight	4,160lb (1,887kg)
Maximum take-off weight	6,030lb (2,735kg)
Performance	
Maximum speed (clean)	230mph (370km/h) at 10,000ft (3,048m)
Range	600 miles (966km)
Service ceiling	26,000ft
Armament	2 x .303in Browning machine guns with 500rpg in undercarriage spats; 1 x .303in Lewis machine gun in rear of cockpit section; up to 500lb (227kg) externally, including bombs on spat stub wings (six universal carriers each side) and small external lower rear fuselage mounting

ABOVE: **The famous 161 Squadron Lysander special duties pilot Hugh Verity (second from left) poses with colleagues in front of his personal Mk.IIIa(SD) V9673/MA-J. It was adorned with 'Jiminy Cricket' artwork and mission markings** MALCOLM V LOWE COLLECTION

the new aircraft had an impressive speed range, which allowed it to fulfil its intended mission, as well as taking on other completely unrelated roles later in its career.

Trailblazer

Designated by the company as the P.8, the Westland proposal successfully met the Air Ministry's requirements. Its only real rival was a Bristol blueprint. At the same time, Hawker suggested yet another biplane layout which, by 1935 standards, was completely outdated.

Westland received contract go-ahead in mid-1935, and the P.8 prototype – with the British military serial number K6127 – was duly constructed at Westland's Yeovil factory. Ironically, Westland was also tasked with building the Hawker Hector under licence, which would therefore be an interim for RAF army co-operation needs until full-scale production of the P.8 design could be initiated.

The prototype K6127 first flew on June 16, 1936 at Yeovil. Early testing was carried out by the Aeroplane and Armament Experimental Establishment (A&AEE) at RAF Martlesham Heath in Suffolk, and the aircraft caused a stir when demonstrated to the public at RAF Hendon in London a short time later.

ABOVE: **The stub wing that could be attached as required to the Lysander's spat on each side could be used to carry a wide variety of stores and ordnance, as shown by this example being inspected by an aircrew member** MALCOLM V LOWE COLLECTION

Unfortunately, stability problems were encountered with the prototype, resulting in modification of the horizontal tail, a new variable-incidence configuration being a solution. This handling difficulty was never fully solved, with pilots theoretically being briefed on this idiosyncrasy before their first foray into the air with the type.

Another of the prototype's features modified before production began was the shape of the rear part of the cockpit canopy, which had an altered layout for production series aircraft and easily slid backwards over the rear fuselage spine for the gunner to operate his machine gun.

The second prototype flew on December 11, 1936. Several months later during May 1937 it was involved in a serious incident when it suffered significant wing structural failure, its test pilot managing to land the aircraft. The problem was traced to the ripping in flight of the inferior quality of fabric covering on the wing upper surfaces aft of the main spar, leading to internal metal structure collapse. Subsequently, stronger Irish linen was always used for the fabric-covered sections of the wings.

Production plans

An initial contract for 144 production aircraft was made by the Air Ministry during September 1936. The name Lysander was adopted for the new design, although a far more affectionate nickname, 'Lizzie', was eventually bestowed on it.

The first machines were designated Mk.I and were powered by the Bristol Mercury XII radial engine rated at 890hp, at 6,000ft. The first example was L4673, first flown in March 1938. For army co-operation duties, a long retractable hook was mounted below the fuselage offset to starboard to grab messages from the ground while flying very low. Detachable stub wings could be attached to the outside faces of the substantial spatted main undercarriage, these having a light rack with six universal carriers to mount a wide variety of stores and ordnance.

The Mk.II followed, starting with L4739, for which one of the Mk.I airframes acted as a development platform. The Mk.II was notably different in being powered by the sleeve valve Bristol Perseus XII radial engine, of 905hp take-off power. It was housed within a smooth cowling rather than the blister fairings above the cylinders on the cowling panels of Mercury-engined Lysanders.

This version was considered superior to the Mk.I and started to replace the type in RAF frontline units.

The final production configuration was the Mk.III, starting with R8991. This model reverted to the Mercury engine, either the Mk.XX or later the Mk.30 of this breed. These were rated at some 870hp and were thus the lowest-powered engines fitted to production Lysanders. The first aircraft flew during 1940 (R9001 was delivered that August), and the final Lysander Mk.III airframes were completed at Yeovil in late 1941/early 1942.

The Lysander story embraced the overseas and manufacture was not limited to Westland in Britain. In the run-up to World War Two, the type was identified as a potentially useful multi-purpose aircraft for Royal Canadian Air Force (RCAF) service. In the event, it was built in Canada by National Steel Car at its Malton, Ontario works, with 75 Mk.II and 150 Mk.III airframes being completed; manufacture continued into 1942.

Canadian Lysanders therefore ran to 225 examples. A pattern airframe was supplied from Britain, and a number of British-built Lysanders also found their way into RCAF service.

Total Lysander production, based on Westland's own documents, ran to 1,670 examples – 189 Mk.I, 517 Mk.II, and 964 Mk.III/IIIa. These totals include those constructed in Canada.

Operational folly

The first RAF frontline unit to re-equip with the Lysander Mk.I was 16 Squadron at RAF Old Sarum, Wiltshire in June 1938, replacing its Hawker Hectors; a school of army co-operation was established there. An increasing number of RAF units then flew the type (a list of Lysander squadrons is on page 72). Among them was 208 Squadron in Egypt. Lysanders eventually served worldwide wherever British forces were stationed.

During late 1939 some home-based units began to replace their original Mk.Is with the Mk.II, and it was from then onwards that the type was tested in combat. The so-called Phoney War resulted in several RAF squadrons moving to France, among them army co-operation Lysanders. For a time, all went well, but the German attack against France and the Low Countries on May 10, 1940 totally changed the picture. Suddenly faced with Luftwaffe Bf 109 and Bf 110 fighters, Lysanders were slaughtered. It is estimated that around 90 were shot down during the few weeks of the German campaign. Often operating alone and without fighter cover, the Lysanders were comprehensively outgunned.

The same was also true of the Luftwaffe's direct equivalent of the Lysander, the Henschel Hs 126 which turned out to be an easy target for RAF and French fighters. However, in

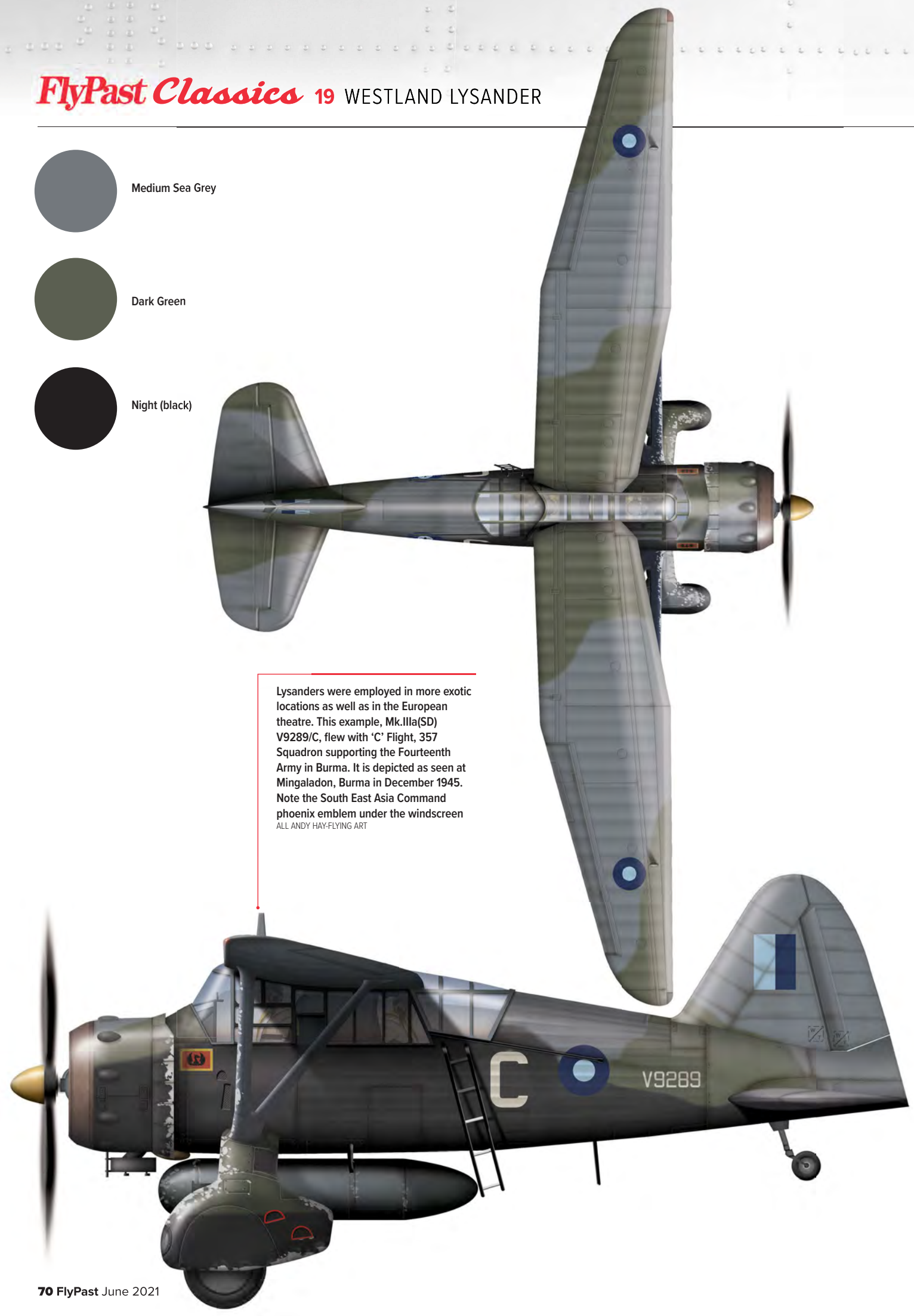
BELOW: **Wearing a mixture of British and US markings, Lysander TT.Mk.IIIa V9817 belonged to the Eighth Air Force's 3rd Gunnery and Tow Target Flight at RAF East Wretham. It was one of 12 examples 'loaned' to the US Eighth Air Force in Britain for target-towing and other second-line duties** USAAF

BELOW: **Photos of operational RAF Lysanders in France in early 1940 are scarce. This view shows the harsh operating conditions faced by man and machine in the winter of 1939-40. The Lysander is believed to be Mk.II L4767/OO-E of 13 Squadron at Mons-en-Chaussée (Péronne) airfield in northeast France** MALCOLM V LOWE COLLECTION

Medium Sea Grey

Dark Green

Night (black)



Lysanders were employed in more exotic locations as well as in the European theatre. This example, Mk.IIIa(SD) V9289/C, flew with 'C' Flight, 357 Squadron supporting the Fourteenth Army in Burma. It is depicted as seen at Mingaladon, Burma in December 1945. Note the South East Asia Command phoenix emblem under the windscreen

ALL ANDY HAY-FLYING ART

Lysander Mk.II L4798/HB-X, 239 Squadron, 1940. Painted in Dark Earth and Dark Green over Sky. Fuselage codes in Sky Grey

Lysander Mk.IIIa(SD) V9673/MA-J, acting Sq Ldr Hugh Verity, 161(SD) Squadron, RAF Tempsford, 1943. Medium Sea Grey and Dark Green over Night

Lysander TT.Mk.III 2353/53, 8 Bombing and Gunnery School, Royal Canadian Air Force, Lethbridge, Canada, 1942. Stripes in Trainer Yellow and Night

Lysander Mk.II P9102, Free French Air Force, Chad, North Central Africa, 1941. Dark Earth/Dark Green over Sky under surfaces. The schemes on French examples differed considerably

Lysander Mk.III LY-119, 2/LeLv 16, Finnish Air Force, Viiksjärvi, Finland, 1942. This airframe wears black and olive green over aluminium dope. Yellow ID bands/panels

A Lysander observer/rear gunner from 4 Squadron pauses while preparing his guns to watch a member of the groundcrew adjusting a ubiquitous F.24 aerial camera before a recce sortie KEY COLLECTION

Lysander Units of Principal Operators

RAF
2, 4, 6, 13, 16, 20, 24, 26, 28, 81, 116, 135, 138, 148, 161, 173, 208, 225, 231, 237, 239, 241, 267, 268, 275, 276, 277, 278, 280, 285, 286, 287, 288, 289, 309, 357, 510, 516, 598, 613, 614, 679, 695

Fleet Air Arm
754, 755, 757

RCAF
2, 110, 111, 112, 118, 121, 122, 123, 400, 414

Note: In addition to the RAF's operational units, there was a variety of trials, second-line and training units that flew Lysanders. They included air gunnery and air observers schools, anti-aircraft co-operation units, and Operational Training Units (OTUs).

ABOVE: **The Free French FAFL flew a mixed-bag of Lysanders, supplied from RAF stocks such as this example, Mk.II P9134. Some were decidedly war-weary, and their markings and colour schemes varied greatly, but they were nonetheless put to good use in North Africa** KEY COLLECTION

ABOVE: **One of several experimental programmes involving the original Lysander prototype K6127 was this trial installation of two 20mm cannon. It was not adopted for production** MALCOLM V LOWE COLLECTION

other parts of the world where fighter opposition was much less plentiful, Lysanders gave excellent service, especially in East Africa, Burma and the Middle East – although in the last arena it was also advisable to have thorough fighter cover.

Trial installations

Efforts were made to afford the Lysander greater protection from rear attack with an intended Boulton Paul turret, armed with four machine guns in the rear of the cockpit where the gunner sat in conventional Lysanders. A mock-up was created, but the turret would have added to the Lysander's take-off weight and already slow top speed. In any case the advent of newer types and the change of emphasis in army co-operation following the troubles in France led to the idea not being adopted.

Wartime necessity sometimes resulted in highly impractical ideas. With the fear of a German invasion of Britain dictating thinking in 1940, a special 'beach strafing' development of the Lysander managed to make it off the drawing board and into reality. This strange beast is sometimes referred to as the 'Pregnant Perch' and was basically a Lysander with a deepened fuselage, allowing for a ventral gunner's position and suitable weaponry with which to mow down soldiers making it ashore from invasion craft. The aircraft concerned was L4673 (a converted Mk.I). It was not a success, and the only example crashed.

Upgunning the Lysander occupied Westland in several ways. For one of its myriad guises, the original prototype K6127 was armed with two 20mm cannon, one attached to each wheel spat firing forward with the detachable stub wings removed. This would have made a much more effective 'beach strafer' if it had been employed on production aircraft.

In a separate incarnation, the much-used K6127 was at one time rebuilt into a completely different aerodynamic configuration with a tandem wing arrangement. Inspired by Frenchman Maurice Delanne, this concept involved replacing the entire tail unit with a second wing equipped with end-plate fins and rudders. There was provision in the sawn-off rear of the fuselage for a gun turret to provide rearwards defence (and not 'beach strafing' as suggested in some published accounts). The fuselage section was modified aft of the wing, but the mainplanes themselves and forward fuselage were unaltered.

Known as the P.12 and sometimes called the 'Westland Wendover', the concept flew in trial configuration and company test pilot Harald Penrose found the aircraft handled well. Once again, though, the configuration ultimately proved unwieldy; on one test flight the mock-up of the proposed rear turret collapsed, trapping its occupant (who according to some accounts was Penrose).

It is interesting to note that Westland applied for a Patent (GB526946) for a retractable undercarriage Lysander. Again this concept was not progressed, but it would have made for a very streamlined Lysander.

New horizons

The disasters in France demonstrated that any army co-operation machine in the deadly arena of World War Two needed to either be heavily defended by covering fighters or be able to properly look after itself. In the following years, Lysanders in army co-operation squadrons were replaced, firstly by the Curtiss Tomahawk and later by the superlative Allison-engined North American Mustang. The latter was capable of defending itself against the latest Luftwaffe fighters. This left many Lysanders redundant, but they were quickly found new roles.

With its slow speed and good handling, the type was modified into a target-towing aircraft, with a fuselage-mounted electric-powered winch for drogue towing. Some Mk.I and Mk.II examples were converted for this role, and Mk.III airframes were also used under the designations TT.I, TT.II and TT.III; some later Mk.III examples were completed in that configuration on the production line. This was a role in which the Lysander excelled, and it was widely used in training units. But two further tasks put the type once more in harm's way.

The first was air-sea rescue, while the second involved clandestine secret missions able to infiltrate enemy airspace under cover of darkness and deliver/collect special operations personnel.

Rescue platform

The Lysander was perfect for air-sea rescue in that it was able to fly low and slow in the vicinity of a downed airman, allowing its crew to accurately drop survival equipment to him. However, considering the type's vulnerability to fighter attack and the fact that such rescues were primarily made in broad daylight, a fighter escort was needed to ensure that the Lysander's crew themselves did not add to the number of aircrew that required rescue.

The Lysander's stub wings were ideal for carrying survival equipment and inflatable life rafts. Several

BELOW: **Unofficially referred to as the 'Westland Wendover', the unusual sole P.12 Delanne-wing Lysander (actually the prototype K6127 in one of its many guises) is seen during a test flight from the firm's Yeovil site in Somerset** KEY COLLECTION

ABOVE: **Groundcrew fit a pair of supply canisters to a Lysander's spat-mounted stub wing. Note the static line between the universal carrier and the pack. Once released, this would pull a smaller drogue parachute, which in turn would deploy the main canopy** KEY COLLECTION

ABOVE: **Ski-equipped Finnish-operated Lysander Mk.III (LY-118, ex-R8995) belonged to 2/LeLv 16. Finland operated an assortment of Lysanders, this example being fitted with locally designed skis** KEY COLLECTION

specialist air-sea rescue units equipped with the type, including 275-278 Squadrons, although Lysanders had already performed this role on a more ad hoc basis from 1940, including rescuing survivors of the depleted units following Dunkirk.

Special duties

Docile and safe handling at comparatively slow speeds, as well as excellent short-field take-off and landing (STOL) capability, made the Lysander perfect for clandestine missions. Designated Lysander Mk.III(SD)/IIIa(SD), a number of these 'agent droppers' were converted or reconditioned by Westland, some of the work carried out at the company's Ilchester, Somerset facility. Among the changes was the fitting of an external ladder to the port fuselage to allow easier access to and from the rear of the cockpit area. An external fuel tank could be carried beneath the fuselage.

RAF Tempsford in Bedfordshire became the home for the secretive special operations work, but several other airfields, notably RAF Tangmere in Sussex, were also used. Working closely with the Special Operations Executive (SOE) and other agencies, these 'ops' began in 1941 with 138 Squadron, but perhaps best-known is 161 Squadron, which later in the war became the foremost operator of Lysanders in this role.

One of the celebrated RAF pilots involved was 161 Squadron's Hugh Verity. Writing in his book *We Landed by Moonlight*, he described these dangerous sorties, flying deep into German-controlled France under cover of darkness to land at dimly lit temporary landing grounds in the French countryside.

The value of these clandestine operations cannot be underestimated, and some of the facts and events remain shrouded in mystery. It was during 1943 and into early 1944 that the covert flying reached its peak, and although the Lysander was the ideal aircraft for the job, there were nevertheless significant losses of personnel and aircraft.

In addition to 161 Squadron, the little-known 148 Squadron

Lysander Mk.II L4742/TV-B of 4 Squadron demonstrates its army co-operation role with a message pick-up at RAF Odiham during May 1939. The aircraft was lost in action over Belgium performing a recce sortie on May 14, 1940. Sadly, its crew were killed KEY COLLECTION

Lysander Mk.II P9105 was fitted experimentally by Blackburn with a forward-swept high-lift wing. Full-span flaps and slats, plus spoilers near the wing tips in place of ailerons reduced its wingspan from 50ft to 38ft KEY COLLECTION

also performed these operations with special Lysander Mk.III/IIIa aircraft in the Mediterranean, together with converted Halifax bombers. In Burma, 357 Squadron flew special duties assignments with Lysanders during 1945, including flying doctors into liberated prison camps and repatriating Allied prisoners (Operation Mastiff).

Export versions

Despite the increasingly urgent need for the RAF to re-equip with Lysanders in the immediate pre-war and early war period for its army co-operation squadrons, export licences were nevertheless granted for the supply of small numbers of Lysanders overseas.

Among the export customers was Ireland (Éire) with six Mk.IIs; Turkey with 36 Mk.IIs, and neutral Portugal received eight ex-RAF Mk.III airframes in 1943 partly as a thanks for use of facilities on the Azores. Other operators who flew a variety of versions or from existing stocks included Finland, Egypt and India.

It is believed that Egyptian-operated Lysanders were the last to serve during a genuine conflict, when several were used against Israeli forces during the 1947–49 Palestine War.

French combat

In addition to Britain and Canada, a major wartime user of the Lysander was the Forces Aériennes Françaises Libres (FAFL) or Free French forces in North Africa.

It is generally accepted that 23 or 24 Lysanders eventually flew under French colours, although this total has been disputed in more recent times. Apart from a Mk.II specially built for France and delivered in July 1939, all remaining examples were 'hand-me-downs' from the RAF, a 'mixed bag' ranging from good to decidedly war-weary. They were mainly repainted in the field with French insignia and the Cross of Lorraine in either blue or red on a white background. No two of these machines looked exactly the same.

The French Lysanders were mainly used against Axis forces in North Africa, but some soldiered on well into 1944 long after the conflict had ended there. One was apparently photographed at Le Bourget airfield outside Paris late in the war.

A specific task for some French Lysanders was to support the Colonne Leclerc, a French equivalent of Britain's Long Range Desert Group that harried Axis forces in North Africa behind the front line.

Reversed supply

An important second-line user of Lysanders during the war was the US Eighth Air Force in Britain. Unlike the French employment, it was never intended to fly the American Lysanders operationally and they were used for a variety of tasks including liaison and target-towing.

One of the identified units that flew Lysanders was the 3rd Gunnery and Tow Target Flight (GTTF). Three other GTTF units also had at least one Lysander in their inventories. Around 12 examples were eventually flown by the Americans in an illustration of 'Reverse Lend-Lease'. The first of these 'Lizzies' were made available during 1942. However, it proved difficult for the Americans to maintain these unusual new 'birds', and by late summer 1944 most had been returned to the British. In the target tug flights they were mainly replaced by the Vultee A-35 Vengeance when enough of these equally uncommon machines had become available. **FP**

• Sincere gratitude for reference material from former Westland Aircraft staff, including my late father Victor Lowe; and to Michal Ovčáčík and Karel Susa of 4+

Lysanders on special duties work were active in Italy and over France. This 148 Squadron Mk.IIIa(SD), V9707, appears to have attracted a crowd, possibly during a flight to Yugoslavia MALCOLM V LOWE COLLECTION

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161/21

JUNE ISSUE ON SALE 13TH MAY 2021

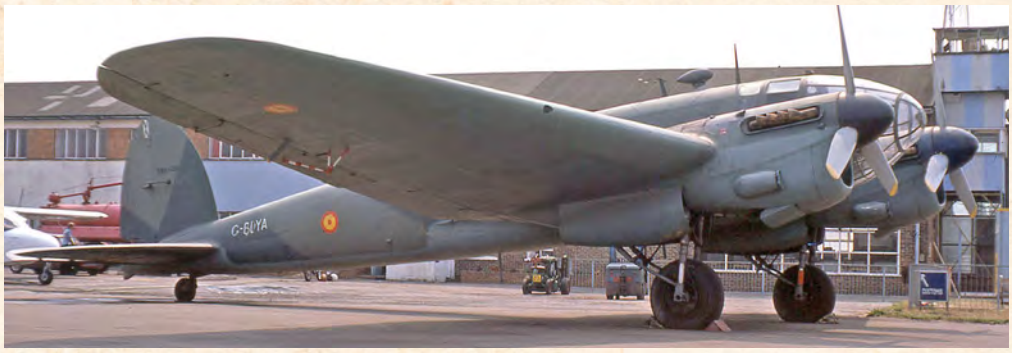
OVER THE FENCE

As airshow appearances by Warbirds of Great Britain's (WoGB) aircraft were scarce, enthusiasts had to be content with glimpses at the company's bases. Ken Ellis provides a taste of a memorable collection

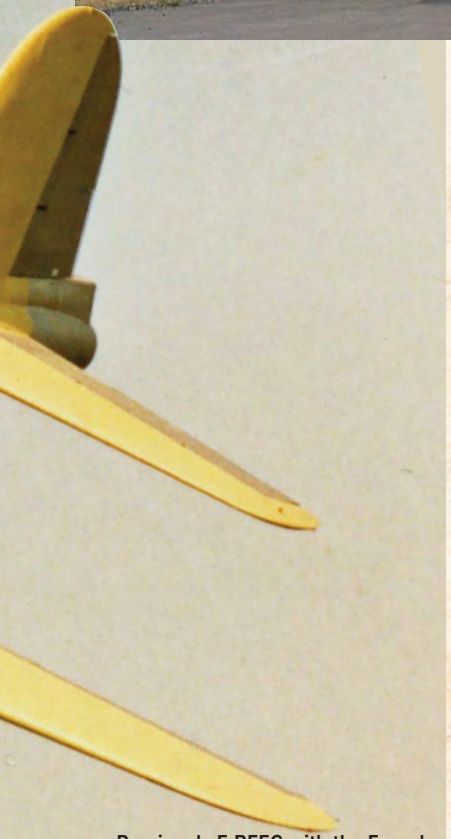
General Motors FM-2 Wildcat N909WJ completed its ferry flight from the USA to Biggin Hill on December 30, 1990 and is illustrated on a rare outing in June 1991. It departed for the Netherlands in November 1992 and eventually returned to the USA

ABOVE: **Five Spanish-built Junkers Ju 52s – CASA 352Ls – arrived at Blackbushe in Hampshire between 1976 and 1980. Formerly Spanish Air Force T2B-212, G-BECL was the first, touching down on July 30, 1976. It was sold in France, in June 1990 ALL IMAGES AUTHOR'S COLLECTION**

ABOVE: **Lockheed F-5G – the photo-recce version of the P-38 Lightning – N505MH 'Miss Behavin'' caught outside the WoGB hangar at Biggin Hill shortly after its arrival from the USA on May 16, 1984. British-registered as G-MURU, it was exported back to America on July 9, 1990**



ABOVE: **Former Spanish Air Force CASA-built, Merlin-engined Heinkel He 111 G-BDYA parked at Blackbushe in September 1976, shortly after delivery. A second example, G-BFFS, crashed in Spain on December 11, 1977 while being ferried to Blackbushe, killing famous pilot Neil Williams, his wife and two others**



Previously F-BEEC with the French Institut Géographique National, WoGB's B-17G Flying Fortress was British-registered as G-FORT, going to Blackbushe in June 1984, then Bitteswell in February 1985. Air tested in yellow primer on May 9, 1987 it was exported to the USA two months later

The Bitteswell complex included hangars on the south side of the Lutterworth Road and occasionally WoGB aircraft would cross it, sometimes under power. One of four Mustangs in the WoGB fleet, P-51D G-PSID 'Widow Maker' joined the operator at Blackbushe in November 1979, moving to Bitteswell in 1985. Acquired by The Fighter Collection, its pilot checked for traffic then crossed to the airfield on March 3, 1987 bound for Duxford

Bell RP-63A Kingcobra G-BTWR appeared at Bitteswell from the USA in a crate in May 1988. With the disposal of the Leicestershire airfield, it was soon taken by road to Biggin Hill, but crashed fatally during a display at Biggin Hill on June 3, 2001

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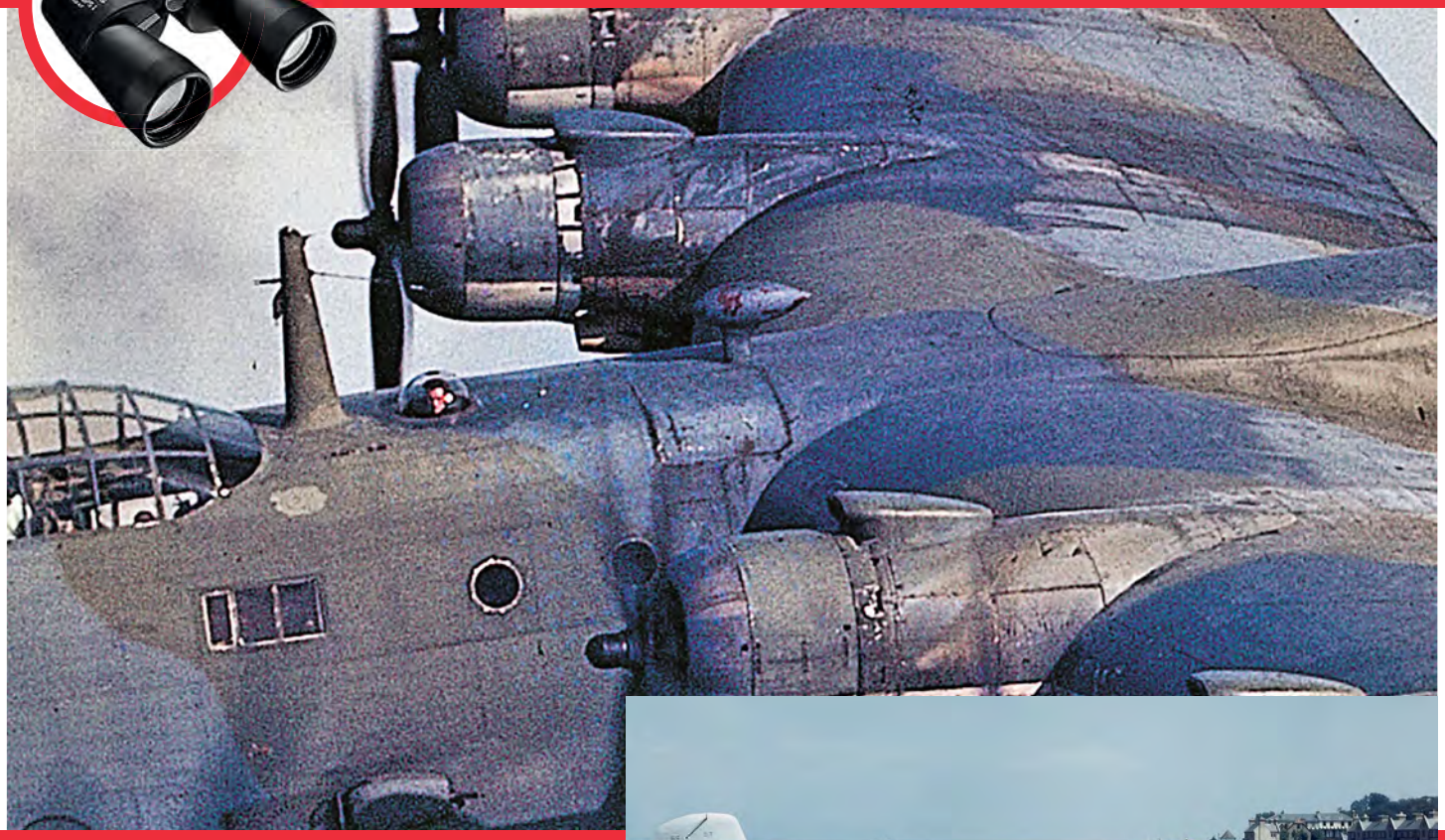

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FlyPast, International Media Service, PO BOX 866, Virginia Beach 23451, USA.

FlyPast (ISSN 0262-6950), August, is published monthly by Key Publishing Ltd, PO Box 100, Stamford, Lincs, PE9 1XQ, UK and distributed in the USA by UKP Worldwide, 3390 Rand Road, South Plainfield, NJ 07080. Periodicals postage paid at Rahway, NJ and at additional mailing offices. Periodicals Postage Paid at Piscataway, NJ and additional mailing offices.

POSTMASTER: Send address changes to *FlyPast*, Key Publishing Ltd, C/O 3390 Rand Road, South Plainfield NJ 07080.

DISTRIBUTED BY: Seymour Distribution Ltd, 2 Poultry Avenue, London, EC1A 9PP
Tel: 020 7429 4000 Fax: 020 7429 4001

PRINTED AT: William Gibbons Ltd, Willenhall, UK

PUBLISHED MONTHLY BY:
Key Publishing Ltd, address as Editorial

Printed in England
ISSN 0262-6950

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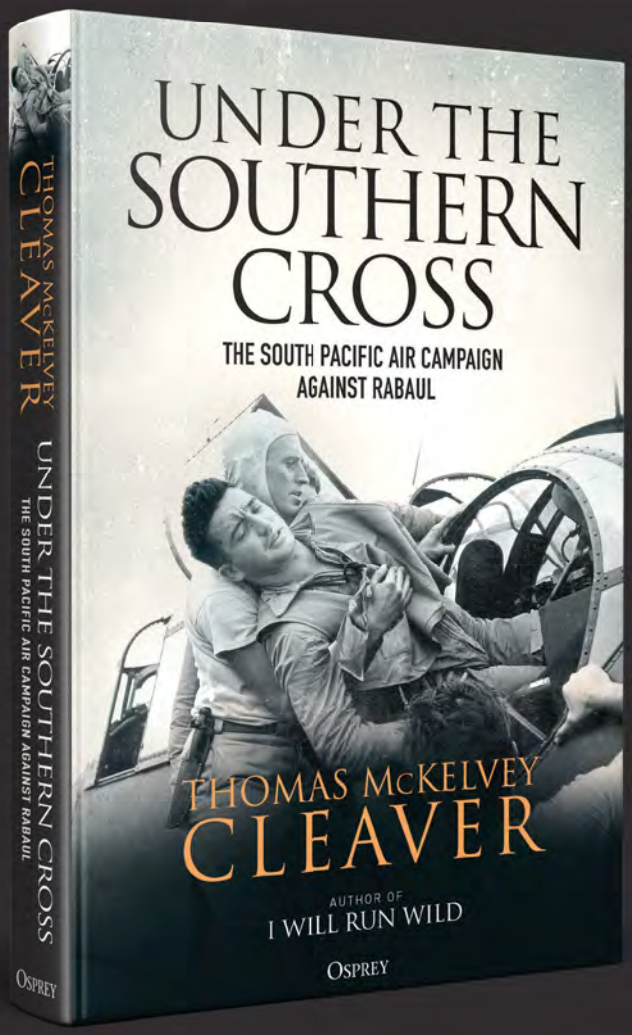

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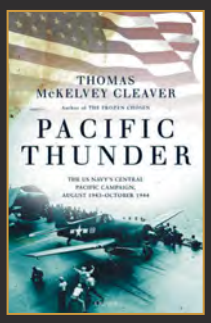

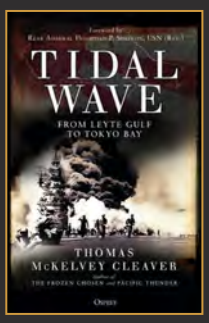

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Aquiline

Andrew Thomas details the combat that resulted in the first American 'ace' of World War Two

Bill Dunn's Spitfire Mk.IIa P7308/XR-D after he had landed it at Hawkinge in Kent on August 27, 1941 following his final combat. Note the damage to the rear fuselage. The machine was eventually converted to a Mk.Va
RAF HAWKINGE

The Royal Air Force readily accepted volunteer American pilots when they began arriving in Britain during the early days of World War Two. Initially serving with RAF units, many posed as Canadians due to the USA's then neutrality from the hostilities. As more volunteers arrived from across the Atlantic, though, it was decided to establish an 'American' squadron – similar to the French Air Service's renowned Lafayette Escadrille of World War One.

As a result, 71 Squadron was formed at Yorkshire's RAF Church Fenton on September 19, 1940 with Brewster Buffalos. Almost immediately, the unit was dubbed the 'Eagle' Squadron in a nod to the USA's national emblem.

One such volunteer was 25-year-old, Minneapolis-born Plt Off William Robert 'Bill' Dunn, who joined the squadron in April 1941. At the time it was flying Hurricane Mk.IIb variants on cross-Channel sweeps into France from Martlesham Heath in Suffolk; two months later the Eagles moved southwest to North Weald in Essex.

"He [the pilot] probably baled out, but I didn't see him do so"

During a sweep on July 2, 71 Squadron claimed its first enemy aircraft, three Bf 109s being downed close to Lille, including one by Dunn who was piloting Z3781... it was a big day for the American volunteers. Four days

Success

later while escorting bombers on a 'Circus' raid (a daytime attack intended to keep enemy fighters in the area concerned) west of Merville, Bill shared in the probable destruction of another '109. He later recorded: "He [the pilot] probably baled out, but I didn't see him do so."

Flying Z3781 again on the 21st, Dunn downed a Bf 109F, followed by another on August 9 west of Mardyck in northern France while piloting Z3267. This was Bill Dunn's final claim in the Hurricane as just over a week later 71 Squadron hopes were fulfilled when the unit received its first Spitfire Mk.IIa.

Working up on the Supermarine type, 71 was soon back in action with an early morning raid against the Lille steel works on August 27. Flying his usual Spitfire – P7308/XR-D – Bill flew one of 100 fighters escorting nine Bristol Blenheims. With the Luftwaffe scrambling, Dunn was soon fighting for his life over Ambleteuse. He recalled: "Dived on

LEFT: **Plt Off William Dunn poses in the cockpit of a Spitfire dubbed 'Ceylon II' sometime during 1941. Dunn was the first 'Eagle' Squadron pilot credited with shooting down an enemy machine**
W R DUNN VIA F OLYNYK

RIGHT: **Bill Dunn in the cockpit of a Spitfire Mk.IIa of the 'Eagle' Squadron during conversion training in August 1941**
W R DUNN VIA F OLYNYK

one of two Me 109Fs, fired from 150 yards, and fired again. Pieces flew off and oil spattered my windscreen. The Me looked like a blowtorch as it went down. Tracers from another 109F behind me flashed past. I pulled back the throttle and skidded my plane. The German overshot me by about 10ft. The 109 was now within my range and with a burst of only three seconds I had him. A wisp of smoke turned almost instantly to flame. As it started down the tail broke off. I had my second victim of the day".

Moments later a burst of fire hit the cockpit of Bill Dunn's Spitfire – instantly turning his right leg into a bloodied mess as he spun away barely conscious. Regaining awareness, Bill slowly descended towards the English coast some 50 miles away. As he did, two Spitfires appeared on his wings and escorted him home. Despite his injuries, and the rudder and rear fuselage of his Spitfire being severely damaged in the onslaught, Dunn safely landed at Hawkinge, Kent. Rushed to hospital, most of his right foot was missing. He would spend the next three months recovering. With five confirmed 'kills', Bill Dunn had become the first American 'ace' of the war. **FP**

"Moments later a burst of fire hit the cockpit of Bill Dunn's Spitfire"

BELOW: **Pilots of 71 Squadron conduct a practice scramble for the benefit of the Press as the 'Eagle' Squadron was unveiled**
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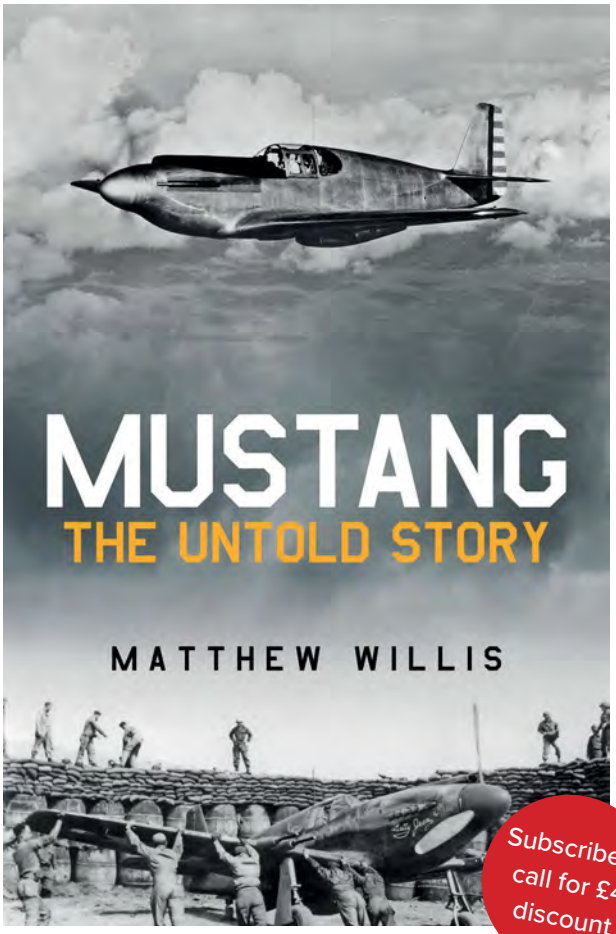

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Jan Forsgren describes the trials and tribulations of Norway's hunt for a fighter during the early 1930s

Nordic SHOWDOWN

In the late 1920s, neither Norway's Hærens Flyvevåpen (Army Air Force) nor Marinens Flyvevåpen (Naval Air Arm) were operating any single seat fighters. Subsequently, by early spring 1931, the country's Jagerflykommissionen – or Fighter Commission – had industriously evaluated a range of aircraft in the hunt for the best viable platform. Types included the elegant Fairey Firefly IIM and Hawker Fury Mk.I from Great Britain, the BMW-powered Heinkel HD 43 from Germany and the graceful-looking, Swedish-built Svenska Aero Jaktfalk (Gyrfalcon), along with Czechoslovakia's promising Avia BH-33E and the beautiful Curtiss P-6 Hawk from the US.

Clear contenders

On May 11, 1931, the commission presented a list of the fighters to the Norwegian Ministry of Defence (MoD) – in order of preference (see panel above right).

Proposed types and powerplants – in preference order

- Hawker Fury – Rolls-Royce F.XIS
- Svenska Aero Jaktfalk – Bristol Jupiter VII
- Svenska Aero Jaktfalk – Armstrong Siddeley Jaguar
- Svenska Aero Jaktfalk – Bristol Jupiter VI
- Curtiss Hawk – Wright Cyclone R-1820E
- Curtiss Hawk – Curtiss Conqueror GV-1550
- Avia B.H.33E – Bristol Jupiter VI

LEFT: **A rare air-to-air view of the sole Norwegian Fury captured during one of its few test flights in the UK. The aircraft was finished with Dark Green upper surfaces, doped silver undersides and polished metal forward fuselage panels** KEY COLLECTION

However, opinions were divided from the outset, with some considering the Curtiss Hawk far better suited to Norway's needs than the Hawker Fury, especially when it came to the licence manufacture planned for the chosen type. Despite reservations – including the price and complexities of the British machine's liquid-cooled Rolls-Royce Kestrel powerplant, especially as the Hærens Flyvevåpen clearly preferred air-cooled radial engines – the Flyverådet (Air Board) decreed that the Fury was in fact the better option. It was eventually decided to conduct further evaluation of both the Jaktfalk and Fury.

As such, a delegation, including noted Norwegian test pilot Ole Reistad, was despatched to Sweden to test the Jaktfalk, while another arrived in the UK to assess the sole Hawker Hoopoe – which was essentially a Fury fitted with a 560hp, 14-cylinder Armstrong Siddeley Panther III radial engine. By this time the Curtiss Hawk had been rejected as it was no longer in production.

Following meetings in Norway on August 13 and 17, the Jagerflykommissionen recommended the purchase of a single Fury and Jaktfalk for comparative evaluations – both powered by the Panther.

On September 9, the MoD approved purchase of the Fury, although negotiations with Svenska Aero were dependent on the outcome of those with Hawker. That said, there were further concerns when the British manufacturer announced it would be unable to immediately supply a complete set of factory drawings – the soonest it could would be some eight weeks after the delivery of the pattern aircraft. After several months of discussion, the government endorsed acquisition of the airframes on November 7 that year.

Consigned to history

The Norwegian Fury, as it was dubbed, flew for the first time on September 9, 1932 from Hawker's Brooklands home in Surrey with esteemed test pilot Gerry Sayer at the controls. Following a brief evaluation at Brooklands and Martlesham Heath in Suffolk, the aircraft was delivered to Kjeller in

"The Curtiss Hawk had been rejected as it was no longer in production"

BELOW: **Norway's Jaktfalk outside Svenska Aero's Lidingö factory in Sweden, prior to its delivery to Kjellar in September 1932. Note the aircraft is equipped with wheel spats** ALL SWEDISH AVIATION HISTORICAL SOCIETY UNLESS STATED

ABOVE: **The Hærens Flyvevåpen eventually procured four Armstrong Whitworth AW.35 Scimitars – the prototype is seen here in 1935. Fitted with a 640hp Panther VII radial engine and a closed cowl in Norwegian service, the type had a top speed of 213mph** KEY COLLECTION

BELOW: **Hawker Fury '401' pictured at Brooklands in early September 1932 prior to delivery. Note the site's famous 'banked' track visible in the background**

"With just 44 hours on the airframe, '401' was placed into storage"

Norway – 25km northeast of Oslo – by Hawker test pilot Paul Ward Spencer 'George' Bulman later that month. On arrival, the machine – which had been allocated the serial number '401' – was quickly fitted with skis for winter trials.

However, in mid-November – possibly on the 18th – the Fury overturned on landing while being flown by Ole Reistad. Returned to Hawker in the UK for repair, investigations revealed the aircraft's centre of gravity was too far forward. It would be May the following year before '401' was returned to Kjeller to continue trials.

On June 13, the Fury 'turned turtle' once again; the aircraft flipping over while taxiing. This time it was mended at Kjeller at a cost of some 11,000 kroner. Returning to the air, the aircraft completed a number of trouble-free flights before being severely damaged in an accident during the autumn of 1933. It would never fly again. With just 44 hours on the airframe, '401' was placed into storage on December 31, 1933 before being officially struck off charge in late 1936.

In parallel, the Svenska Aero SA 14E Jaktfalk was delivered to Kjeller on September 12, 1932.

Incidentally, the airframe, construction number 82, was the very last aircraft built by the firm before owner Carl Clemens Bücker sold the company to AB Svenska Järnvägsverkstädernas Aeroplanavdelning (ASJA), the predecessor of SAAB.

The following year, Bücker formed the hugely successful Bücker Flugzeugwerke in the German town of Rangsdorf.

In accordance with Norwegian specifications, the Jaktfalk was equipped with a Panther engine, a drag reducing narrow-chord Townend cowling and wheel spats. Several sources state that one of the requirements put forward was that it should be able to operate on floats, but this was never put to the test. Allocated the serial number '403' the machine was written off in a crash at Gardermoen airfield (today's Oslo Airport) on August 29, 1933. Like the Fury, the Jaktfalk was placed in storage and finally struck off charge in 1936 – it had been flown for just 40 hours.

Unfortunately, the results of the evaluation have been lost in the mists of time.

That said, the Hærens Flyvevåpen eventually purchased four of Armstrong Whitworth's graceful-looking Scimitars with Panther engines, despite them lacking the structural strength required for winter operations.

When war broke out on September 1, 1939, the Hærens Flyvevåpen was equipped with 12 Gloster Gladiators.

However, according to German intelligence collated prior to Operation Weserübung (the invasion of Denmark and Norway), it was estimated that the country's fighter defences numbered three squadrons with between 27-36 aircraft each. These included the aforementioned Gladiators, Twin Wasp-powered Curtiss Hawk 75A-6s and, ironically, several Hawker Furys! **FP**

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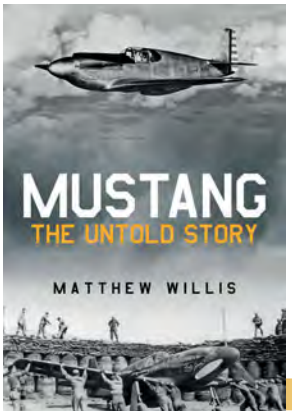

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Churchill's Last R

ABOVE: Hawker Harts were among the types likely to be pressed into service for the proposed Operation Banquet; K2096 and K2098 are pictured on the northwest frontier in 1938
MOD/CROWN COPYRIGHT

You have only to consider the numbers of de Havilland DH.82 Tiger Moths still flying today to understand that it was, without doubt, a fine aircraft. With its benign handling characteristics, it proved to be the perfect primary trainer. From its introduction in 1932 right through to the 1950s, many thousands of trainee RAF and Fleet Air Arm pilots – as well as airmen from numerous overseas air forces – learned to fly in this unassuming but much-loved two-seater.

However, not even its greatest admirer could have seriously cited the biplane as a potentially credible bomber. During the summer and autumn of 1940, when a Nazi invasion of Britain seemed all but inevitable, this was nevertheless the unlikely role for which the Tiger Moth was considered – and in some cases, prepared (for details on the Tiger Moth transformed into anti-invasion weapon, see *Grimly*

Last resort

Steven Taylor details the RAF's desperate defence plan in 1940 that would have thrown vulnerable training aircraft into frontline action

Fiendish, FlyPast, May 2019).

The employment of the famous trainer in an offensive role was a central element of Operation Banquet. This desperate plan was devised by the Air Ministry; it aimed to muster a motley assortment of aircraft, including trainers, obsolete biplanes and army co-operation Westland Lysanders, and re-configure them as ad hoc bombers to mount a last-ditch defence of the country against invading German forces, should Fighter and Bomber Command's frontline strength be wiped out by the Luftwaffe.

Operation Banquet was conceived in May 1940, as the German blitzkrieg swept through France and the Low Countries. On the 15th, an operational order was issued by the Air Ministry, entitled 'Reinforcement of Bomber Command with Training Command aircraft in the event of an invasion of the United Kingdom'. Twelve days later, as the evacuation of Allied troops from Dunkirk began, this contingency

ABOVE: **De Havilland Tiger Moth EM836 of 1 EFTS being fitted with bombs for trials. In Operation Banquet, bomb-carrying Tiger Moths would have attacked German troops on the invasion beaches** BAE SYSTEMS

RIGHT: **RAF Fighter Command operations room at Bentley Priory in Greater London during the Battle of Britain** MOD/CROWN COPYRIGHT

codenamed Banquet. Among the aircraft earmarked for this reserve strike force were Avro Ansons of 6 (Training) Group, which would be hurriedly relocated to 14 Bomber Command stations near the coast in the event of enemy forces landing, along with Lysanders of 22 (Army Co-operation) Group. Even obsolete Hawker Harts, Audaxes and Hinds, then still in use as trainers, were to be utilised.

Desperate measures

Perhaps the most extreme element of the plan became known as 'Banquet Light'. This entailed the basic trainers of the Elementary Flying Training Schools (EFTS) – mainly Tiger Moths and Miles Magisters – being adapted as light bombers. They were to carry out level and dive-bombing attacks

"It would be used to mount a last-ditch defence of the country against invading German forces"

against German troops storming British beaches, expected to be along the south coast, between Portsmouth in Hampshire and Ramsgate, Kent.

On July 13, 1940, Training Command was instructed to prepare the largest available number of aircraft for anti-invasion operations. It intended to form 70 Flights, each comprising five aircraft, with the force coming under the operational control of Army Co-operation. The Tiger Moths and Magisters would be flown primarily by experienced flight instructors, though trainees at a "reasonably satisfactory" standard could also expect to undertake combat missions. The official order stated: "As the plan will seriously interfere with training at EFTS [units] it will only be put into execution when the Air Ministry consider that the situation warrants it."

De Havilland rapidly dusted down drawings for bomb racks it had designed in the early 1930s for the Royal Iraqi Air Force's DH.84 Dragons, and 1,500 sets were quickly produced. The racks could carry eight 20lb bombs, in one of two configurations: four under each wing or all eight beneath the fuselage, positioned under the rear cockpit. They could be released either individually or all at once.

Throughout July, tests were conducted at RAF Boscombe Down in Wiltshire with both Tiger Moths and Magisters. Trials of the bomb-carrying DH.82s proved encouraging, with the test pilots reporting that ordnance dropped cleanly, without fouling the aircraft's fixed undercarriage when in level flight or in a dive of between 50-55°. It was also found that the most effective configuration of the racks was under the wings, rather than beneath the fuselage. With no bomb sights, pilots instead used the cross-bracing wires between the wings to assist their aim.

There were even tests of a 'heavy' bomber version of the Tiger Moth. That summer Hereward de Havilland – the younger brother of company founder Geoffrey – personally conducted trial flights at the firm's site in Hatfield, Hertfordshire, using a Tiger Moth adapted to carry a single 240lb bomb. On one occasion, he reportedly attained an altitude of 7,000ft while carrying this payload.

Controversial decision

As well as standard munitions, there were plans to incorporate a more contentious weapon into the Banquet defence scheme. Five Lysander squadrons were tasked with spraying mustard gas and other chemical weapons from canisters attached to the aircraft's sturdy fixed undercarriage.

As mustard gas was notorious for the devastating effects of its use during World War One and consequently banned by the Geneva Protocol of 1925, its potential deployment against the Germans had been a matter of heated debate within Winston Churchill's war cabinet. The Prime Minister strongly backed its use in the event of enemy landings. "We should not hesitate to contaminate our beaches with gas if this would be to our advantage," he said on May 30, 1940.

Having been given the green light, the RAF pressed ahead with trials of Lysanders and other aircraft equipped with gas containers. By July, the War Office was able to report that the RAF could now mount a "gas attack from the air on a considerable scale for a limited period" and that spraying from low altitude "would be the most effective method for dealing with troops on beaches".

Satisfied that such tactics could be an effective countermeasure to invasion, Churchill ordered a massive increase in the country's production of mustard gas, which reached 350 tons per week by the end of September.

Invasion panic

The closest the proposed Operation Banquet came to being activated was on the night of September 7, 1940. Earlier that day, the Luftwaffe had launched its first major bombing raid on London, a strike that killed more than 400 people. With nerves fraying, 'Cromwell' – the code word meaning a Nazi invasion had begun – was issued to several units. In some parts of the country church bells rang out to warn of imminent enemy landings. Supposed sightings of German paratroopers were also widely reported that night.

The panic had a particularly profound effect on one group of trainee pilots, attached to 3 School of General Reconnaissance at RAF Squires Gate in Blackpool. The off-duty airmen were rounded up by the police in the town's pubs and clubs and flown by Ansons to RAF Thorney Island in West Sussex. There the dazed and bewildered collective saw Tiger Moths being hurriedly fitted with bombs – they were informed by an officer that they were to attack the German invasion fleet. On hearing this news, one of the pilots reportedly fainted.

Of course, the widespread panic turned out to be a false alarm. As the threat of invasion diminished, so the prospect of Operation Banquet being implemented began to fade. But invasion fears persisted even into 1941, and exercises connected with Banquet continued until late 1943 when the concept was finally abandoned.

Had a German invasion taken place and the plan been enacted, it is sobering to assess the chances for the unfortunate RAF pilots. They would have been at the controls of slow and vulnerable training aeroplanes, many of them relatively outdated biplanes and without defensive armour, in skies largely controlled by a potent and experienced Luftwaffe. Clearly their prospects would have been very poor indeed.

Although the pilots stood ready to do their duty, this was a banquet for which very few in the RAF would have had much appetite. **FP**

"Had the plan been enacted, it is sobering to assess the chances for the unfortunate RAF pilots"

BELOW: **Around 300 EFTS Tiger Moths were earmarked for deployment as part of Operation Banquet**
BAE SYSTEMS

James 'Jabby' Jabara became a legend during the Korean War as the first American jet ace. For the 70th anniversary of his combat successes, **Malcolm V Lowe** explores this accomplished pilot's achievements

ABOVE: **Pilots such as Jabara made the F-86 Sabre the most celebrated fighter on the UN side in the Korean War. He was photographed many times with Sabres as a backdrop** ALL MALCOLM V LOWE COLLECTION

Aerial combat between piston-engined aircraft yielded many high-scoring pilots who achieved five and more 'kills' to become aces. This was particularly true during World War Two, but in the post-war era dominated by jet-versus-jet combat in smaller-scale wars and skirmishes, far fewer military aviators have had the opportunity to become aces and amass large numbers of victories.

One of the limited number of conflicts that did involve a considerable amount of aerial combat between jets was fought over Korea during the early 1950s. This allowed several pilots to score totals that, for the jet era, were substantial and resulted in the first aces to emerge from jet-on-jet fights. It was the arena in which 'Jabby' Jabara came to the fore and became internationally renowned.

"Universally known by his nickname 'Jabby', Jabara was distinctive by his small stature"

Characterising his flying career, Jabara was famous for his love of cigars. He is seen here during his frontline flying in World War Two with his P-51D Mustang, appropriately named 'Ceegar Kid'

Fifteen Cuts

LEFT: The forward fuselage of Jabara's F-86A Sabre 48-257/FU-257 from the 334th FIS of the 4th FIW. This unit was among the first USAF aerial assets to deploy for service in the Korean War

Indeed, the Korean War of 1950-53 was the first major conflict in which jet-powered aircraft duelled in combat; from that point it became the customary type of fighter activity. It pitted the best of Western warplanes against those designed and manufactured by the Soviet Union and was an early representation of the dangers of the Cold War escalating into deadly conflict.

The US Air Force (USAF) was created in 1947 from the US Army Air Force(s) (USAAF) that had fought so successfully during World War Two. The new service, although considerably reduced in personnel and frontline materiel, nevertheless packed a substantial punch due to its re-equipment with the new breed of jet fighters and bombers. By far the best of them was the superlative North American F-86 Sabre. With its swept-wing design and (for its time) powerful General Electric J47 turbojet engine, the F-86 was conclusively the best single-seat fighter that fought on the United Nations (UN) side during the Korean War against North Koreans and their communist Chinese and Soviet backers.

North Korea, however, possessed a fighter every inch the F-86 Sabre's equal – the Soviet MiG-15 *Fagot*. A diminutive, swept-wing fighter, powered by a jet engine design that originated in Britain, the 'Fifteen' was to prove a very challenging opponent for USAF fighters in the classic air battles over North Korea.

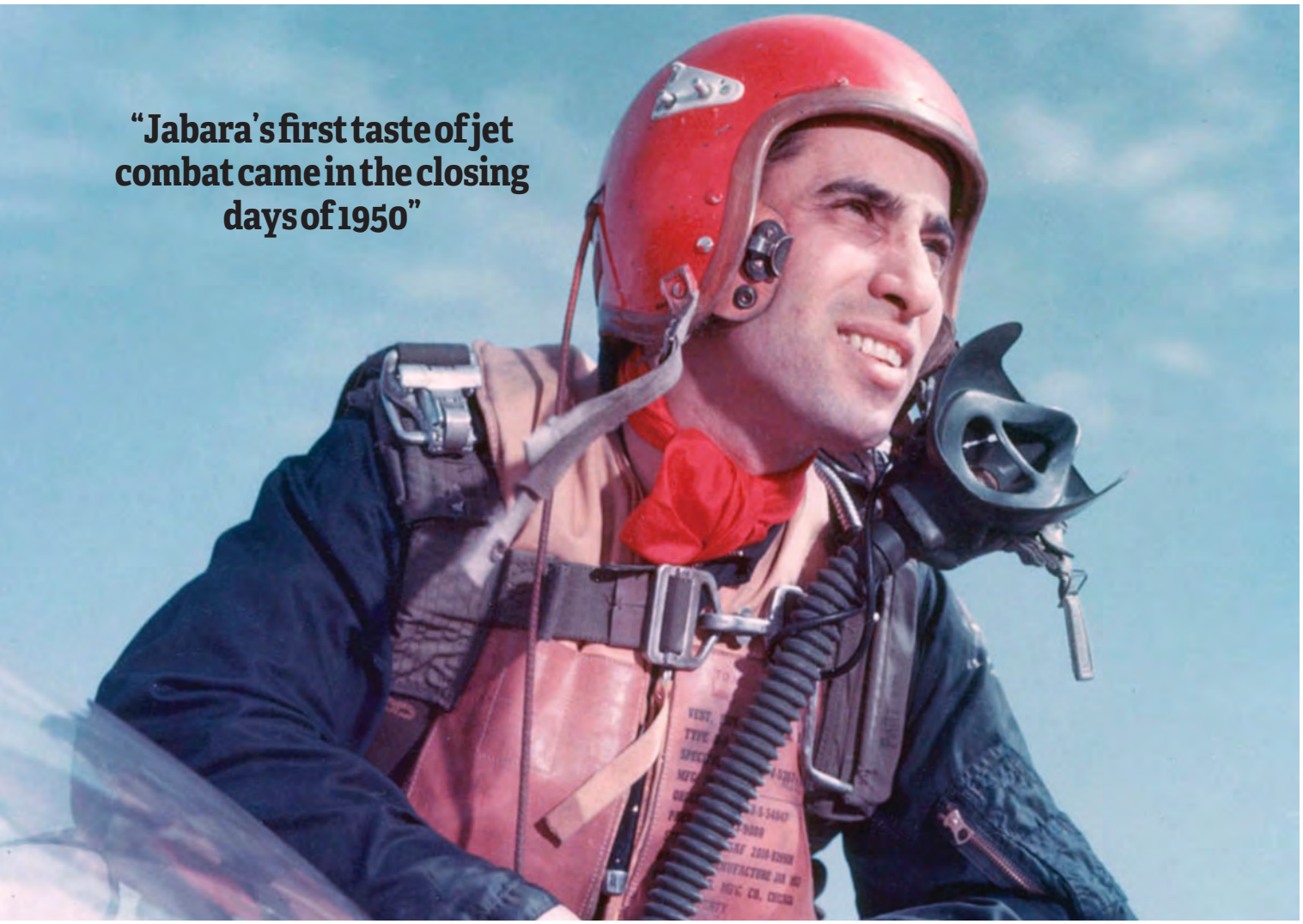
In its initial production F-86A configuration, the Sabre entered service with the USAF's 94th Fighter Squadron of the 1st Fighter Wing in 1949 and was therefore entering increasingly widespread USAF service at just the right time for the coming war over Korea.

A formal photograph of 'Jabby' Jabara later in his USAF career. Besides flying F-86 Sabres in the Korean War, he was also an accomplished frontline pilot of the F-104 Starfighter during the late 1950s

Combat beginnings

James Jabara was born on October 10, 1923 at Muskogee, Oklahoma. He was of Lebanese descent, his parents originating from a town in the south of what is present-day Lebanon. Universally known by his nickname 'Jabby', Jabara was distinctive by his small stature (reputedly just 5ft 5in tall), which potentially stopped him from being a frontline pilot. Nevertheless, he enlisted in the USAAF during 1942 and eventually gained his pilot's 'wings' and a commission as a second lieutenant at Moore Field, Texas in early October 1943.

He was subsequently posted to England and completed two combat tours, flying the excellent North American P-51 Mustang piston-engined fighter. The first was as a member of the 363rd Fighter Group (FG) of the Ninth Air Force, the second with the



"Jabara's first taste of jet combat came in the closing days of 1950"

Jabara is regarded as the world's first jet-versus-jet fighter ace. Pictured here during his second combat tour in the Korean War during 1953, he was already a national hero for his exploits during his first detachment of 1950-51

355th FG of the Eighth Air Force. During his time with the 363rd he achieved 1½ aerial victories (the half being a shared claim with another pilot).

He remained in the USAAF after the war and transitioned to the USAF on its formation in 1947. This continuing service gave him the opportunity to fly a jet fighter for the first time in 1948, when he piloted a Lockheed F-80 Shooting Star. Immediately impressed with its speed and power, he was later to become a star himself of this genre of warplane.

Eastern arena

The Korean War began in June 1950 with the invasion of the Western-leaning South Korea by the communist North. A considerable number of USAF units were committed to fight over Korea during the conflict's early stages. Among them, crucially, were squadrons equipped with the F-86A Sabre. Jabara was then serving with the 334th Fighter-Interceptor Squadron (FIS) of the 4th Fighter-Interceptor Wing (FIW). This unit had a lineage that traced back to its achievements while flying the P-51 Mustang as the 4th Fighter Group with the US Eighth Air Force in England during World War Two. It became a highly successful outfit during the new conflict over Korea.

Deploying to Johnson Air Base, Japan in November 1950, the wing was assigned to the USAF's Fifth Air Force and was soon involved in aerial combat with North Korean fighters. Initially the North Koreans had been equipped with a miscellany of propeller-driven warplanes, but help had come early in the war with the import of MiG-15 fighters (and much additional air and ground equipment). These warplanes were supplied by the Soviet Union and flown by seasoned Soviet pilots (Chinese aviators were also involved in the conflict), although this was hotly denied at the time by the Soviet authorities.

Jabara's MiG Kill Credits

1951 (F-86A)

April 3
April 10
April 12
April 22
May 20 x 2

1953 (F-86F)

May 16
May 26 x 2
June 10 x 2
June 18
June 30 x 2
July 15

Note: The aerial victory scores related in this article are the officially recognised achievements of USAAF/USAF fighter pilots as published by the Albert F Simpson Historical Research Center/Air University at Maxwell Air Force Base, Alabama, and in the writings based on official documents by Frank Olynyk of the American Fighter Aces Association.

Jabara's first taste of jet combat came in the closing days of 1950, and he was credited with the probable destruction of a MiG-15 on December 30 in the vicinity of the North Korean town of Sinŭiju. Situated near the border with China, this location became an area of considerable aerial tussles, with a specific part of northwestern North Korea, south of the Yalu River, being referred to by the Americans as 'MiG Alley'.

The US fighters were tasked for a greater part of the air war with the protection of other UN aerial assets, particularly USAF Boeing B-29 Superfortress heavy bombers being used to considerable effect against North Korean infrastructure and industry. They were also given the chance to seek and destroy North Korean fighters whenever this became possible.

A line-up of F-86A Sabres operated by the 4th FIW, in 1951. Jabara initially flew with this unit's 334th FIS in combat over North Korea, although he was technically on attachment with the same wing's 335th FIS on May 20, 1951 when he was acclaimed for becoming the first jet ace

Shoot-down success

On April 3, 1951, Jabara was involved in another dogfight with North Korean MiG-15s and was credited with his first shoot-down. According to documentation regarding that occasion, he was flying an F-86A with which he has become closely associated, serial number 48-257 coded FU-257.

He was then a captain. Several successes quickly followed and he achieved further 'kills' on April 10, 12 and 22. At that point he was one victory short of becoming an ace.

During that period the 4th FIW began moving from its Japanese airfield to Suwon AB in South Korea, although it had already forward based some of its assets on the Korean mainland.

On May 20, 1951, Jabara was flying as a part of a 4th FIW formation mainly drawn from the 335th FIS, which encountered a large number of North Korean MiG-15s. On this occasion he was recorded as piloting F-86A 49-1319 (some sources claim it was 49-1318). He jettisoned the Sabre's underwing fuel tanks, but one remained with the aircraft. In theory he should have aborted his sortie at that point, but apparently eager to search for his fifth victory he nevertheless joined the ensuing melee.

Jabara was subsequently credited with two MiG-15s shot down, making his fifth and sixth victories. He observed one of the MiGs exploding under fire from his six .50 cal machine guns, although he did not see the second example crash.

Nevertheless, this was a major achievement and Jabara was immediately lauded as the first jet ace. As a result, he was rapidly removed from operations: he had instantly become too valuable to lose in combat.

Returned to the US, Jabara was hailed as a national hero. His adopted family home of Wichita, Kansas held a parade in his honour. He duly attended numerous events and interviews, and eventually made a goodwill visit to Lebanon and his parents' home town.

Photographed during his first combat tour of the Korean War, Jabara appropriately posed with a line-up of F-86A Sabres of the 4th FIW. In the background is 48-257/FU-257, the aircraft he flew while achieving his initial aerial victories

Hailed in the press as the world's first jet fighter ace, Jabara was awarded the Distinguished Service Cross, the second highest American decoration for military achievement or valour.

Adding to the tally

On his request, Jabara returned to the front line during early 1953. He rejoined his old unit, the 4th FIW, which by that time had moved to Kimpo AB in South Korea. Promoted to major, he initially flew the F-86E before transitioning to the more powerful F-86F Sabre. His best-known 'mount' was 52-4513/FU-513.

Triumph quickly followed. On May 16, 1953 he shot down a MiG-15, and this was quickly added to by further successes; a full list of the victories officially credited to him is included on page 102. By that time the improved MiG-15bis had entered North Korean service, but USAF documentation did not differentiate between the basic MiG-15 and its MiG-15bis versions.

The Korean War ended with an uneasy armistice in July 1953. Jabara finished the conflict with a total of 15 MiG kills, which made him the second highest scoring USAF pilot of the war.

In the latter stages he had been involved in a rivalry with another Sabre pilot, Capt Joseph McConnell Jr of the 51st FIW, a competition won by the latter with a total of 16 MiG-15

RIGHT: On return from his famous combat on May 20, 1951 when he 'made ace', Jabara was reputedly carried in triumph from his F-86A by two fellow pilots, apparently re-enacted in this image for the cameras beside F-86A 49-1318

F-86 Sabre vs MiG-15

An important role of the Soviet and Chinese-flown MiG-15s during the Korean War was to intercept USAF B-29 Superfortresses. The operating altitude of these bombers gave the MiGs a slight advantage over their Sabre adversaries in terms of overall performance – and in a close dogfight. But at lower levels the Sabre had the edge, especially in being able to turn more tightly. Writing of his combat experiences, Jabara himself felt the Sabre was superior below some 30,000ft.

The MiG-15 had greater firepower (2 x 23mm cannon and 1 x 37mm cannon) compared to the various marks of F-86s deployed to Korea (6 x .50 cal machine guns), but the Sabres had far better computing gunsights. The MiG-15 also had a much superior climb rate, possessing a finer thrust-to-weight ratio than the larger and heavier F-86.

Nevertheless, the Sabre was faster at lower levels. As with all aerial combat, however, the abilities of the pilots concerned also played a major part. Interestingly, some Soviet pilots of the Korean War were – like their US counterparts – veterans of combat in piston-engined fighters during World War Two.

Jabara seated in an F-86 Sabre. For a time he was one of the most photographed aviators in the western world, his fame having spread much further than his native US

Distinguished duo: Jabara (centre) with famous US World War One fighter pilot Eddie Rickenbacker (left). Jabara's small stature is obvious

"He observed one of the MiGs exploding under fire from his six .50 cal machine guns"

victories – all of McConnell's 'kills' were achieved in 1953.

Scoring problems

As with so many incidents during aerial conflict, some of Jabara's air combat victories have come into scrutiny years after the event. More recent examination of Soviet archive documentation has even called into doubt the timing of Jabara becoming a jet ace. During the famous Sabre versus MiG-15 dogfight in which Jabara made his two shoot-downs and became an ace, the Soviets recorded just one MiG-15 being lost and at least one source suggests that Jabara actually did not become an ace until his second Korean tour in 1953.

Jabara remained in the USAF after the Korean War. In the late 1950s he became specifically involved with the Lockheed F-104 Starfighter programme. In early 1958, he joined the 337th FIS at Westover Air Force Base, Massachusetts, flying frontline F-104s. During the 1958 Quemoy and Matsu crisis with communist China, Jabara and the 337th FIS briefly deployed to Taiwan, where the Starfighters were flown near the coast of mainland China for several weeks to deter Chinese aggression and 'fly the flag'.

Jabara was latterly to serve, albeit briefly, in Vietnam. It was to be his third and final war, and by then he was a full colonel.

Tragic ending

It is a sad fact that many wartime heroes, having survived all that a conflict can throw at them, end up succumbing to a needless peacetime accident. This was certainly true for Jabara. In anticipation of a full combat tour in Vietnam, Jabara with his wife, son and three daughters intended to relocate to South Carolina. On November 17, 1966, he was the passenger in a Volkswagen being driven by his 16-year-old daughter Carol Anne on their way to the new home, when the car crashed. Both Jabara and his daughter subsequently died from their injuries. They were buried together at the Arlington National Cemetery for US military personnel. News of his death shocked America and resulted in many tributes. Tragedy struck again in January 2002 when his grandson, Nicholas Jabara, was killed while undergoing USAF pilot training in a Cessna T-37.

'Jabby' remained in high esteem within the US military long after his death. Each year the USAF Academy graduates association bestowed the 'Jabara Award' to one of its members whose accomplishments were particularly noteworthy.

A James Jabara Memorial Foundation was set up in his honour, and an airport northeast of Wichita was renamed the Colonel James Jabara Airport. **FP**

Red Star Encounter

During a historic fighter sweep over Berlin on April 16, 1945, pilots of 611 and 422 Squadrons, Royal Canadian Air Force, encountered their Soviet allies aloft for the first time. **Andrew Thomas** picks up the story

As the air war moved towards its final phases in early 1945, RAF Bomber Command launched frequent raids deep into Germany, while continuing to strike the remnants of the Kreigsmarine surface fleet – including the pocket battleship Lützow. Anchored in the shallow waters of Swinemünde in Germany's western Pomerania (now Poland), the vessel was targeted by 18 Lancasters of 617 Squadron on April 16.

Their escort for the mission was the North American Mustang Mk.IVs of the Hertfordshire-based Hunsdon Wing comprising 611 and 422 (RCAF) Squadrons. With 611's Norwegian ace Lt Col Werner Hosewinckel Christie leading, Sqn Ldr Mitch Johnston of 442 was at the head of 12 of his unit's aircraft.

Taking off from Hunsdon and turning towards the Baltic coast soon after 1430hrs, 611 Squadron's Fg Off Phil Knowles later recalled: "We were a little late in making the rendezvous with [the bombers] over Europe and they called up to say that if we did not meet in five minutes they were going home! We met OK, the weather was clear over the target and they bombed successfully, but the flak was extremely intense and a Lanc' was lost. It was a terrible sight to see such a big machine spiralling down in flames with bits falling off. We heard later that the Lutzow [sic] had been sunk. Swinemünde was fairly close to the Russians and we could hear them clearly on the R/T."

Despite the loss of Sqn Ldr John Leonard Powell's Lancaster with no survivors, the raid was a success; the Lützow, hit by a single 12,000lb Tallboy bomb, was sunk.

BELOW: **Mustang mix: Fg Off Len Wilson's mount on April 16, 1945 when he shared in 442 Squadron's final 'kill' was KH647/ Y2-H – seen here at Hunsdon around the time of this historic action** A J MALLANDAINE

BELOW, RIGHT: **During the skirmish, Fg Off George Jones claimed his only 'kills' of the war**
611 SQN VIA A P FERGUSSON

BELOW: **Battle weary: Sqn Ldr David Seaton (left) – CO of 611 Squadron – looks drained as he debriefs at Hunsdon following the action on April 16, 1945**
611 SQN VIA A P FERGUSSON

After seeing that 617 was heading for home, Werner Christie (flying his personal machine KH790/WHC) led the Mustangs south on a fighter sweep towards Berlin. While the Hunsdon pilots had heard Russian chatter on the radio over the Baltic coast, they were about to encounter their Soviet counterparts for the first time.

Approaching Berlin, WO John Greenman of 442 Squadron reported seeing unusual aircraft, and 611's Flt Lt Brian 'Grouse' Partridge – piloting KH730/FY-D – recognised their red stars. He quickly identified them as a pair of Soviet Air Force Ilyushin Il-2 Sturmoviks escorted by a gaggle of Yakovlev Yak-9 fighters.

During a radio interview the following day, Partridge revealed: "We got within 100 yards of them, and as we passed we waggled our wings in greeting to our Allies. Several of us gave the 'V-sign' and the Russian pilots waved to us. It was a great experience for our squadron to have the honour of being the first to meet the Russians." In his logbook he noted: "Ramrod Swinemünde & sweep Berlin area. Escorted 25 Lancs bombing cruiser in port area. Excellent bombing; 1 Lanc hit and crashed. Headed south & made 1st acquaintance with Russian a/c – 6 YAK 9 fighters & 2 Stormovik bombers."

Mustang melee

This already eventful mission took a dramatic turn before the Hunsdon Wing turned for home. At 1750hrs while flying northeast of Berlin at

"It was a terrible sight to see such a big machine spiralling down in flames with bits falling off"

10,000ft, the Mustang pilots spied a horde of Luftwaffe machines – including sleek Messerschmitt Me 262s – parked on the airfield near the town of Finow. As they did, a formation of 20 enemy fighters appeared. Quickly identifying them as short-nosed Focke-Wulf Fw 190s, Werner Christie closed in: "I opened up on the leading aircraft of a formation of three with a five-second burst from a range of about 150 yards. Observing strikes on portside of the engine and cockpit, I noticed his starboard wingtip was also damaged… Smoking badly, it continued straight ahead, so I pulled out to port to make another attack from about 200 yards, before closing in to about 50 yards and ending up directly behind.

"I fired several short bursts lasting about ten seconds and

BELOW: **Seen here at RAF Digby, Lincolnshire sometime in May 1945, Mustang Mk.IV KH680/Y2-B – nicknamed 'The Edmonton Special' – was allocated to 442 Squadron's Flt Lt Ken Charman on April 16**
A J MALLANDAINE

again observed strikes on the cockpit, engine and along with the wings – as I did, the port wing fell off. The aircraft quickly rolled five or six times horizontally before it crashed in flames into a wood." It was the 27-year-old Norwegian's tenth and final victory.

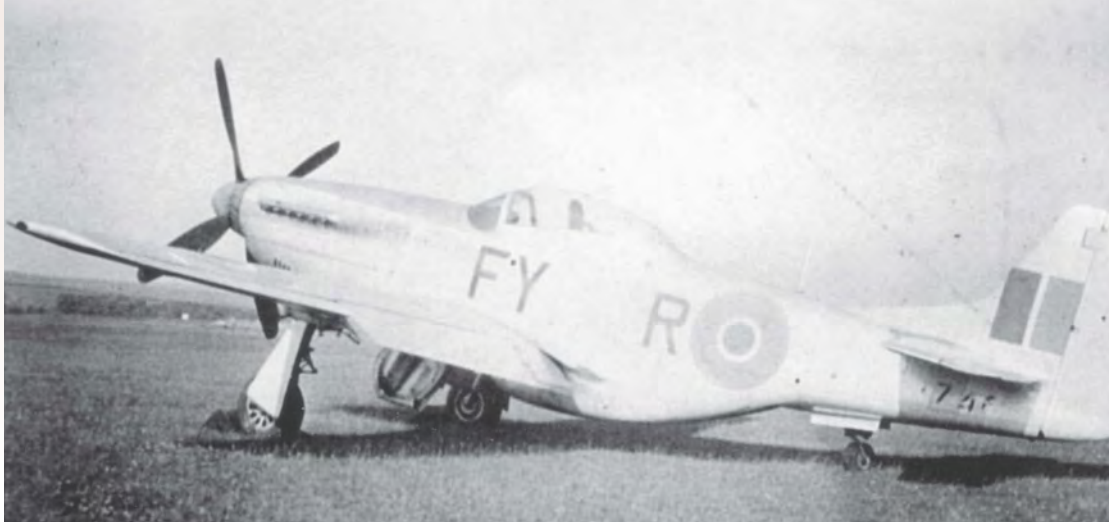
With a ferocious skirmish ensuing, the rest of 611 Squadron also engaged the enemy fighters. Destroying one and damaging another, 'Grouse' Partridge later recorded: "I attacked with a long burst at 400 yards – scoring strikes first on the rudder, which seemed to shatter, and then on the root of the port wing where pieces fell away. I closed to 150 yards and gave a short burst seeing hits on the port side of the fuselage. The enemy aircraft suddenly turned very sharply to port and dived rapidly away – though I did not see it crash, Plt Off Ward confirmed it hit the ground."

By then, at about 4,000ft, 'Grouse' spotted another enemy formation 2,000ft below him and gave chase: "I overhauled them fairly rapidly [and] attacked the number two at 500 yards – giving short bursts as I closed. I saw strikes first on the cockpit and then all over the fuselage and [it] slowed down losing height over the edge of the airfield." Claiming this as damaged, he noted in his logbook: "…spotted 10 Fw 190s in region of Finow & Eberswalde. Wing bag 6-3-1. Claim 1 destroyed & 1 damaged." However, the honours of the day went to Fg Off George Jones...

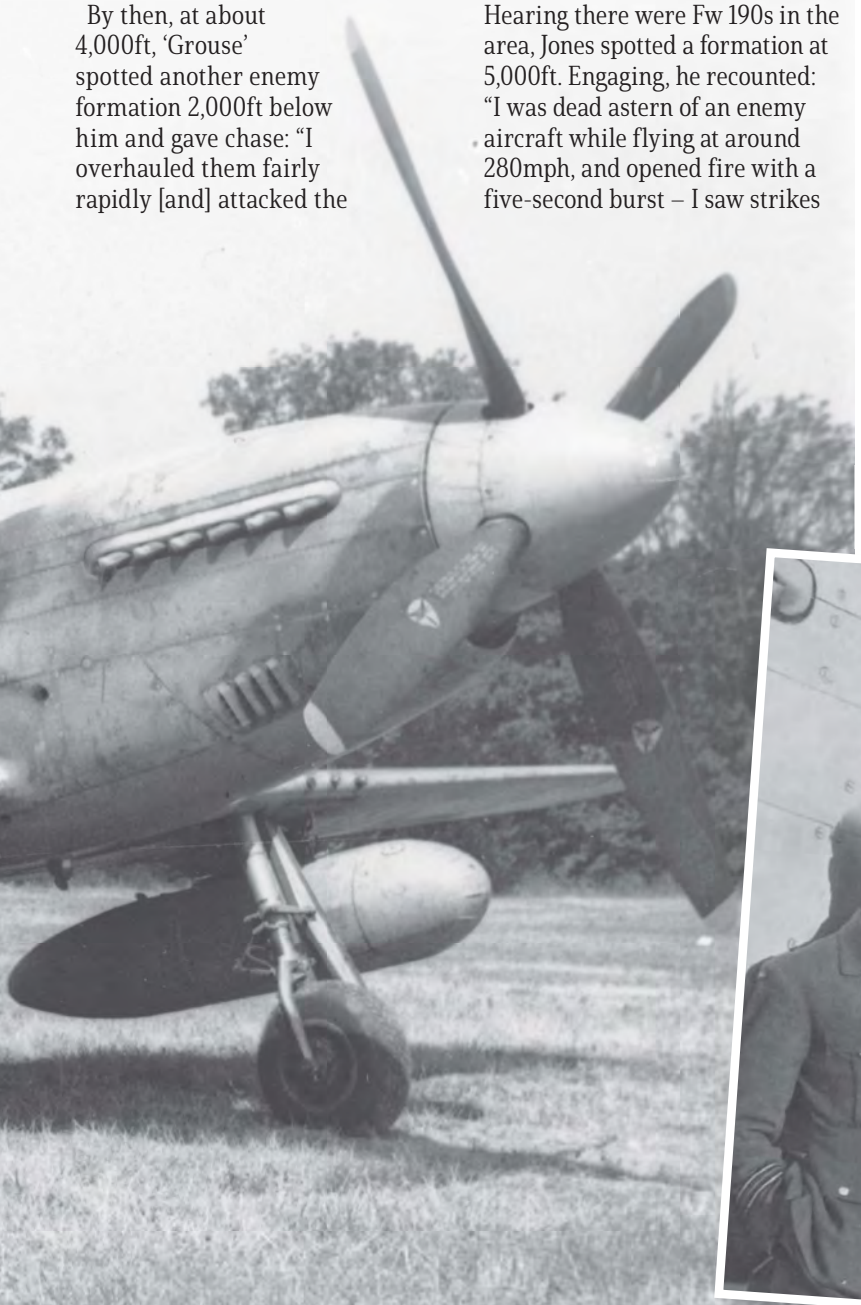
Hearing there were Fw 190s in the area, Jones spotted a formation at 5,000ft. Engaging, he recounted: "I was dead astern of an enemy aircraft while flying at around 280mph, and opened fire with a five-second burst – I saw strikes on the fuselage, before it burst into flames, plunged down and blew up on hitting the ground in a nearby wood. Pieces of the enemy aircraft flew past me and oil covered my windscreen, and as I climbed away into sun [another] Fw 190 dived past me – my number two, WO S Mack, fired a burst as it flew straight into the ground."

'Six Clobbered'

Spotting another enemy machine below him heading west, Jones wound his Mustang up to 400mph and gave chase. He recalled: "I was unable to see him through my windscreen until I was about 200 yards behind and just to the side of him due to the oil. I fired a short burst and found I was not scoring hits, so dropped directly behind him and gave another brief burst. I saw hits on the fuselage and mainplane so continued to fire until it began to fall apart. I followed it down and saw it crash into the ground. At the same time, Mack attacked another Focke-Wulf, succinctly describing how he



ABOVE: **North American Mustang Mk.IV KH746/ FY-R was being piloted by 611 Squadron's Fg Off Wilding when the unit encountered the Soviet aircraft over Berlin**
611 SQN VIA A P FERGUSSON



BELOW: **The successful 442 Squadron Red Section poses for the camera – (front, left-right) CO Sqn Ldr Mitch Johnston and Flt Lt Vince Shenk along with (rear, left to right) Fg Offs Len Wilson and 'Rocky' Robillard**
A J MALLANDAINE

ABOVE: **Seen here posing with a Spitfire, Norwegian ace Lt Col Werner Christie led the Hunsdon Wing during its successful hunt over Berlin on April 16, 1945. He was shot down and captured just two days later** CHRISTIE

ABOVE, RIGHT: **The final 'kill' of 611 Squadron's war was claimed by Plt Off Ian Walker, pictured here. In his logbook he noted that it was: "...pouring black smoke, and rolled over to port in a dive"** 611 SQN VIA A P FERGUSSON

"...611 claimed five destroyed, one probable and two damaged"

had followed his section leader: "As we pulled into sun, I saw an enemy aircraft coming down on us head on – I was at about 8,000ft. I fired a two-second burst at a range of between 250-400 yards, and saw hits before he shot straight passed me into the ground."

Tackling a Fw 190, Ward witnessed several strikes as it dived away spewing black smoke – he was credited with one destroyed and one damaged. Plt Off Ian Walker flying KH743 downed another: "I closed to 100 yards and [fired] a prolonged burst – seeing strikes on the fuselage and starboard wing. The enemy aircraft immediately rolled over in a gentle dive to port as parts of the tail fell off." He wrote in his logbook: "After meeting some Stormoviks and 6 YAKS, we ran into our Hun friends, 6 clobbered. Got mine finally from 70 yds dead astern. Started pouring black smoke, and rolled over to port in a dive." In what was the squadron's final combat with the Luftwaffe, 611 claimed five destroyed, one probable and two damaged.

Led by Mitch Johnson, 442 Squadron's Red Section also engaged the Fw 190s, albeit in hazier conditions. During the subsequent 15-minute fight – its only engagement with the enemy while flying the Mustang – Fg Offs Len H Wilson and Roger 'Rocky' Robillard shared in the destruction of a single Focke-Wulf, while another was almost certainly destroyed by American Flt Lt Vince Shenk.

Of his first combat Len Wilson, who was flying KH647/Y2-H, disclosed in his after-action port: "I was flying Yellow 1 in Ramrod 1542 sweeping Berlin area at approximately 1750 hours. Yellow 2 (Flg Off Robillard) and I chased a Fw 190. Yellow 2 gave a short burst, strikes seen, but he got out of position to continue the combat. I was about 1,000 yards away, closing rapidly to 250 yards, giving a 2-second burst with 5-10° deflection, the [enemy aircraft] caught fire and crashed into a small wood, exploding."

Flying Mustang KH668/Y2-T, 'Rocky' Robillard revealed: "I was flying as Yellow 2 in Ramrod 1542 sweeping the area around Berlin at 8,000ft at... 1750hrs. I followed my number one and we chased a Fw 190 – although I overshot Wilson and found myself in a position to fire. Engaging the enemy machine from 400-500 yards, I fired a two-three-second burst and saw strikes on the port wing and wing roots, before it dived to starboard – as if to crash. But it levelled out leaving me out of position to continue the combat. Wilson therefore closed to 250 yards and fired. I saw the aircraft catch fire and dive into the woods, exploding."

While 'Rocky' and Wilson were engaged, Vince Shenk spotted another '190 on the tail of a Mustang and forced it to break off, before a long burst from the Canadian's guns caused the German fighter to roll onto its back and plummet towards the ground. With the action all but over Werner Christie reformed the wing and led it home, both squadrons having claimed their final 'kills' of the war. The Mustangs landed at Hunsdon at 2030hrs after their historic and eventful Berlin rendezvous. **FP**

Fg Off Art Nowlan sits nonchalantly on the wing of 442 Squadron's KH668/Y2-T at Digby in May 1945. On April 16, it was flown by 'Rocky' Robillard during the destruction of a Fw 190 A J MALLANDAINE

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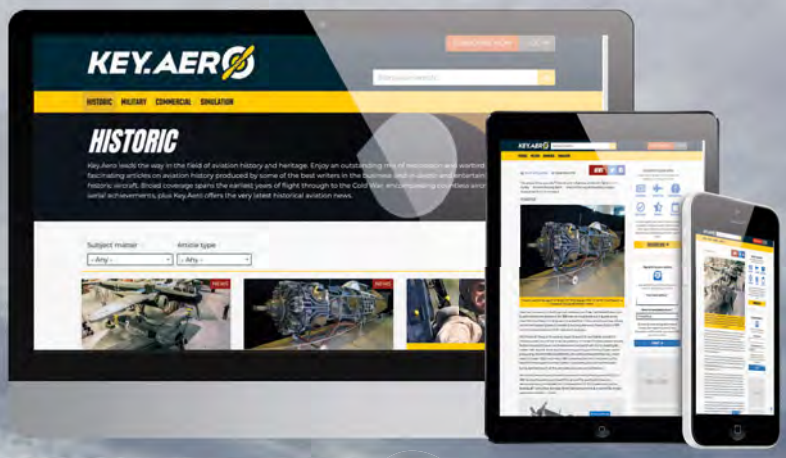

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Firing a child's imagination

Star letter

I was most interested to read about the Hawker Fury biplane in the March issue. When I was six or seven in 1942 or 1943, the Fury was the first aircraft I ever sat in, an experience which I still remember well. My father, a Royal Navy man, must have heard that a Fury was on show at Clewer, near Windsor, and decided to take me, an acknowledged aeroplane nut, to see it.

As I recall, the Fury was not in camouflage and I don't think it had wheel spats on the undercarriage. I do remember that it had a two-bladed wooden propellor which was broken, missing half of one of its blades. I wonder what happened to that inspiring aircraft?

At Eton some years later, I met [Hawker designer] Sydney Camm's brother, F J Camm, while out fishing. He was to model aircraft what his brother was to full-sized ones. They were Windsor boys and both became highly influential in their fields... Sydney was our finest and most significant aircraft designer. He was in the game from Tomtit to Harrier.

At that age I was encyclopaedic on aircraft recognition and was the arbiter when grown-ups needed help. The adult that boy turned into became a pilot with his own much-adored Piper PA23E Aztec, G-BBSL. He's now rather part-worn and grounded, but remains interested and an avid reader of your excellent publication, for which many thanks.

NEALE EDWARDS
CHARD, SOMERSET

Hawker Fury Mk.I K1938. This aircraft was written off on July 13, 1938 while with 11 Flying Training School at Wittering, Cambridgeshire KEY COLLECTION

Cuban Hawker Sea Fury

Mention of the 1961 Bay of Pigs invasion in the article about [warbird legend] 'Connie' Edwards (March issue) reminded me of this photo. It's interesting to know that British-built equipment played a part, though whether that's a positive or not will depend on your political standpoint. Havana, in Cuba, might not seem an obvious place to spot a Sea Fury. I believe it had been supplied to the Batista regime and then taken over by Castro – by all accounts it proved highly effective.
KEITH OTTO VIA EMAIL

Call of nature

Regarding *Atomic Delta* in the March issue, the Mirage IV was a stunning aircraft but the Dassault team failed to take into account one basic piece of equipment. Despite being capable of staying airborne for 15 hours at a time, it was conceived with no "pipi room" as Bernard Jeanjean described it in the Forces Aériennes Stratégiques newsletter in 2009. He relates the struggle its pilots had with Dassault engineers to get some form of relief tube installed in the aircraft. Not as straightforward as it sounds, because urine freezes at –56° at subsonic speeds. Dassault said that designing one would be too costly and, regarding the risks of 'pollution' given the proximity of the potential 'outlet' to the radar and radio altimeter , they were reluctant to incorporate one in the aircraft. A solution was eventually found, although this had nothing to do with any foresightedness on the part of Dassault.

NEIL PAGE VIA EMAIL

Hero at Herne Bay

I greatly enjoyed Ken Ellis's report on airfields of the north Kent coast in the March issue. I hope Ken was also able to see the statue of designer Barnes Wallis. It stands on a tall plinth, a figure with hands on hips, binoculars round neck, gazing seaward. One of his bouncing bomb prototypes is in the Seaside Museum.

I hope too that Ken popped into All Saints, Eastchurch, which has a stained glass window dedicated to the memory of two pioneers of flight. Designed by Karl Parsons and erected in 1912, it commemorates Charles Stewart Rolls and Cecil Stanley Grace. Rolls was killed in July 1910 when the tail of his Wright Flyer broke off during a display near Bournemouth. Grace disappeared in a Short S.27 over the Channel in December 1910 when competing for the Baron de Forest prize for the longest England-Europe flight. It is a fitting memorial.

Attempts have failed to resurrect the airport [Manston]. Its conversion to a Brexit lorry park isn't a good omen.

LESLIE SMITH
BILTING, KENT

The stained glass window in All Saints church
LESLIE SMITH

The statue of Barnes Wallis on the seafront in Herne Bay DAVE INGREY

Canadian connection

Thank you for the great piece on the Boeing B-47 Stratojet (January issue). It's a testament to America's commitment to air power that they bought more than 2,000 of what was initially thought to be an unsuccessful aircraft. I was pleasantly surprised to note your coverage of one little-known use of the aircraft – as a testbed for the Orenda Iroquois advanced turbojet slated for Canada's Avro CF-105 Arrow.

I noted a few other Canadian links in that issue's *Ice Aces* article about the pioneering days of Antarctic aviators. I spotted the DHC-2 Beaver on wheel-skis, circling overhead the upturned Auster in the lead photo. The other aircraft of note is the Barkley-Grow floatplane. Although they were built in the US (Canadian Car and Foundry bought the rights, but did not build any), most were used in Canada, many as bushplanes on skis and floats. Of the 11 produced, all three survivors are in museums in Alberta.

I encountered one based in northern Manitoba around 1960. It's sobering to think that this was only 20 years after your historic photo was taken, but is now a 60-year-old memory for me!

Talk about 'relics'!

CHARLES J JENNISSEN
ALBERTA, CANADA

Lost over the moors

I enjoyed the excellent *Classics* feature by Malcolm V Lowe on the Hawker Fury biplane (March issue). George 'Ben' Bennions flew the type with 41 Squadron before the war, but he had one flight that nearly cost him his life. On a routine navigation exercise he flew to North Coates in Lincolnshire, then set off home. He decided to fly up the coast to Scarborough then turned on to a westerly course. It became a desperate fight for survival.

As he flew over the North York Moors the cloud base steadily lowered until he was forced to climb, as the highest part of the moors was at more than 1,300ft. As he ascended, his wings started icing up to the point that he couldn't get any more height. He said: "After several minutes in this situation I decided to end this nightmare and pushed the stick forward. As I broke cloud I was diving down a notch on the edge of the moors [where the B1257 from Helmsley crosses to Stokesley]. I couldn't believe my luck. I wasn't certain where I was but saw a bus below. I circled it and saw it was indicating Stokesley. Bingo!"

He later became a successful fighter pilot in the Battle of Britain and was awarded the DFC, flying Spitfires with 41 Squadron – but with skills acquired in a Fury.

IAN GILBERT
PITLOCHRY, SCOTLAND

Polar pioneer

Robin Evans's feature *Ice Aces* in the January issue was interesting, but I'd like to mention another of the foremost British pioneers of mid-1930s polar aviation, Wilfred 'Wally' Hampton.

His first such venture was with the British Arctic Air Route Expedition led by 'Gino' Watkins in the early '30s. Wally was just 25 at the time. Having studied aviation engineering he was the house builder, pilot, mechanic and general 'fixer'. They lived with the eskimos in Greenland and learned hunting and survival skills. Hampton made considerable design improvements to their sledges while the local people turned out to be very good at stretching Irish linen over Tiger Moth wings when repairs were required.

The two biplanes were used for mapping and laying out food and fuel dumps for the sledge parties. They operated on either skis or floats depending on the season. As a finale, Hampton and John Rymill decided to sledge, walk and kayak from the east to west coast of Greenland, completely unsupported. They might have perished but, being very tough, they just kept going. They were a month overdue on arrival and search parties had been called off.

Later that decade and at the other end of the world, the British Graham Land Expedition was led by Rymill, Wally's great friend, with Hampton second in command. They took a Fox Moth which had a two-man passenger cabin. This time they were mapping, and used sledges and huskies to get about as they had been taught in the earlier Arctic expedition.

There is much archive material in the records of the Scott Polar Research Institute within Cambridge University, and I am grateful for the detailed information supplied by Wally's son.

WG CDR IAN GAWN RAF (RTD)
SCILLÉ, FRANCE

'Civvies' in military clothes

The December 2020 issue featured a good article by Ken Ellis about the Imperial Airways fleet of Handley Page HP.42/45s, as well as the Armstrong Whitworth Ensigns and Short L.17 airliners. Their subsequent service in the RAF (or as civilian aircraft) was sometimes recorded in the annals of 609 Squadron – all three had parts to play in the unit's early years.

Mobilised on August 24, 1939, the squadron was ordered north from Yeadon, Yorkshire, to Catterick for five weeks. Transport was partly provided by two commandeered delivery trucks and a pair of Ensigns. At Catterick, 609 collected a full complement of Spitfires, before moving to Kinloss in Scotland after short stays at Drem and Acklington, Northumberland. On January 14, 1940, 42 airmen and an officer were taken from Kinloss down to Drem by an HP.45 *Heracles.* However, snow and gales featured that winter – and while HP.42s and '45s passed through occasionally, they often ended up snowed in or nearly bogged down.

Worse was to follow. On April 14, Short L.17 *Scylla* [one of only two made; the other was named *Syrinx* - ED] landed at Drem to collect Imperial Airways ferry pilots. A gale was brewing. Although accounts suggested the aircraft was picketed down but later broke free, the definitive report comes from the 609 Squadron duty pilot, Sgt John Beard. As the L.17's Capt Payne relaxed in the Officer's Mess, Beard became concerned that the four-engined biplane was visibly rocking in the strengthening wind. In a phone call to Payne, Beard expressed his concern but was told not to worry. Increasingly anxious, he made two further calls, which received similar responses. Calling for a fourth time, Beard informed Payne that his aircraft had assumed an inverted position.

The stricken machine was leaking 87-octane aviation spirit, so 609 groundcrew mounted a guard to ensure that only its own squadron could collect the fuel in cans, later to be used for running cars and motorcycles. Witnesses reported that the radio operator, as duty crewman in *Scylla*, had appeared in the rear doorway to answer a call of nature when the aircraft went over. He was reported to be shaken but unharmed!

DAVID DARLEY
PRESIDENT, 609 (WR) SQUADRON ASSOCIATION

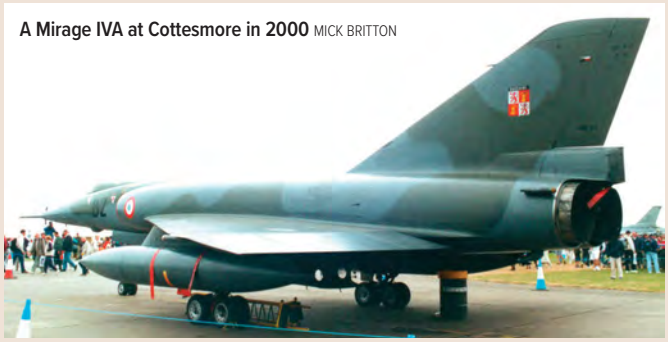
An archive view of Short L.17 G-ACJJ 'Scylla' KEY COLLECTION

Quelle surprise

In keeping with the distinctly Gallic flavour of the March issue, I am composing this between glasses of Cognac and prior to lighting another Gauloise. While I enjoyed the cover feature on Pierre Clostermann, the *pièce de résistance* was the article on the Mirage IVA. It does not seem so many years ago that the publication of such a feature would have been inconceivable, such was the secrecy surrounding France's nuclear deterrent. The type was rarely seen outside France and never at UK military airshows. I wonder if it ever attended Farnborough, as I don't recall a mention of it in any report down the years.

While they did occasionally participate in UK air exercises, they invariably flew round-robin missions from their home bases and never landed in Britain, unlike the Mirage IIIs and Jaguars. It was not until RIAT 2000 at Cottesmore that I saw one on static display (although one had previously attended in 1994). By then it had been relegated to reconnaissance duties, having ceded the nuclear strike role to the Mirage 2000N. It is also worth noting that one of the units that operated the type (EB 1/93 'Guyene') had previously served as 346 Squadron, French Air Force, at Elvington, now home to the Yorkshire Air Museum, which has the only example of the type in the UK.

MICK BRITTON VIA EMAIL



A Mirage IVA at Cottesmore in 2000 MICK BRITTON

In praise of the ATA

I read the excellent article about aviator Amy Johnson in the February issue of with a degree of sadness, as my mother knew Amy in the Air Transport Auxiliary (ATA) during World War Two.

She said that Amy was always a rather unhappy soul. She also knew Amy's ex-husband, the pilot Jim Mollison, who also served in the ATA.

There are many theories about Amy's demise, not least the rumour that she was carrying a secret agent to France. All rather fanciful, methinks.

Many of the ATA pilots suffered the same fate as Amy – notably Susan Slade, who was lost in a Wellington near to Little Rissington. The pressure to deliver aircraft in wartime must have been very great and combined with poor winter weather you have a recipe for disaster.

As an aside, my mother noted that the name of one of her friends – Irene Arkless – was missing from the ATA memorial. Irene was killed when her Airspeed Oxford hit a house shortly after take-off.

I contacted [ATA legend] Lettice Curtis about this and she told me that the official records indicated that Irene had left the ATA. Lettice was grateful to me for pointing out the error and I got a lovely letter from her. Consequently, Irene's name was added to the memorial at White Waltham, which gave both my mother and I great pleasure.

All things considered, the ATA pilots did a sterling job during the war, not least releasing other pilots to serve on the front line.

SQN LDR MICHAEL BARNES
SLEAFORD,
LINCOLNSHIRE

Comet in the spray

Regarding readers' Comet memories, my anecdote dates from my plane-spotting visits to Heathrow as a 13-year-old, around 1965. Aircraft were landing on a soaked runway 23, while my friends and I were stationed at the west end of the Queens Building for a good view. A United Arab Airlines Comet landed and employed reverse thrust to assist braking on the wet surface. To our amazement, it almost disappeared from view as the fuselage and most of the wings were obscured by spray – only the tips of the tail fin and wings and the nose remained visible. We couldn't believe what we'd seen, but sadly didn't have a camera handy. Later, I realised this must have been a fairly common occurrence for aircraft such as the Victor, Vulcan and Nimrod.

PHILIP COLE
GILLINGHAM, KENT

In *FlyPast*...

5 years ago

Our June 2016 edition reflected on the air component of Operation Barbarossa, Germany's ultimately ill-fated invasion of Russia.

10 years ago

This issue put the legendary Hawker Hunter jet in the spotlight, examined Lancaster 'ops' over the Ruhr and described Vulcan XH558's move to a new home.

20 years ago

Two decades ago we detailed the discovery of a Spitfire off the coast of Egypt, and broke the news of SR-71 and T-33 roll-outs at Duxford.

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Aerial arsenal

FlyPast Product Of The Month

www.canfora.se
USAAF AIRCRAFT WEAPONS OF WWII, TOM LAEMLEIN, SBK, ILLUS, 160PP, £26.99

It is rare that aircraft enthusiasts are treated to a book focused solely on airborne armament. This lavishly illustrated title from Swedish publisher Canfora excels in its efforts to highlight the bombs, machine guns, cannon and rockets toted by flying machines of the United States Army Air Corps in World War Two. The initial thrust centres on weapons fitted to types such as the P-38, P-39, P-40, P-47 and P-51; some are shown in their 'bare' state as well as installed. Bombers are not ignored, as there are many studies of the defensive guns equipping the A-22, A-26, B-17, B-24 and other types. One fascinating section centres on the multiple strafing guns fitted to B-25 Mitchells – these were fixed in the nose, and/or on the fuselage. The imagery is mainly black and white, startlingly clear for the most part, although colour shots are included and often reveal the paint and metal hues of the ammunition. Other standout subjects include the M10 triple rocket launcher along with bombs seldom seen in general aircraft/unit histories, such as the rarer AN-M41 fragmentation 'packages' and M56 4,000lb bombs. Much thought has gone into the photo selection, which includes some airframes rarely seen in print. A superb book for historians, enthusiasts and modellers. It's available in the UK from www.panzerwrecks.com

Quintessentially British

www.thehistorypress.co.uk
SECRET SPITFIRES: BRITAIN'S HIDDEN CIVILIAN ARMY, KARL HOWMAN AND ETHEM CETINTAS WITH GAVIN CLARKE, HBK, ILLUS, 191PP, £20

As Germany took the war to Britain in 1940, there was one thing above all that stood in its way, the Spitfire. New airframes were rolling off the production line almost as fast as the Luftwaffe was downing them. To prevent Spits reaching frontline squadrons, German high command ordered the bombing of Supermarine's Southampton factories on September 24 and 26. With the sites all but destroyed, they were convinced they had permanently halted manufacturing; little did they know that 'good old British ingenuity' would soon have round-the-clock production up and running within months, using dozens of secret locations within 50 miles of Southampton. This is the story of how Supermarine's clandestine workforce of women, children and non-combatant men built Spitfires in garages, hotels, barns, bus depots and even houses. Five chapters are generously illustrated with modern and period imagery, while the narrative reveals the planning and execution behind this huge undertaking. First-hand accounts detail the lives of the workers, said to have been responsible for the manufacture of almost half of all Spitfires. A remarkable story of willpower, secrecy, daring and determination.

Long-winged spies

www.casematepublishers.co.uk
HUNT FOR THE U-2, KRZYSZTOF DABROWSKI, SBK, ILLUS, 72PP, £16.95

This revealing book focuses on the interception of US reconnaissance aircraft by the Soviet Union and other Communist nations from 1959-1968. Well written and illustrated, it is a must for anyone interested in 'spy' flights. No examination of the subject would be complete without details of that most famous of shoot-downs – American U-2 pilot Francis Gary Powers was captured and imprisoned temporarily in the USSR. However, there is much more to learn here, and the book has detailed narrative on all manner of interceptions. It includes details of the aircraft employed (such as the Su-9, MiG-19 and MiG-21) and ground-based anti-aircraft systems. Inevitably, the U-2's missions over Cuba during the Missile Crisis are explored, as are the flights performed by the Republic of China Air Force (Taiwan) with U-2s and RB-57As. Maps, tables, diagrams, colour profile artwork and other illustrations provide context, helping to illuminate exactly how U-2s were countered. An excellent read.

‘Chota’ in action

www.militarysignaturearchive.co.uk
HURRICANE PRINT, £105
If aviation art is your thing, or you’re considering taking the plunge into collecting for the first time, this could be a worthwhile option. This print by Darryl Legg depicts Sqn Ldr Frank ‘Chota’ Carey in his Hurricane Mk.IIb Trop while in combat with Japanese Ki-27 Nates over Burma during

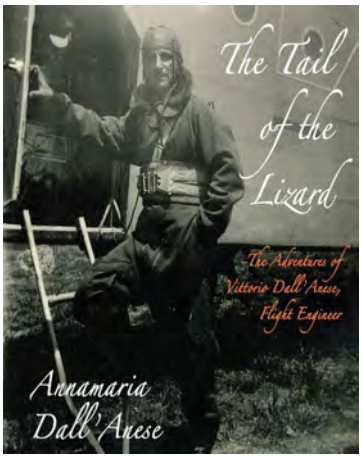
World War Two. It’s mounted impressively and includes all-metal RAF wings, a pencil sketch of Carey, the pilot’s signature and a replica Distinguished Flying Cross. Do note that the personal ‘FR-C’ codes shown on the fuselage are speculative, as evidence of this airframe wearing them is elusive. The print can also be supplied framed for £125, with either silver or gun metal hues, and all come with a certificate of authenticity.

Island wings

secretary@ciss.uk
PIONEER AVIATION IN THE CHANNEL ISLANDS VOLUMES ONE AND TWO, ROGER E HARRIS, SBK, ILLUS, 278PP/306PP, £30 EACH
A staggering amount of research has gone into these glorious books. Author Roger Harris is a member of the Channel Islands Specialists’ Society and while you might assume that the islands’ aircraft history is a niche subject, it turns out to be fascinating and the interesting types involved will appeal to enthusiasts. Volume One goes up to 1933, while the second focuses on 1934-47. Flying boats and floatplanes loom large, with types such as the Felixstowe, Sea Eagle and Calcutta appearing, but it also studies stunt and joyride flying, the first landplane to alight on Guernsey (and many other debuts), as well as the inaugural Jersey Aerial Pageant. Volume Two documents many firsts, especially in the era when aviation tourism became more common. Besides the many splendid photos, there are scans of tickets, advertising posters and timetables and the value of some of the ephemera pictured is supplied. To order, contact CISS secretary Richard Flemming via e-mail: secretary@ciss.uk or write to: 64 Falconers Green, Burbage, Hinckley, Leicestershire LE10 2SX, UK. There’s a £5 P&P charge per volume for UK orders. The CISS is offering *FlyPast* readers a discount: both volumes for £40 plus P&P.

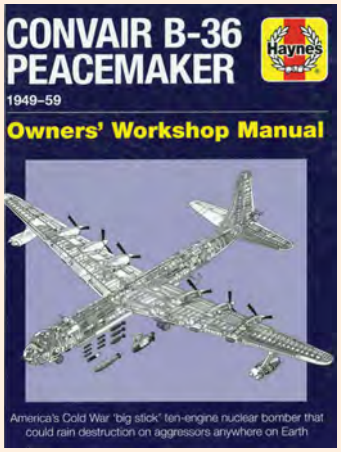
Against the odds

www.lulu.com
THE TAIL OF THE LIZARD: THE ADVENTURES OF VITTORIO DALL’ANESE, FLIGHT ENGINEER, ANNAMARIA DALL’ANESE, HBK, ILLUS, 128PP, £19.99, EBOOK £7.75
Like many who fought during World War Two, Vittorio Dall’Anese was a quiet and unassuming man who rarely, if ever, spoke of his experiences as a flight engineer with Italy’s Regia Aeronautica. But as time passed Vittorio realised he needed to tell his story. Spending countless hours alone with a voice recorder, he entrusted just one person with his thoughts and memories – his granddaughter, Annamaria. Aged just nine when her ‘nonno Vittorio’ died, it was 15 years before she dug out the tapes and heard his voice again. Listening to his tales of perilous flights, heart-stopping action during Italy’s North African campaign, tragedy, courage, betrayal and sabotage, she realised the significance of his words, both as a history and as a first-hand account of the desires, fears and passion of war. This is the result. In a series of short, heartfelt chapters, the narrative reveals a man who thought the only life worth living was one in the skies. Lavishly illustrated, the author has intertwined her own thoughts and impressions, adding to an already gripping story. An incredibly humble and eye-opening effort.



SAC’s big stick

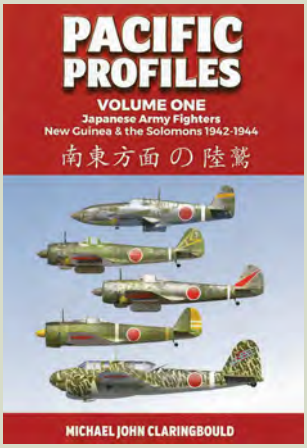
www.haynes.com
CONVAIR B-36 PEACEMAKER 1949-59, DAVID BAKER, HBK ILLUS, 220PP, £25
As the first post-war nuclear deterrent system operated by the USAF’s Strategic Air Command, the enormous B-36 melded piston and jet power. It will also be ever-famous as the star of the James Stewart film *Strategic Air Command*, before ‘Jimmy’ eventually flies the B-47. Haynes’ book, in its long-running *Owners’ Workshop Manual* series, tells the full story of this behemoth bomber, from its inception to



retirement and is packed with superb photos of the machine. There is a pleasing array of colour images, but even the black and white shots are clear and detailed. All the bomber sub-types are explained, along with the reconnaissance variants, but the narrative also runs to the XP-85 Goblin parasite fighter (trialled on the ’36), and other special projects. Many works in this series provide a section on operating a live example of the subject aircraft, but as there is no ‘warbird’ B-36, the book instead delves into the type’s day-to-day workings via accounts from former aircrew. With factory drawings and charts among the interesting text, this is an excellent foray into the subject.

Hinomaru rising

www.casematepublishers.co.uk
PACIFIC PROFILES VOLUME ONE, MICHAEL JOHN CLARINGBOULD, SBK, ILLUS, £26.95
It's always good to see more material on the Pacific air war, and this artwork-focused book ticks many boxes for those interested in the colours and markings of Japanese aircraft. The red-circle Hinomaru, or 'meatball' as it was known to the Allies, was a unifying insignia on flying machines that often looked very different in terms of their paint schemes. This softback examines the fighters of the Imperial Japanese Army Air Force during operations over New Guinea and the Solomons in 1942-44. It's claimed the artwork is the most accurate to date. Chapters are based around individual units, preceded by an overview of Japanese aircraft in the South Pacific and technical facts about markings. Each unit is covered generously, with a mix of colour profiles and three-views depicting the Ki-43, Ki-45 and Ki-61; it's pleasing to see renderings of captured aircraft in US markings. Black and white photos and some in colour provide further illustration in this worthy study.



Cold War vanguards

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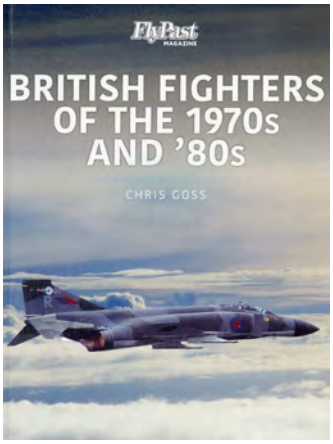
BRITISH FIGHTERS OF THE 1970S AND '80S, CHRIS GOSS, SBK, ILLUS, 96PP, £14.99
Key Publishing's book stable now features this photographic study of British interceptors through the later part of the Cold War. Focusing on the now iconic English Electric Lightning and the mighty McDonnell Douglas Phantom, it shows both aircraft in all their glory, using a worthy collection of mostly colour images. Author and *FlyPast* contributor Chris Goss charts the course of these capable defenders via images from the David Howley collection, and a creditable number of units and colour schemes are represented. The 'Senior Service' also gets a look-in as Fleet Air Arm F-4s are included as well as a section on the period in which the RAF leased former US Navy airframes, the latter designated F-4J(UK). With informative captions throughout, this is a wallet-friendly examination of these exciting historic jets.



Saluting friend and foe

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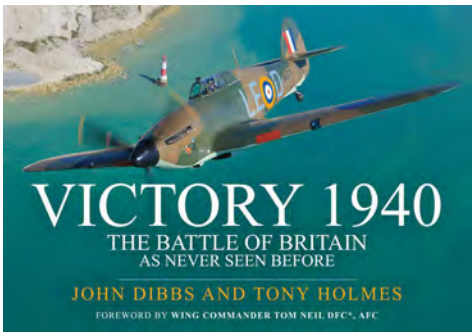
VICTORY 1940: THE BATTLE OF BRITAIN AS NEVER SEEN BEFORE, JOHN DIBBS AND TONY HOLMES, SBK, ILLUS, 224PP, £16.99
At the time of writing this review in late February 2021, there was just one known surviving Battle of Britain pilot. This makes the new edition of this masterful 224-page book all the more poignant, taking you into the heart of the battle. Led by an insightful foreword from Battle of Britain ace Wg Cdr Tom Neil, *Victory 1940* is a pictorial chronology spread across 11 chapters. Painstakingly restored period images share the pages with stunning modern day air-to-air photographs of surviving examples of types that fought during that defining summer. With firsthand accounts, combat reports and analysis, the well researched narrative uncovers the determination and respect for each other that fliers on both sides carried into the air. More importantly, it highlights the devotion to duty in the face of insurmountable odds. There is, as Tom Neil stated, "a need to implant in the minds of the young, the gallantry and sacrifices of those who fought in the Battle of Britain". *Victory 1940* does just that!



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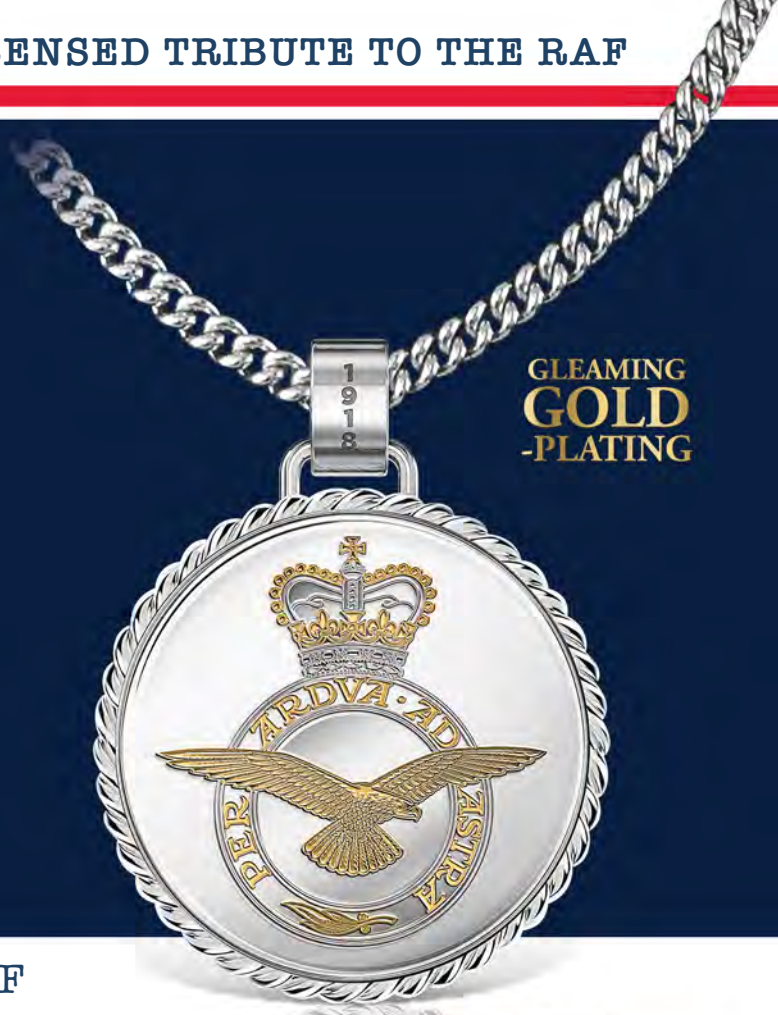

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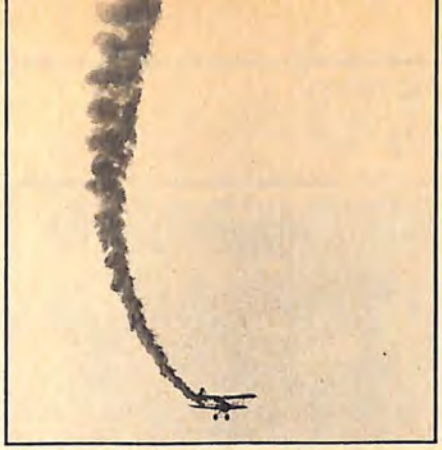

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FlyPast

May/June 1981

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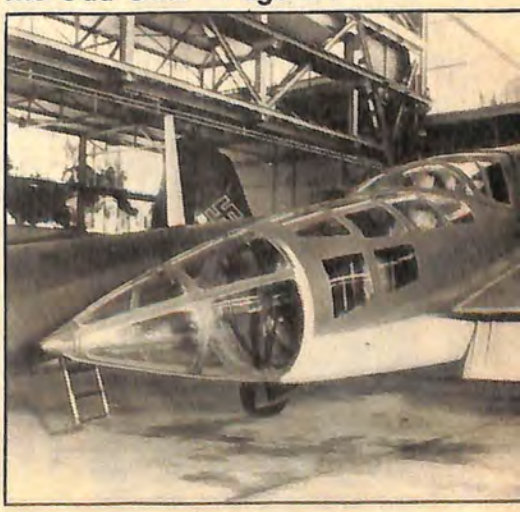


EDITORIAL: Key Publishing Ltd., 1 Wothorpe Road, Stamford, Lincs. PE9 2JR. Tel: 0780-55131.

EDITOR: Mike Twite.

DESIGNERS: Andrew McKay, Bridget Ryan, Mike English.

ADVERTISING: 1 Wothorpe Road, Stamford, Lincs. PE9 2JR. Tel: 0780-55131.

ADVERTISEMENT MANAGER: John Phillips.

CIRCULATION: Seymour Press Ltd., 334 Brixton Road, London, SW9 7AG. Tel: 01-733-4444.

PUBLICITY: 12 Cowgate, Peterborough. Tel: 0733-69149.

PUBLICITY MANAGER: Peter Ward.

SUBSCRIPTIONS: 1 Wothorpe Road, Stamford, Lincs. PE9 2JR. Tel: 0780-55131. Copies of FlyPast can be mailed each month to any address in the world. UK rate £7.50 inclusive for six issues. Overseas rate £10.90 inclusive for six issues. Airmail rates available on request.

Published by Key Publishing Ltd., 1 Wothorpe Road, Stamford, Lincs. PE9 2JR. Tel: 0780-55131. Printed in England by Pindar Print Ltd., PO Box 8 Newlands Park Drive, Sacrborough, N. Yorks. Typeset and composed by Arty Type, Grosvenor House, Eastgate, Whittlesey, Peterborough. Colour process by Mr Repro, 4th Floor, 9 Northburgh Street, London. Tel: 01-251-0681.

EDITORIAL

Welcome to the world of FlyPast

WELCOME to FlyPast, a new bi-monthly aviation magazine, published by a new company and taking a new look at this fascinating world of aviation.

Our main interests will lie with older aircraft – those military aircraft which have seen out their useful service life; those civil airliners which can no longer work for their living; and those private aircraft which have been abandoned by flying schools, business users and private owners as serious means of transport.

But we will also be keeping a weather eye on many other aspects of aviation such as the glider, the helicopter, the balloon, the airship, the space rocket. And perhaps most important of all, the men and women who have designed, built and flown them.

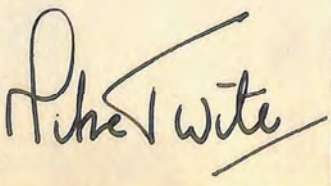
As you glance through the magazine you will see that we plan to encourage the preservation of historic aircraft.

We firmly believe that aircraft should be rebuilt to flying condition where possible. After all there's nothing quite so useless as a racing car that cannot race, a steam yacht that cannot sail or an antique chair that cannot be sat upon. Similarly, while a static aircraft is interesting, it is only in the air that it can demonstrate its abilities.

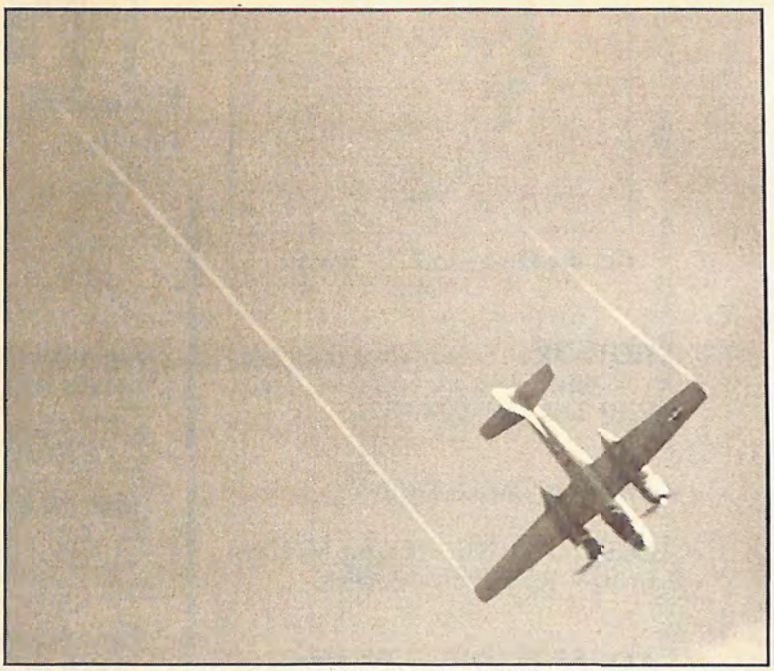
Another fascinating aspect of our coverage will be regular features on aircraft archaeology, that incredible hobby which is still yielding unbelievable finds. Our little 'scoop' on the plans to lift a Wellington from the depths of Loch Ness demonstrates the intriguing possibilities of this branch of aviation.

It is largely from readers' reactions to a magazine that editors can gauge how well they are doing, so if you have a point to make please drop me a line.

Obviously, letters will be considered for publication and if you have an article burning to be written we will also be pleased to read it.



NEWS



With vapour streaming from its wingtips the A26 Invader struggles to barely had time to wind on his film before the aircraft crashed.

Tremors after

THE reverberations and recriminations over Don Bullock's fatal crash in the A26 Invader at Biggin Hill last year are still being felt within the air display fraternity.

Immediately effected was a ban on the carrying of passengers during air displays – a sensible move, but the inquest turned into a character assassination of the pilot, whose fitness to fly was brought into question.

As the Civil Aviation Authority has not yet completed its investigation it is rather early to judge the issue. But panic restrictions on air displays must be avoided.

It would seem pointless to single out Don Bullock as the culprit in any changes that may take place, for there were several other air show crashes last year and indeed, literally hundreds of other air crashes. If airline pilots can fly plane loads of passengers into mountains and highly trained RAF pilots can fly into each other over towns, there would seem to be plenty of other targets for the CAA to aim at.

Indeed one of the Red Arrows managed to fly into the mast of a yacht last year, writing off a valuable Hawk. Apart from a brief flurry of

Sale of the Century

CHRISTIES, the South Kensington auctioneers, will preside over the sale of Sir William Roberts' Strathallan Collection on July 13 and 14.

Disposal of a collection of this magnitude is expected to attract buyers from all over the world and certain exhibits must inevitably leave Britain. Some aircraft may yet be witheld from the auction, but a doubt must hang over the future of Comet 2R XK655 and Shackleton VP293 which would be very costly to dismantle and transport.

recover from its last barrel roll. Ron Wickers, who took these photographs,

Biggin crash

daily paper sensationalism the next day the whole incident was soon forgotten. So let's have no witch hunting.

One good thing to come out of the incident is that various clubs and organisers have begun meeting together with a view to forming a body which will lay down some rules about air display organisation.

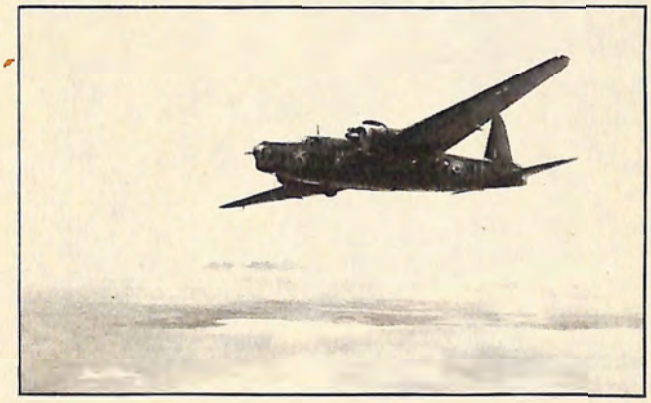
The Americans already have a similar group and their need is infinitely more apparent with many hundreds of air display pilots. Britain can probably muster 150 at a pinch.

G-FIRE flies again

Spencer Flack added Spitfire XIVc G-FIRE to his impressive collection of airworthy warbirds at Elstree on March 14, when Ray Hanna took this ex-Belgian Air Force veteran aircraft (above) back into the air after a lengthy rebuild.

Purchased from the Strathallan Collection in July 1979, the Spitfire was previously SG-108 with the Belgian Air Force and served with 414 Squadron and 610 Squadron before that as NH904. To be painted in overall red colour scheme, G-FIRE will join Hunter G-HUNT, Sea Fury G-FURY and Jungmeister G-AXMT in airshows this summer.

A Wellington on the wall



THOSE who have read Group Captain Bill Randle's experiences of flying Wellingtons in this issue may like to avail themselves of a limited edition print of a painting by Anthony C Harold.

The full colour painting, reproduced here in black and white, is of Group Captain Randle's Wellington Z-Zulu climbing into a peaceful autumn evening in 1942, towards Europe, from which it was destined never to return. Each print will be signed by Rcndle and the artist.

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TSR2:

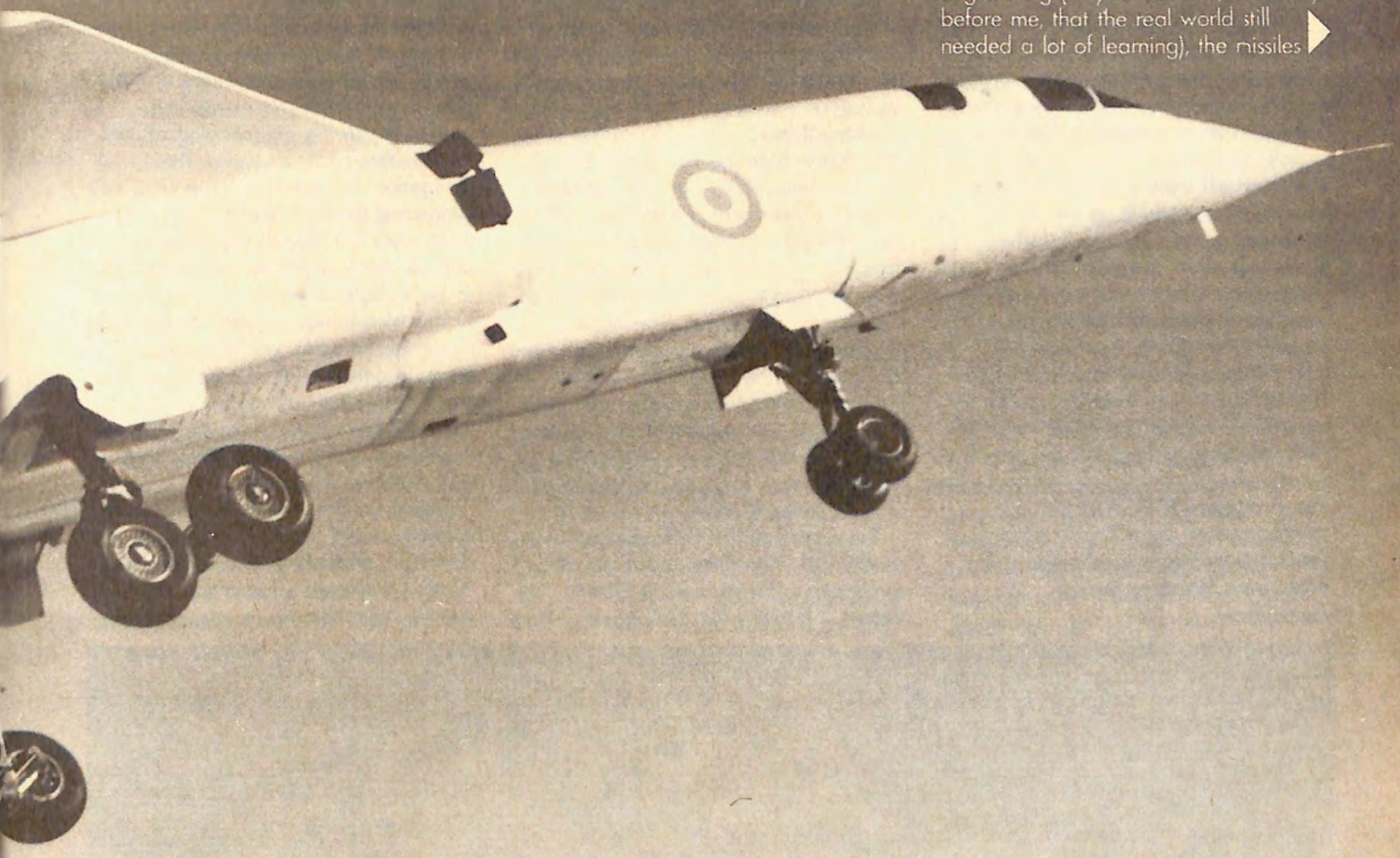
the martyrdom of a superjet

by Jeff Daniels

with contributions from Roland Beamont

TO appreciate the significance of the TSR2 project as it seemed in 1961 when I first became associated with it, you have to look back to a situation in which the British aircraft industry was fighting to counteract the infamous Duncan Sandys White Paper of 1957, which claimed that by 1970 missiles would be able to do everything and the day of the manned aircraft for military use was over.

Even in 1961, when I graduated from Bristol University with my bright, shiny new degree in aeronautical engineering (only to discover, like many before me, that the real world still needed a lot of learning), the missiles



policy was already beginning to be discredited.

Before university I had worked at the English Electric Guided Weapons Division in Stevenage. Three years later English Electric had become part of the British Aircraft Corporation, and the Blue Water missile on which Stevenage had been heavily engaged was cancelled. Part of the saving on Blue Water was diverted to TSR2, and it was hardly surprising that when the time came for me to return to the fold, it was suggested that I should work at BAC's Military Aircraft Division at Warton in Lancashire.

TSR2 was the one programme to have survived the Sandys debacle. In 1961 almost everything about it was shrouded in secrecy, and in my early days at Warton, working in the wind tunnels, all I saw of it were some models which were kept covered when they were not actually in the tunnel.

My first impression was that the shape was more conventional than I had expected for an aircraft which was designed to do almost everything, from Mach 2 and 45,000 feet to high-subsonic cruise at very low level. True, the fuselage looked long and heavy in comparison with its tiny delta wing – TSR2 spanned 37ft against an overall length of 89ft – but the engines were installed side-by-side in the rear fuselage, and the tail still consisted of a fin and two horizontal surfaces.

After a few months in the tunnels I was transferred to Warton's Technical Publications Department with a specific new task: to write the "contractor's edition" of Pilot's Notes for TSR2. I should emphasise that the Pilot's Notes of any RAF aircraft are compiled by the Handling Squadron at A&AEE Boscombe Down. But Handling Squadron does not start with a blank sheet of paper. The aircraft manufacturer has to provide what is, in effect, a draft which covers the flight-test findings of his own pilots and which also briefs RAF test pilots on such things as systems handling.

Now at last I was in a position to appreciate both the merits and the drawbacks of TSR2, from the point of view of a keen young engineer and an ex-University Air Squadron pilot. My view was coloured by the fact that my original alliegance had been to English Electric and that I was working at Warton. It soon became clear – and my job was certainly made more difficult by the fact – that I was working on what was largely an English Electric aeroplane, but one for which design leadership now lay with the "other half" of BAC, formerly Vickers.

The award of the TSR2 contract was conditional upon three great aircraft companies – Bristol, English Electric and Vickers – forming the BAC group. None the less, the aircraft was in form very close to the P17 project which English Electric had originally put up to OR339, the Ministry specification which gave rise to the TSR2 concept.

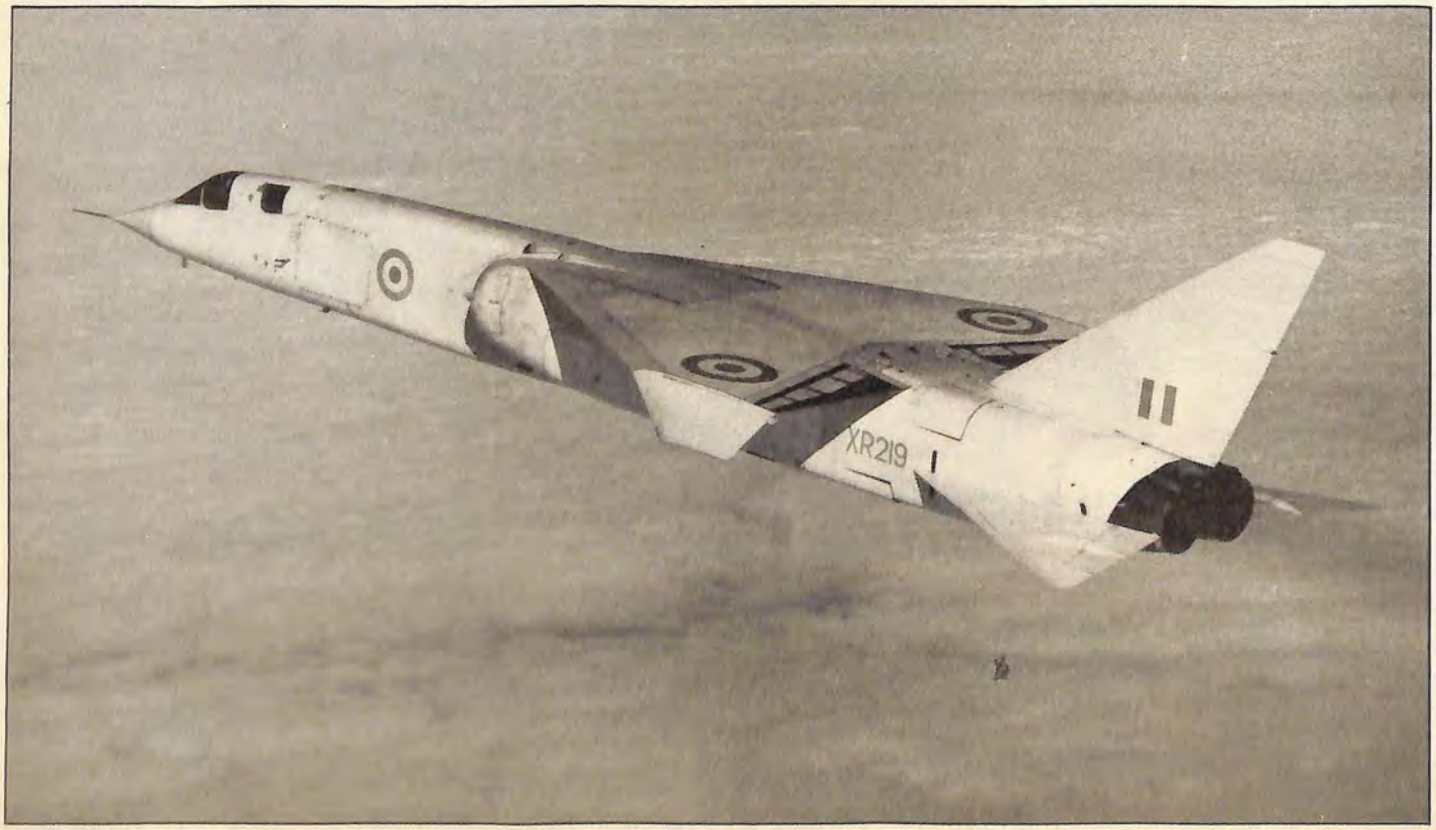
There was every reason why English Electric should have been the front runners. They had built the Canberra, which (among other things) TSR2 was intended to replace; they had far more real-life experience of supersonic operation, thanks to the Lightning which was then just entering RAF service; and they had easily the best group of wind tunnels for the job, not to mention the most suitable airfield.

The snag was that TSR2 was conceived as a "weapons system" in which, according to the theory of that time, the airframe was merely the means of stowing and carrying about the bits that really mattered. The navigation and attack systems, integrated through central computers, were what the aircraft was all about, and electronic expertise was supposed to be Vicker's province.

Thus Weybridge assumed design leadership of what was, in hardware terms, largely a Warton aeroplane. And there were plenty of sceptics at Warton who told enthusiastic youngsters like me that it was really because Weybridge was closer to Whitehall.

The result was a good deal of unhappy rivalry, amounting at times to downright unhelpfulness, between the Warton engineers – responsible for the rear fuselage, the engine installation, the

The prototype TSR2-XR219 photographed by a British Aircraft Corporation photographer on a test flight from Warton. (British Aerospace).



wings and the tail – and the Weybridge people who were in charge of the forward fuselage and all it contained, including the cockpits and all the electronics.

The junction between the two halves of the aeroplane was formed by a kind of no-man's-land between frames 629, where the Weybridge half ended, and 640 where Warton took over. The frame numbers ran in inches from the nose aft, though actually the tip of the radome was –4 because its shape was changed after all the frame numbers had been allocated.

Two engineers, one from each end of the organisation, were appointed to look after the vital gap, and in fact they did their job well. Despite immense scepticism in many quarters, the sections with all their complicated "plumbing" did eventually match up with very few problems.

In 1962, matching-up was still in the future, but I was already far enough into the task of writing the Pilots Notes to be much more aware of the work done on the design side.

To an astonishing degree TSR2 had to be all things to all men. The requirement to perform a hi-lo mission (supersonic cruise at altitude followed by a rapid descent to low-level terrain-following for the final run to the target) would have been demanding to meet all on its own. To it had been added a demand for exceptional field performance, in terms not only of take-off and landing length but also of the ability to operate from poor, semi-prepared surfaces.

To achieve the necessary lift from the tiny wing, optimised as it was for the low-level terrain-following role, full-span blown flaps were fitted. These improved take-off but more importantly they reduced the approach speed. The actual landing roll was reduced by automatic deployment of a very large brake parachute, and by the fitting of big brakes on the four main landing wheels, two in tandem on each leg. Reverse thrust was considered impractical.

Full-span flaps meant there could be no conventional ailerons, so the slab tailplanes were made to operate independently, to control the TSR2 in roll as well as pitch. The fin was also a single slab unit, with no separate rudder. Despite this and its very large size there were parts of the flight envelope in which the aircraft was not naturally stable in yaw, so auto-stiffening – a system with greater authority than conventional auto-stabilisation – was adopted with three control channels to give reliability on a two-overrules-one basis.

Another offshoot of the need to operate from damaged or emergency airfields was the requirement that TSR2 should be self-contained, in other words that it should be able to start up with no outside aid. Since the two big Olympus 22R engines took a lot of starting, a very complicated scheme evolved based on the use of a Blackburn Cumulus auxiliary turbine power unit in a retractable housing.

The Cumulus, which drew fuel in a gravity feed from the main tanks, could be run on the ground to provide power and air-conditioning for checking the electronic systems, while it also provided the compressed air for starting the main engines. The Cumulus itself was started by an hydraulic motor fed from a pressure accumulator which, if need be, the pilot could re-charge with a hand pump!

The main engine starters were the cause of many problems. It was decided to use an apparently ingenious system which would combine the functions of engine starter, using pneumatic motor, and constant-speed drive for the alternators which provided electric power. In effect the pneumatic motor adjusted the engine drive speed via an epicyclic gearbox for the constant-speed drive, while the gearbox was locked up to allow the motor to turn the engine for starting.

Main picture: Photographed at Duxford in the summer of 1980, XR222 is in a sadly dilapidated condition, with many missing access panels and signs of deterioration.

Inset: Housed at the Cosford Aerospace Museum, near Wolverhampton, XR220 is in superficially good external condition and is well looked after by the museum staff. (Cosford Aerospace Museum).

Eventually this system became very reliable, but TSR2 suffered from being its first customer. Nor were things helped by the fact that the constant speed drive and starter (CSDS) units were only part of the clutter in the auxiliary bays. Each engine also drove two fuel pumps, and two hydraulic pumps, one for the flying controls and the other for the remaining systems.

It quickly became clear that "two of everything" was very much the order of the day except where three were demanded! The object of the exercise was praiseworthy: to ensure that TSR2 could never be disabled by any single failure. The trouble was that two of everything was expensive, heavy and bulky.

The fuel system was a particular nightmare, a so-called "fueldraulic" arrangement which worked like an hydraulic system except that it used fuel as its working medium. The four engine-driven pumps drove other pumps in the tank collector boxes, and these fed the engines.

The possible ways of cross-feeding working pumps were so many that it took a lot of work to condense the explanation to a single page of Pilots Notes. Worse still, the fuel contents were measured both by a capacity gauging system, and by a gallons-gone flowmeter which were supposed to cross-check: vital because the fuel distribution affected the longitudinal balance of the aircraft and was used to control the CG in flight. In the event of a failure the second crew member had to work out what had happened and if necessary channel fuel from one tank to another.

Even though I was full of enthusiasm for the aircraft, some of its complication seemed needless even then. If the short-field requirement had been eased, and cartridge or turbine starters (as used in the Lightning) had been accepted, the TSR2 could have been lighter, smaller, simpler and cheaper. If some of the more needless duplication of the systems had been avoided, it could have been cheaper still. But it was no good: belt, braces and a piece of string was the rule.

Duplication even extended to the weapons system, in that two central computers (digital Verdan units licensed from the USA) were fitted. One minor problem arising from so many duplicated systems was that the pilot needed to be warned of single failures in each of them. In the end the cockpit central warning panel contained 48 warning lights, split equally between amber (advisory) and red (danger) warnings.

In most ways the TSR2 cockpits, especially the pilot's were surprisingly conventional. The only really advanced feature "up front" was the head-up display. This did not stop the cockpit becoming the centre of a scene that was repeated in other areas of the aircraft: the endless and often aimless discussion between far too many people.

An astonishing number of committees surrounded TSR2, weighing it down and tending to slow the programme. Such committees were especially thick with Ministry people, many of whom had no other project to justify the continued existence of their departments. Thus even in the early stages the so-called Cockpit Steering Group, which I inevitably had to attend, could muster 40 members and spend a day or more taking a few simple decisions.

With this kind of thing being repeated all over the aeroplane, and people weighing in with their own little requirements, it seemed at times that completion of the design was actually receding.

Despite all this the programme went ahead, based on the "development batch" principle which had first been used in the Lightning programme and called for no fewer than nine prototypes (XR219-227) followed by eleven pre-production aircraft. The flight test programme was to be split between them so that it could be carried through with greater speed.

The first flight aircraft, XR219, was assembled in B hangar at Boscombe Down early in 1964. The flight itself was confidently expected by mid-summer but instead there came an endless series of engine runs trying to pin down various serious vibration problems. The Olympus engines had problems of their own – there were five drastic test-bed failures during early 1974 – and flight-cleared engines were very slow in coming through, and then cleared only for a very short life before removal and inspection.

One particular full-reheat run during the summer ended with a compressor surge so loud that it shook walls in the Boscombe Officers' Mess over a mile away. Clearances, especially in the auxiliary bay, were checked and re-checked for signs of the engines fouling the airframe, but in the end it was only after the first flight that the fueldraulic pumps were found to have been faulty all through the ground-running phase.

Eventually 'Bea' Beamont undertook the first flight of XR219 in September 1964. The general understanding at the time was that engines had less than half an hour of cleared flight time remaining, but Beamont recalls that "with strictly ***non-airworthy*** engines, the first flight was undertaken at the express recommendation of the pilot . . .!" It was strictly an undercarriage-down, low-speed sortie. Many of us hoped that a few hours' flying would soon be completed, even perhaps that XR219 might make it for a Farnborough Show flypast.

Meanwhile a tragedy hit the programme. The completed fuselage of XR220 was moved from Weybridge to Boscombe Down by road, on a truck which (to some at least) seemed marginal in its ability to cope. However, all went well until it was backing into B hangar for unloading when the truck tilted and 220 was deposited on its side, with the taileron spigot gouging a deep groove in the concrete of the apron. It says much for the strength of the airframe design that the mishap caused no misalignment.

We had worse things to worry about. Following the first flight, there seemed no sign of a second. Flight-cleared engines were still hard to come by, and some departments were using this enforced delay as an excuse to pile fresh modification work on the aeroplane. By November, our Boscombe superintendent told me in despair that there were more modifications now waiting to be incorporated than there had been when 219 was wheeled in after its first flight.

Everybody had a good reason why their modification should be fitted forthwith. Had not the firm decision eventually been taken to bar further work, except for that which affected airworthiness, the second flight might have been delayed well into 1965. Even as it was, it took place in poor conditions in the dying days of December 1964.

After that things certainly seemed to improve, although XR220 was a long time being brought to readiness. The third aircraft on the other hand, XR221, the first intended to carry the full avionics fit, was apparently doing far better in ground trials at Weybridge than anyone had dared hope.
hope.

XR219's flight programme was not without incident. During the early flights, sequence valve failure repeatedly prevented undercarriage retraction, and during the fifth flight the mainwheel bogies failed to de-rotate themselves to

the landing position. Beamont had to land "on tiptoe" with the risk that the bogies would be forced the wrong way to result in major undercarriage failure. He did it, as he always flew, superbly, achieving a near-zero rate of descent to the relief of many agonised watchers.

More persistent trouble also affected the undercarriage, which was showing a tendency to shimmy at touchdown. Beamont said it was unacceptable; Jimmy Dell, who took up the programme after the initial flights, agreed. Don Knight, the third and last pilot to fly the TSR2, experienced one landing which even Beamont, ever a stern but protective mentor of his flight test staff, recalls as having "broken part of the bogie assemblies and ended up with a lot of swerving and commotion."

Peter Moneypenny, riding in the back seat (all the flights were made with an observer, even the first in which Don Bowen monitored the fuel and other systems) said that at one point after the initial touchdown he could see the Boscombe runway through one side window and blue sky through the other!

It was clear that the undercarriage vibration and damping rate problems would need a significant modification programme to solve them but meanwhile XR219 was flown to Warton by Beamont, easily achieving supersonic speed on the way. It was soon grounded for the undercarriage modifications which, as a first and temporary measure, involved the fitting of fixed struts which would again confine operations to the wheels-down condition.

By this time we had other worries. In the autumn of 1964 a new Labour Government had taken office. Though the Labour candidate who won Preston North by the narrowest of margins stood on the hustings and assured hundreds of voters, who happened to be BAC workers, that there was no question of the project being cancelled, it was soon clear that the writing was on the wall.

By early 1965, Ministry people who had once scrambled over each other to stick their oar into the proceedings could hardly be bothered to waste their time. They knew what was coming, and most of the Warton workers guessed.

By this time there existed three aircraft in essentially flying condition, six more in an advanced state of completion and certainly recognisable as aircraft, and major components for several of the pre-production batch. It made no difference.

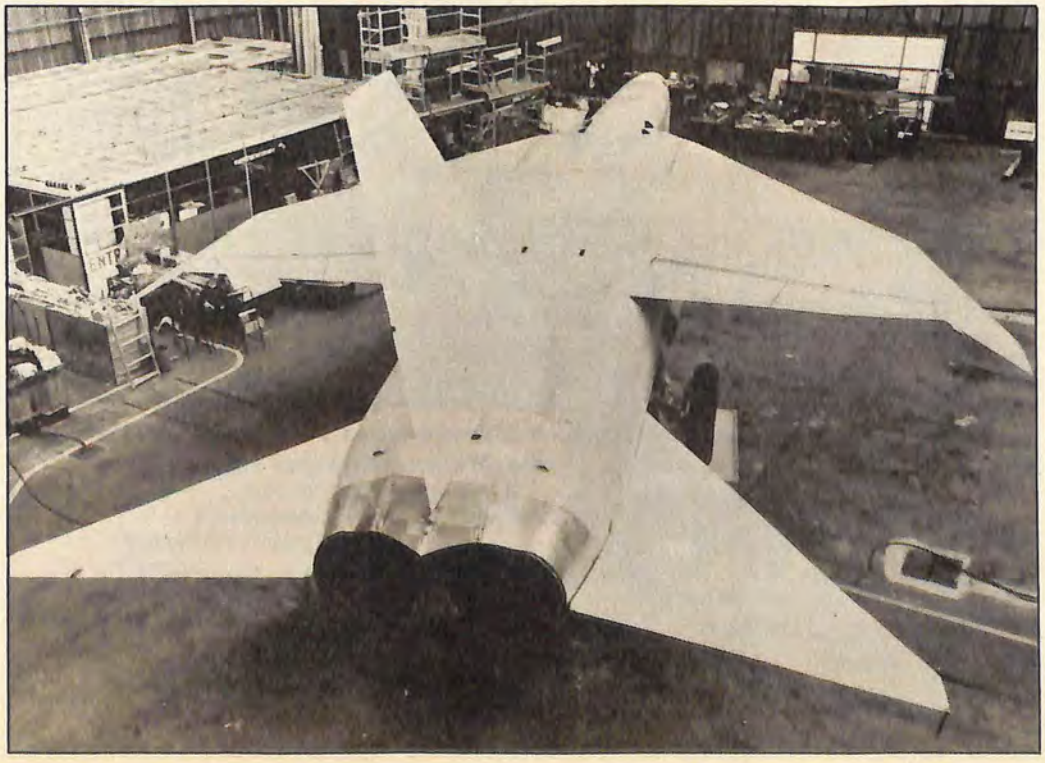
There were, and perhaps still are, arguments about whether BAC should have been quicker to offer the Government a fixed-price rather than a cost-plus contract, as it did in the last dying days, or whether more of an effort should have been made to fly 219, 220 and 221 to give the appearance of an operating fleet rather than a single aeroplane (though given the continuing lack of flight-cleared engines, this was not really an option). Probably it would have made no difference. The new Government was too determined to kill TSR2.

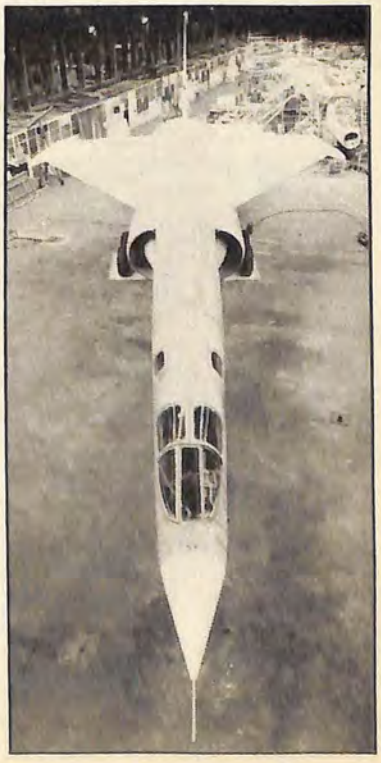
American F111s were ordered "instead", though my view remains that the intention was always to cancel those too (as eventually happened) as soon as was politically convenient. Of almost equal convenience was the idea that the TSR2 design team should collaborate with the French on a new variable-geometry multi-purpose aircraft, the AFVG, which died a predictably early death in the project study stage.

As for TSR2 itself, it died quickly. The standing instruction to design staff was to finish the drawing they were working on, and then stop. The drawings however, were all microfilmed. The jigs were torn up and cut to pieces, as were all the aircraft except the first three which ended up respectively at Foulness gunnery range, Cosford and Duxford. Stories abound of how other specimens were "rescued" but must sadly be apocryphal, unless some scrap man was clever enough to lay hands on front ends from Weybridge and back ends from Warton, and to put them together ..... still, there is supposed to be this one in a shed near Staines. I wonder?

With all that said, what kind of aircraft was the TSR2? I knew the three men who flew it, and the flight test engineers who analysed the results. All agreed that, apart from the undercarriage problems, XR219 exceeded expectations. To take one small example, take-off performance was sufficiently in advance of

The camera can lie! This head on shot gives the impression that the TSR2 is all nose, but the shot from the rear (left) gives exactly the opposite viewpoint. (British Aerospace).





specification that work had started to simplify and therefore cheapen the flap-blowing system. Roland Beamont said TSR2 was much more pleasant to fly than the Lightning throughout the speed range at lower level.

It is certainly galling to realise that had the programme continued, TSR2 could have been in RAF squadron service before 1970 to give the service a weapon which could fly over a thousand miles, much of it at low level in zero visibility, and deposit a bomb within a few yards of its planned target. Beyond that, plans were already passing through the Warton project office for a long-range all-weather fighter version.

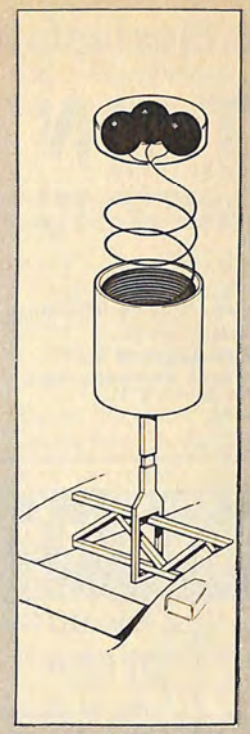
Instead, all we have are the lessons we should have learned. In the first place, the project should not have been loaded with so many contradictory requirements, and with so much equipment. Second, any project based on more than one design centre needs strong leadership, accepted by all concerned: TSR2 certainly lacked that at least until it reached flight test and become Warton's direct responsibility. Third, any such project team needs to ensure that the engine keeps pace with the aircraft in order to avoid frustrating delays, to start its flight programme and keep it going as early as possible.

I still feel that the three-month gap between TSR2's first and second flights was one of the factors which raised public doubt and made the act of cancellation easier. The Tornado team which includes B.O. Heath, (who worked long and hard for TSR2) certainly avoided any such mistake.

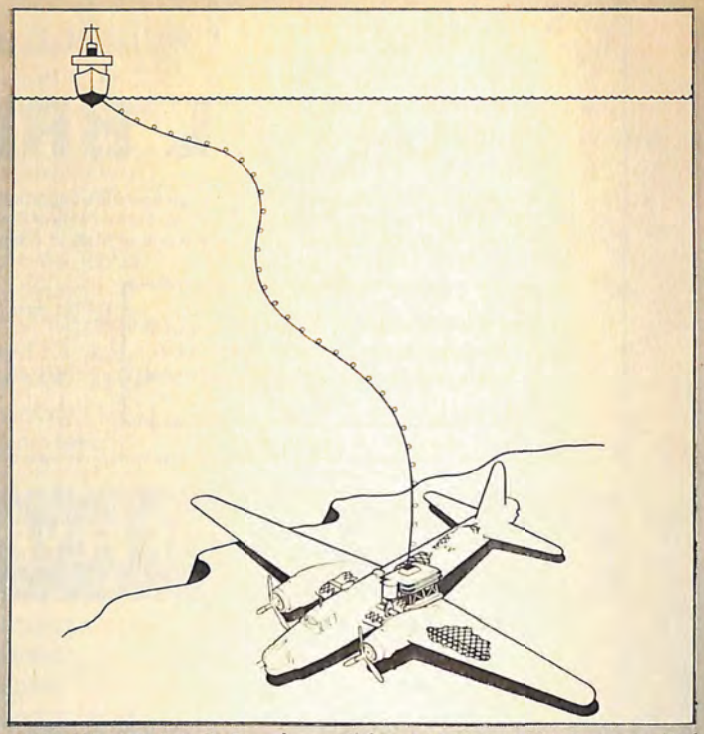
Thus ended TSR2 (and P1154 and HS681) on Budget Day in 1965, leaving the RAF condemned to a long period with either obsolescent or American-designed aircraft. Heavy, complicated and expensive it may have been, but it flew exceptionally well and, at today's prices, it looks positively cheap. Nor, until Tornado enters service, will the RAF actually have an aircraft which can even approach the same all-round ability.●

● In supplying comments on technical and flight testing aspects of the TSR2 Roland Beamont stresses that the short flight test programme on XR219 was exceptionally successful and showed conclusively that there were no major stability nor control problems to be dealt with on up to 100 per cent of its primary operating envelope at low levels, and to beyond Mach 1 at altitude.

The Warton Design and Flight Test organisation, which was very well qualified to judge in this area, had concluded by Flight 23 that the TSR2 project was a major technical success, and hindsight has done nothing to alter that view.



Special lifting units comprise a metal fork with a large drum housing coiled Kevlar cable and buoyancy module.



Heriot-Watt University's submersible, ANGUS 003, is controlled from a surface mother ship via an umbilical line. ANGUS's first task will be to descend to the wreck and attach three lifting units to main wing spars inboard of the engines and fuselage frame forward of the tail fin.

The Loch

In what is probably the most ambitious aviation archaeological project ever undertaken, an early Wellington bomber is to be raised from its resting place at the bottom of Loch Ness, restored and eventually put on display in a national museum.

This operation, if successful, will result in the preservation of the only example of a wartime Wellington MkIA – of which only 187 were built – and only the second Wellington in existence anywhere.

The aircraft is N2980, which ditched in Loch Ness over 40 years ago.

N2980 was delivered to 149 Squadron at RAF Mildenhall during November, 1939, and took part in the disastrous raid of December 18 when only 12 Wellingtons from a force of 24 returned from a daylight armed reconnaissance of Northern Germany. Subsequently, N2980 was employed on night operations, first by 149 and later by 37 Squadron.

In common with other surviving Wellington Is, N2980 was later relegated to a training role, joining No. 20 Operational Training Unit at RAF Lossiemouth in North Scotland, on October 6, 1940. The aircraft attrition rate at OTUs was high and 20 OTU suffered particularly badly, with dozens of Wellingtons lost in the Highlands and over the sea.

On New Years' Eve, 1940, N2980 was despatched from Lossiemouth on a training flight. The crew, comprising an instructor pilot and seven trainee crewmen, was briefed to fly a cross-country navigational exercise (NavEx) over Route W.2 (Base – Fort Augustus – Point of Sleat – Isle of Canna – Golspie – Base). Squadron Leader N W D Marwood-Elton, who was in command of the Wellington, takes up the story:

"One engine cut out while flying over the Monadhliath Mountains at approximately 8,000 feet. Little of the ground was visible owing to cloud and heavy snow squalls – and anyway, the mountain terrain did not lend itself to a forced landing. As it was not possible to maintain height, I gave the order to bale out. I was flying the aircraft and my second pilot, Pilot Officer Slater, was standing beside me facing aft and telling me as each member of the crew jumped.

"The trainee crew took longer to abandon the aircraft than I had forseen and when Plt. Off. Slater's turn came we were dangerously close to the mountain tops. As luck would have it I spotted a loch through a break in the clouds. I then ordered Plt. Off. Slater not to bale out but instead to stand by for a landing on the water.

"This manoeuvre was not a difficult one as the loch stretched out before us like a runway, and we still had one good engine. The touchdown was normal but on coming to rest the Wellington rapidly sank, giving us only about 90 seconds to launch the dinghy and clear the aircraft."

One of those who witnessed N2980 ditch was Mrs Helen Massie, who at the time lived close to the north west shore of Loch Ness, about seven miles south of Inverness. She recalls that it was a fine clear afternoon when the aircraft was heard overhead.

"A friend and I were talking just outside our house and we both remarked that something must be wrong with the 'plane by the noise it was making. It continued to cross the loch in the Foyers direction and for a short while was lost to view behind some trees. Then it reappeared, coming back across the loch, losing height rapidly and it was about 200 yards from our shore when it struck the water.

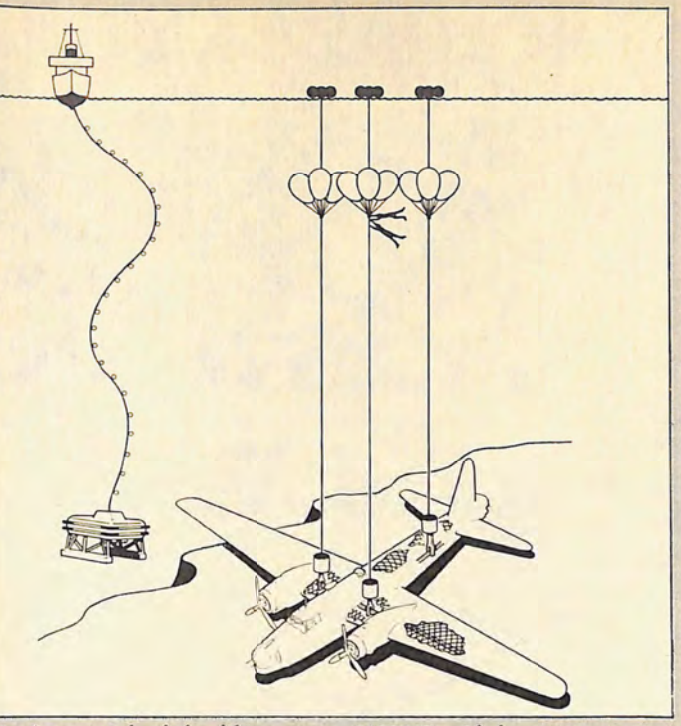
"The propellors were still turning as it touched down and sent up a great plume of spray, which prevented us seeing the occupants getting into their dinghy. Two men paddled ashore and a passing lorry took them to Inverness.

"A day or two after the crash a dredger came down the canal and an attempt was made to salvage the aircraft but nothing was found."

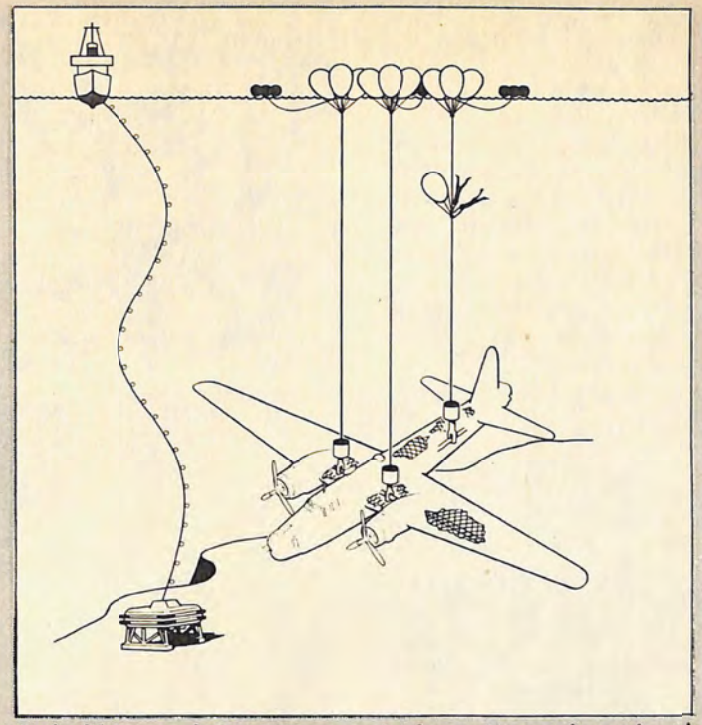
An otherwise successful escape was marred by the death of one of the trainee crewmen, killed when his parachute partially failed after snagging on the aircraft. The other five parachutists all landed safely and were taken in by local people where they joined in the Hogmanay celebrations!

For almost 40 years the Wellington lay undisturbed and largely forgotten on the bed of Loch Ness. Then, in 1979, a team of Royal Navy divers discovered it lying in 70 metres (230ft) of water close to the northern end of the loch.

The Underwater Technology Group at Edinburgh's Heriot-Watt University



Having attached the lifting gear, ANGUS withdraws to monitor initial stages of the operation. All three cables have been carried to the surface and divers descend about 15 metres to shackle points. Lifting bags are attached and by careful introduction of air the aircraft starts to rise.



As the lift proceeds, ANGUS moves in close to inspect the underside and check for 'droppings'. The diving party attaches more lifting bags and the Wellington is raised in stages to the surface where flotation bags are added to fuselage, tail and wings. It is then towed to Lochend and beached.

Peter Moran's story of the world's most difficult aircraft rescue attempt

Ness Wellington

took a serious interest in a proposed recovery operation and early in 1980 Robin Holmes, a senior lecturer at HWU, contacted the Royal Air Force Museum at Hendon with outline plans for the recovery of N2980 utilising the group's remotely controlled mini-submersible, ANGUS 003, which had already dived in Loch Ness, surveying and photographing the Wellington.

In offering to take on a major part of the recovery, HWU have made several important provisos, including one which insists that adequate funding to restore the Wellington should be guaranteed before the operation commences, a wise move when one considers the fate of aircraft wrecks previously recovered.

While it is quite possible for divers to operate at the depth at which this wreck lies, the HWU team's intention is to establish a technological 'first' for the UK by recovering an intact aircraft primarily using a remotely controlled submersible and thereby demonstrating the potential for recoveries from much greater depths, far beyond the limits of divers.

The aircraft lies near the edge of a drop into a much deeper part of the loch, so the recovery will have to be undertaken with great care.

The N2980 rescue – detailed in the accompanying illustrations – will of neccessity be a long-term project divided into five phases.

Phase 1: Forming an association of interested parties to organise fund raising, legal aspects, insurance, logistics, preservation and restoration. Such an association is likely to comprise, in addition to HWU, the Ministry of Defence, the RAF Museum, divers from Underwater Projects and RAF Kinloss and representation from the British Aviation Archaeological Council.

Phase 2: Making a complete photographic record of the aircraft wreck, to be carried out by RN or civilian divers. If this proves the proposed recovery technique feasible, and if the structure is deemed strong enough to be lifted, then the project will continue.

Phase 3: The consturction of a wooden/metal mock-up of a Wellington mid-section for training purposes. This full scale model would then be immersed in a suitable reservoir and equipment and techniques perfected using ANGUS 003 to attach the lifting equipment.

Phase 4: Attempt recovery of Wellington N2980 from Loch Ness.

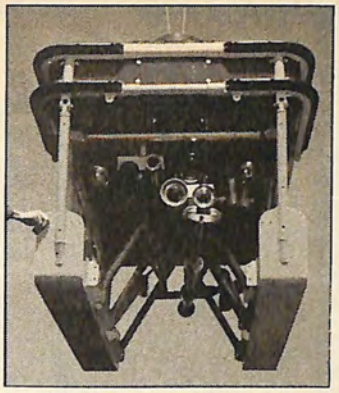
Phase 5: Preservation, restoration of the Wellington and eventual placement in a museum.

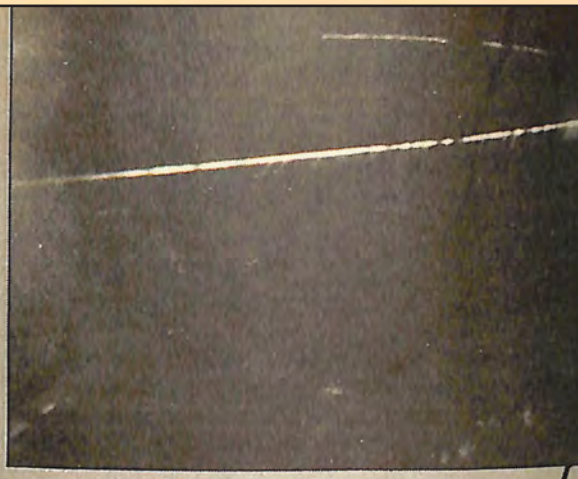
In February 1981, Heriot-Watt University was formally authorised by the Ministry of Defence to put the recovery plan into operation. In future issues of FlyPast we will be following the developments in this exciting and ambitious project.

● The author acknowledges the kind help afforded during compilation of this story by: Robin Holmes of Heriot-Watt University, Group Captain N W D Marwood-Elton DFC RAF (Rtd), Mrs Helen Massie and Gary Brindle.

Pictures by ANGUS

ANGUS 003 is the latest of Edinburgh Heriot-Watt University's unmanned submersibles. Television, cine and stills cameras are carried while sophisticated navigation and sonar scan aid positioning. It can operate down to a depth of 330 metres.

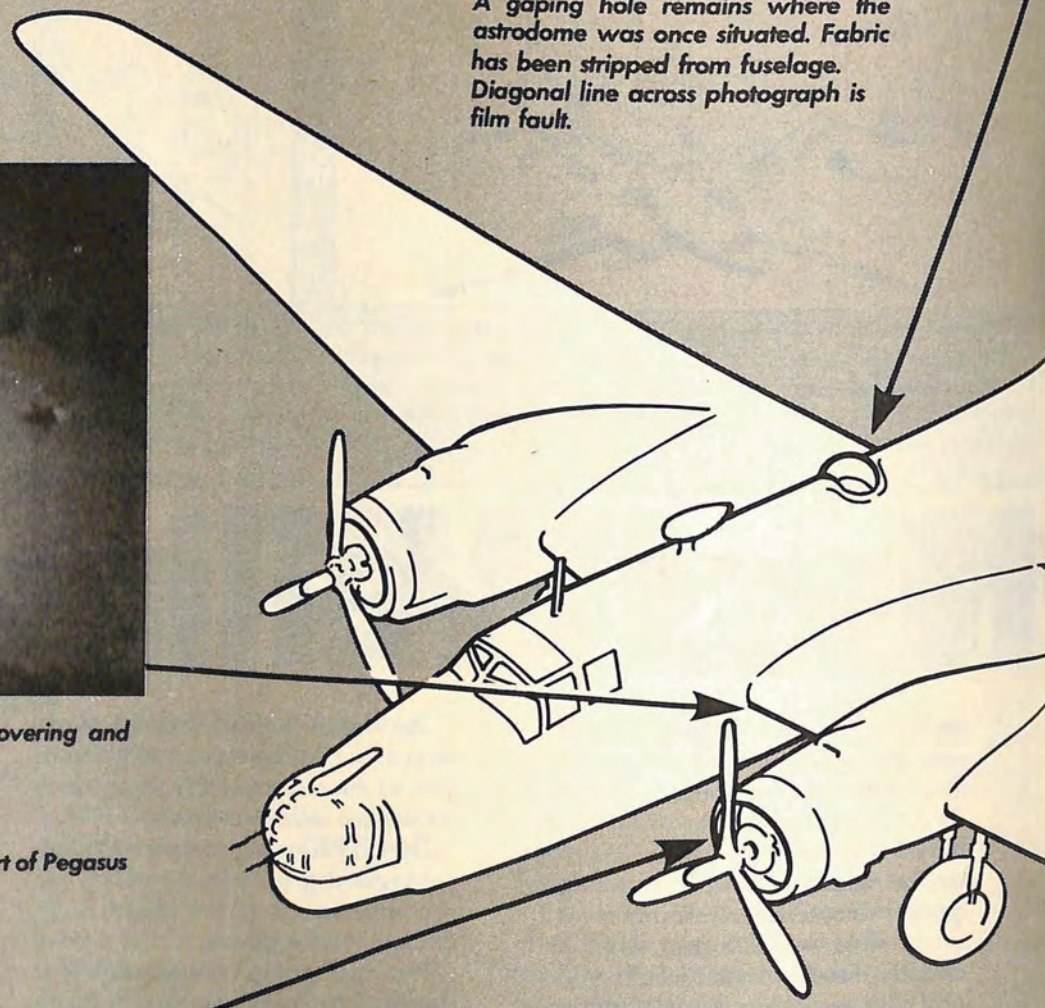


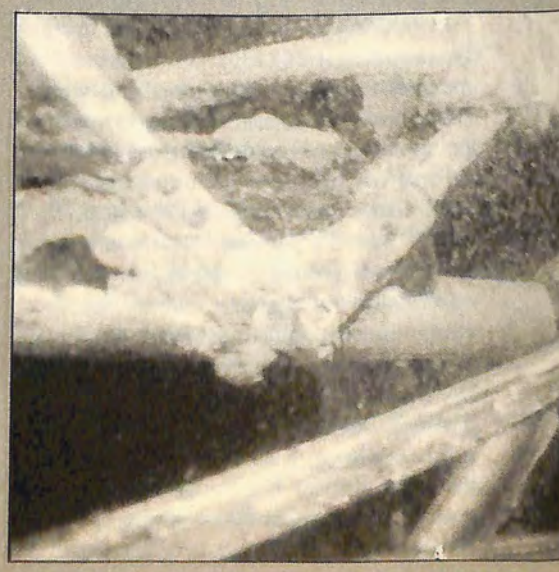


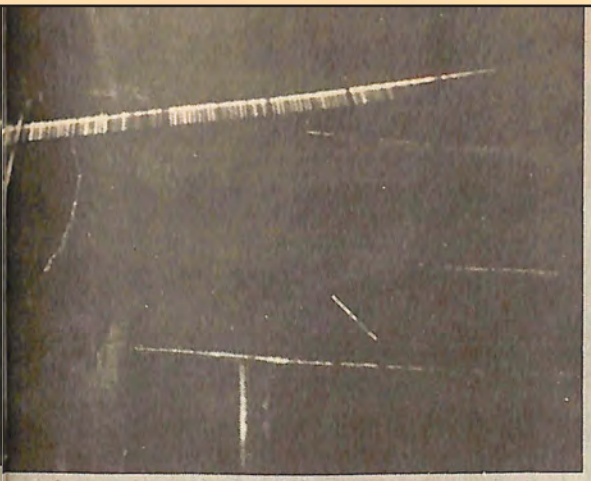
A gaping hole remains where the astrodome was once situated. Fabric has been stripped from fuselage. Diagonal line across photograph is film fault.

ABOVE: Port wing root showing fabric covering and punctures to upper wing surface.

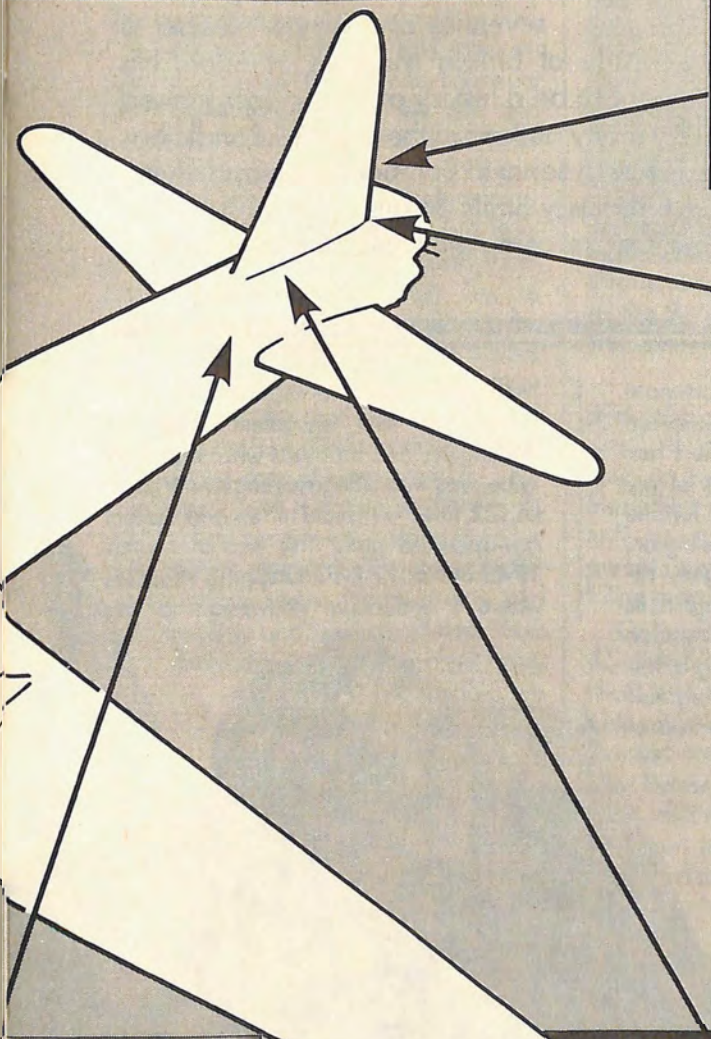
BELOW: Port lower engine cowling with part of Pegasus engine, prop blade and hub.







Swung to port, the rudder and trim tab.



Rear turret and base of rudder. Trailing edge of tailplane is just visible at bottom left.

RIGHT: Exposed geodetic structure of port fuselage, just above tail-plane.

LEFT: Fuselage upper longeron just forward of port tailplane.

I REMEMBER...

SUBJECT: VICKERS-ARMSTRONG WELLINGTON

BY: GROUP CAPTAIN BILL RANDLE

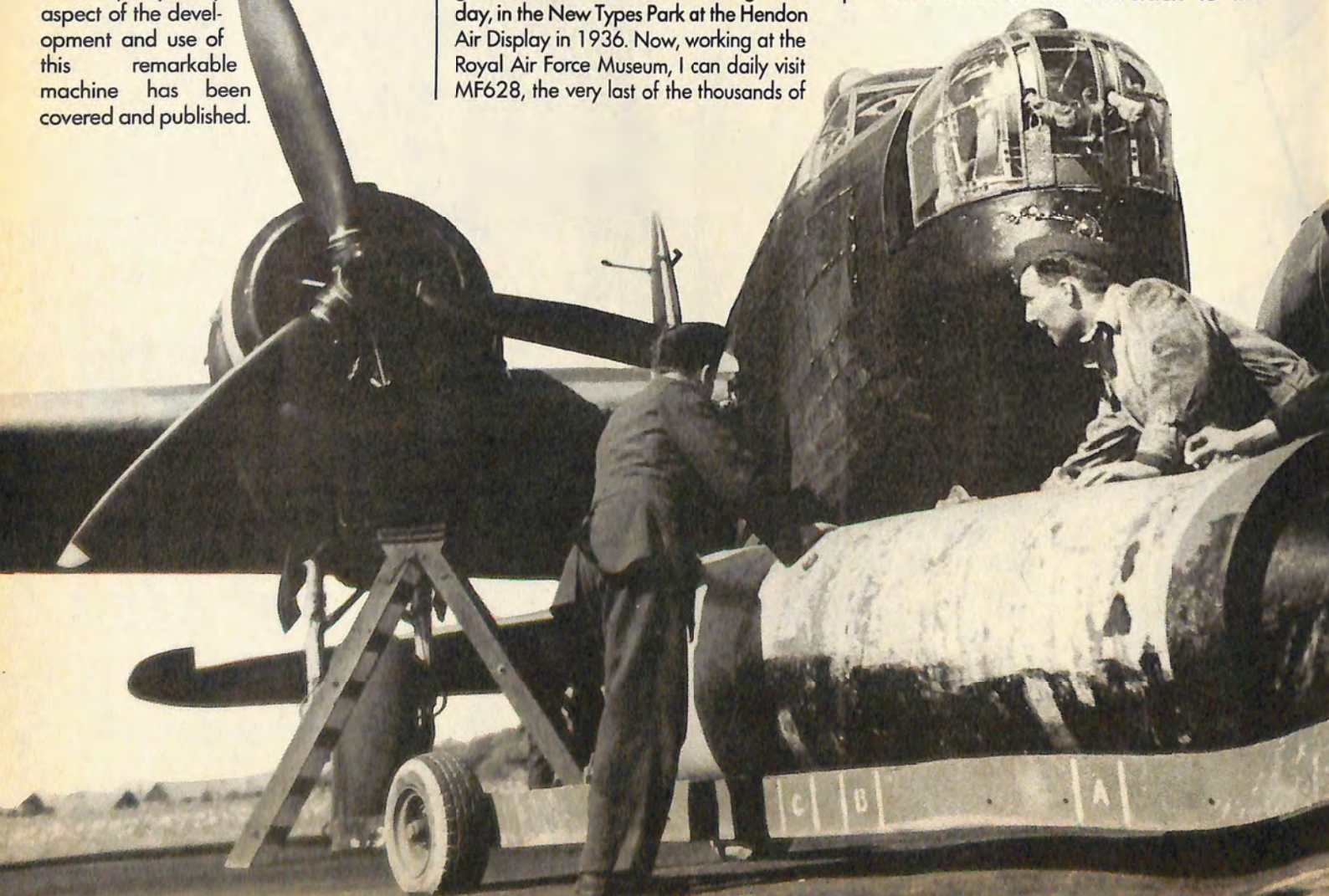
Series compiled by Michael A Fopp

The Vickers-Armstrong Wellington will forever be a part of many men's lives and is certainly remembered with affection by those who flew her both in and out of combat. Her geodetic construction and basic design were the brainchild of Sir Barnes Wallis, inventor extraordinary and designer of the famous 'bouncing bomb'. The following account of life with the aircraft is written by Group Captain WSO Randle CBE, AFC, DFM, FBIM, who served in the Royal Air Force until the mid-seventies and is now Keeper of the Battle of Britain Museum, Hendon. His account is not meant to be a history of the aircraft, indeed this has been accomplished by many authors in the past. Bill Randle has managed to convey exactly what it was like to serve in Bomber Command, flying Wellingtons, during the War. With typical modesty he completely omits details of his mission over Essen on September 16, 1942. Suffice it to say that his was one of the first complete crews to evade capture by the Germans and return to England.

No one can question that the Wellington ranks among the great aircraft of all times. From its specification set out by the Air Ministry in 1932 a potential developed which was to have a profound effect upon concepts of bomber policy. Every aspect of the development and use of this remarkable machine has been covered and published.

For my part, I was one of the fortunate many who can look back with affection on the "Wimpy", as most of us called her, which occupied the first 7 years of my flying career. It was also my good fortune to see at close quarters the first Wellington, the B9/32 prototype K4049 rightly regarded as the most advanced design of its day, in the New Types Park at the Hendon Air Display in 1936. Now, working at the Royal Air Force Museum, I can daily visit MF628, the very last of the thousands of Wellingtons which served the RAF.

My first real encounter with the Wellington, and that was what it proved to be, was with a Pegasus engined Mark I, L4322, fitted with fixed turrets and Vickers gas-operated guns. This was in March 1942 at No. 12 OTU, Chipping Warden, where I underwent conversion to this



heavy machine with the experience of only 145 hours 33 minutes flying hours, all of which had been on single-engined aircraft, the most complicated being the Harvard. With the engines at full power on take-off and the aircraft moving at about 60 mph the throttle linkage to the port engine snapped and, before we could properly react and switch off, L4322 had burst a tyre, made two or more spectacular ground loops well off the runway and then slowly went down on the port wheel.

Progression to solo took 5 hours 45 minutes of flights in the Mark I, IA and IC. My inexperience on twins had some influence on this but, as was to be borne out later, there was little of the skill and expertise among the instructional staff which was later passed on by Central Flying School through the Flying Instructor's Schools. Most instruction came from screened pilots, supposedly resting between operational tours. Very few at Chipping Warden had been allowed the time to take the Flying Instructors Course and that included some of the instructors. Looking back, the chief problem for most of us, was the lack of information on what to do in the case of engine failure.

All went well with me until May 5, 1942. I had progressed, training together with another sergeant pilot, almost to the cross-country stages. Night circuits and landings had been completed. I had been stood down after night flying and my co-pilot, who was a few stages behind me, was authorised to take the crew for an hour to practice circuits and landings. Instead he went low-flying and managed to fly into an elm tree at the bottom of his parent's garden about 30 miles away, killing everyone on board.

Group Captain Bill Randle, Keeper of the Battle of Britain Museum, Hendon.

David Cotton.

On June 21, flying another Wellington IC, L2475 in fog over East Anglia on the final leg of a cross country back to Chipping Warden there was a loud bang, the starboard engine ran away and burst into flames because the propeller had fallen off. Despite the immediate use of the Graviner fire extinguisher system, and cutting off of fuel, the fire would not go out, so I gave the order to bale out, which had to be rescinded as we were then passing below 1,000 feet.

Having had no instruction on single-engined flying, I wrongly deduced that it would be best to fly as slowly as possible, not knowing I was ensuring that a crash would be inevitable. The slower I flew, the greater the drag and soon there was nothing I could do to stop us descending steadily through the fog. The landing lights were switched on, and then rapidly off again as the glare in the fog was too great. The Wireless Operator clamped the key on SOS and we braced ourselves for the inevitable crash.

Flying at about 75mph, with full flap down and wings straight and level, we hit a row of trees, leaving the tail, but fortunately not the rear gunner, in a tall elm and then slammed on to a village green, careered off through a small house and came to rest in a barn. My log book records the only casualties as 1 cow, about 15 chickens, one barn, half a house and one very frightened lady who awoke in bed after we had smashed through her kitchen, bringing her down from the bedroom above. The aircraft was a total loss as she subsequently blew up and burned out; the crew bruised, cut and demoralised.

We finished OTU without any more trouble, as one of the four crews to complete the course out of ten which had started. There was a marked sense of relief in joining No 150 Squadron at Snaith, which was equipped with the new Mark III, with its more powerful Hercules engines and feathering propellers. We arrived there on July 8 and before lunch I had received some excellent instruction, including single engine flying and feathering drill.

After waiting a while for a new crew, I moved on to the most interesting part of the course – the cross-country flights. In this, my doleful inexperience was exposed time and again. The Wellington was not an aircraft to forgive the inexperienced and my stupid mistakes often led to drastic results. At first, it was fortunately only small things. On June 3 in a IA, L2532, I experienced for the first time the operational fault which plagued the Wellington for many years, that of a tyre bursting on take-off. Luckily, instead of the customary collapse of the undercarriage, fol-

Bombing-up a Wellington Mk.III of 150 Squadron at Snaith. Squadron Leader Randle flew the only aircraft in 150 Squadron modified to carry the 4,000lb Block-Buster bomb illustrated here. So large was the bomb that it hung out in the slipstream.

(Charles E Brown via RAF Museum).

lowed by the rupture of the oil and fuel tanks, and the resultant fire, the undercarriage held firm for a while then collapsed slowly. The only damage was a bent propeller on the port engine.

On June 10, in a IC with Mark I instruments, the starboard engine revs began slowly to run down whilst flying in turbulent cloud over Snowdonia. In my ignorance, I believed the engine was failing and took the only remedial action I knew, namely to throttle back, switch off, pull up Balance Cock A – the cure for all evils, which made fuel available to one bank of tanks to the other side. Fortunately, we broke cloud over Llanbedr and landed with nothing more serious than a broken tachometer!

On June 17 in a IC, L7850 over the Irish Sea, the starboard engine began to miss badly and again I resorted to pulling up Balance Cock A. This device was down behind the seat out of sight, together with other cocks such as Balance Cock B, which enabled you to cut off fuel to either engine. Not knowing that I had pulled B instead of A, I settled down to fly as carefully as possible towards the Isle of Man, which was clear ahead at about 15 miles. After a minute or so, the port engine failed, because of my self inflicted fuel starvation. With the ailing starboard engine now doing its best to keep us in the air we staggered towards Ramsey, skirted the hills, as we were too low to get over them, and arrived at Jurby downwind among a flurry of Masters and Harvards, which fortunately spotted the laboured approach of the Wellington.

That evening I was taken on my first bombing trip as second pilot to Wilhemshaven, in X 3349. Second pilot was in fact a misnomer as there were no dual controls, the idea being for the new pilot to observe how an experienced crew operated. Two more such trips followed and on July 23 in X 3313 my crew and I went on our first trip, to Duisburg.

I found the Wellington relatively easy to fly accurately on instruments and by no means tiring. She was also manoeuvrable for a bomber and could cork-screw under certain circumstances well within the turning of an approaching fighter. Her durability was renowned and No. 150 Squadron had its full share of aircraft returning with damage which in another type would probably have meant total loss.

We flew X 3313 fairly regularly until for reasons I never knew, I was given BJ 877 to fly. This aircraft, lettered Z for Zebra, was the only one on the Squadron modified to carry the 4000lb block-buster. The standard bomb beams and doors had been removed and the large bomb was held by a single shackle, with about a quarter of this dustbin-shaped weapon standing clear of the aircraft.

A Wellington Mk.II of the type flown by Group Captain Randle. This mark was

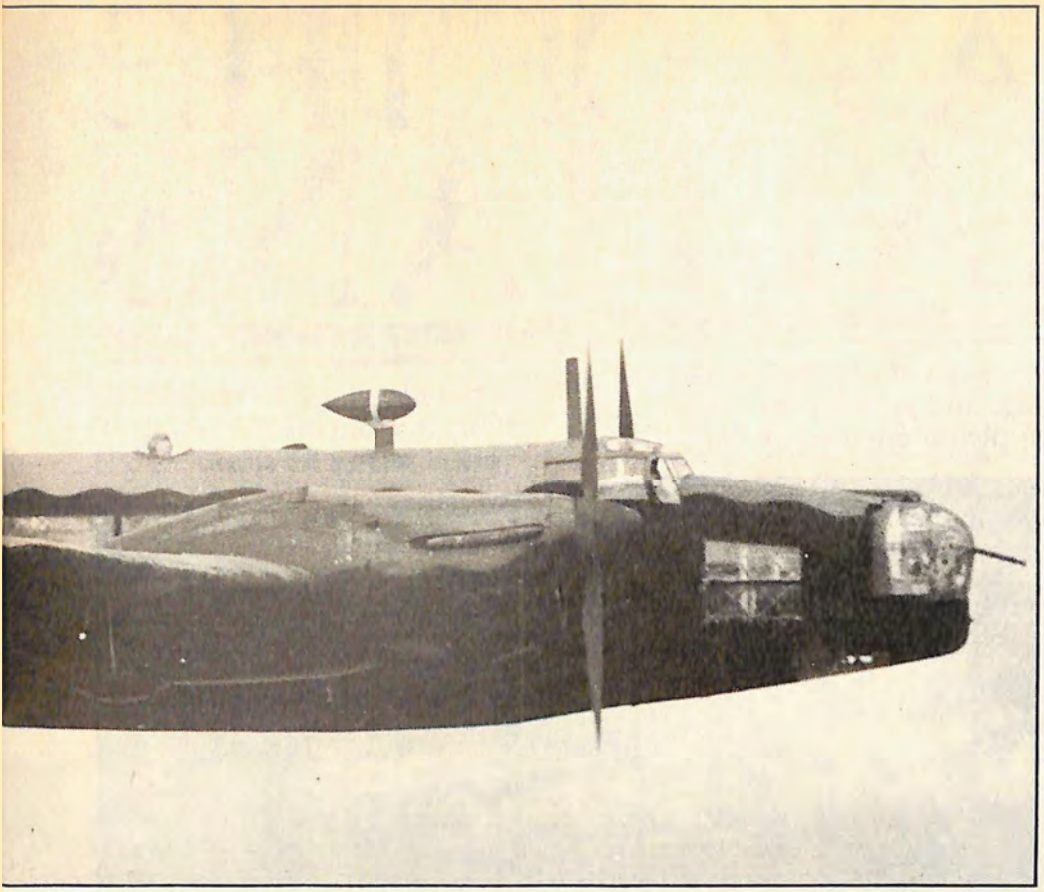
The flying characteristics of the modified aircraft were noticeably different, for with a much heavier load held around the centre of gravity, she was less stable, and because of the drag of the exposed part of the bomb, a little slower. There was no need to confirm "bomb gone" as, upon release, the aircraft seemed to bound upwards and then, much lighter, she became more manoeuvrable and if anything, faster. It was in this aircraft that I stumbled upon cruise climbing and thereafter held her in a trimmed climb right to the target area. It was not unusual to be at 20,000 feet crossing the Dutch coast and as high as 23,000 feet over the Ruhr.

On August 28 BJ 877 was grounded after returning from a raid on Saarbrucken, as a result of violent evasive action and a subsequent high-speed dive across the Channel to shake off the attentions of an ME 110 night fighter which we had all clearly seen in the early dawn light at 19,000 feet. On return to Snaith, with Balance Cock A on, it was found that the fuel tanks in the port wing had all been ruptured, probably by the stress of the pull-out from the dive.

After two trips on X 3304 we were glad to return to BJ 877, which we flew until September 16. In the early hours of that day we went mine-laying off Wangerooge at the mouth of the Elbe and that evening returned to Germany en route to Essen. Over Zwolle on the Dutch coast, at 21,000 feet with a strong following wind of more than 100 knots we were hit by a solitary anti-aircraft shell.

About 15 minutes later the port engine failed and we feathered the propellor. We were then descending into the Ruhr barrage and before long Z Zebra became almost uncontrollable. With full opposite rudder and the wheel hard over to keep up the wing, she could only manage to fly in a large erratic circle being blown further and further into Germany. We baled out at about 16,000 feet, the only unusual happening being the start of what must heve been a barrel roll as I let go of the controls.

In January 1943 I returned to England and was posted to No 23 OTU at Atherstone on Stour as an instructor on Wellingtons. By this time pilots at OTU were given a short CFS course at the start of their screening and I was sent to No 3 FIS at Babdown Farm in February to learn not only how to fly properly but also how to instruct. I returned to Atherstone in March 1943 to work hard and for the first time really began to enjoy the Wellington. As an extraneous job I lectured on the



fitted with the Rolls-Royce Merlin V12 engine. (Charles E Brown via RAF Museum).

construction of the aircraft and the emergency drills.

During my tour at Atherstone I again experienced the wretched misfortune of a burst tyre on take-off despite the most thorough inspection of tyres and runways. On three occasions between May 1943 and February 1944, I was quickly out of the cockpit and through the escape hatch after a tyre had burst and the undercarriage had collapsed. Fire and subsequent destruction of the aircraft followed quickly on two of these occasions.

The root cause of most accidents was still engine failure and the small margin of 15 knots between the critical and single-engined flying speeds led many into quite horrifying accidents. We did our best to instil confidence in the students by practising one-engined flying whenever possible and under all manner of conditions and we reached the stage where the students also did a considerable amount of feathered flying solo.

The other main cause of accidents centred on general lack of experience or just bad luck. Loss of control in cloud, bad instrument flying, careless approaches to land, getting completely lost, being unable to deal with icing, and the unforgiveable crime of low flying led to a rich crop of accidents. Twice during 1943/44 I saw the wing come away outboard of an engine nacelle. Life at OCU was exacting, interesting and never dull, but very few instructors offered to stay on after their 6 or 9 months rest from operations.

I was sent to No 20 OTU in February 1944 for more of the same thing. Apart from operating from Lossiemouth, we flew from Milltown and Elgin, the latter a grass airfield. It is interesting to remember that although we had PSP down on some of the wetter parts of this airfield we did not have a single case of a burst tyre despite having to brake frantically to stay on the grass runway on many occasions.

The accident rate remained high throughout the Spring and Summer of 1944, March being a particularly bad month. We lost an instructor and his crew while making a practice single-engined approach at night and it was about this time that Lossiemouth organised its Mountain Rescue Team.

My personal contribution, this time fortunately only to the incident rate, was one take-off again marred by a burst tyre, a double engine failure at 18,000 feet right over Kinloss, which gave me all the time I needed to pump down the undercarriage and flaps and make a successful downwind landing, and a mysterious happening when, after two short air tests on an aircraft which to me seemed to be trimmed incorrectly, I had taxied it to dispersal, switched off and was just leaving by the forward hatch when she burst into flames and blew up.

In September 1944 we began training French crews. These were very experienced pilots who had flown with the Vichy Air Force in Morocco and Algeria and were destined to fly Halifaxes in Bomber Command. This period led to a rapid recovery in the standard of my French, particularly with the more emphatic words. Most of our instruction had to be given standing alongside the French pilot, who held the only set of controls. But they were good pilots and the risks to ourselves were only imaginary. I believe I am correct in saying that only one French crew was lost at Lossiemouth. No one ever knew the reason, as the aircraft disappeared into the Atlantic somewhere off the Hebrides.

I had now completed 1,500 hours as first pilot on the Wellington, the total required for conversion to the Mosquito. My application was successful and after conversion at 16 OTU Upper Heyford I joined 692 Squadron at Gransden Lodge.

I renewed my association with the Wellington in August 1946 at No 1 Pilot Refresher Unit, first at Wheaton Aston, then at Moreton-in-Marsh from where we moved to Finningley in January 1948. Most instructors had a minimum of 1,500 hours on the Wellington; some, like myself, more than 2,500.

No 1 Pilot Refresher Unit was a good unit with a first-class flying record. It had two flights, one using Harvards and Spitfires, led by Flt. Lts. Steve Carson MC and Bill Bedford AFC; the other Oxfords and Wellingtons under the control of Flt. Lt. L.F. Clarke, a master of the Wellington. In his flight I flew regularly, training pilots who would go on to fly Lancasters, Lincolns, Yorks and later the Washington.

I left No 1 PRFU in August 1948 after a hard worked tour, during which not a single flying accident or incident had occurred. Quite a record, even in those days.

I never flew a Wellington again. They disappeared very quickly from the RAF inventory when the Valetta and Varsity took over the training role. The disappearance became almost total because of the lack of any official preservation policy. That is why only MF628, a T Mk 10 remains at Hendon, the sole survivor of 11,461 which were built. She is by no means at exhibition standard but happily has just been fitted with a front turret and will soon be converted into an operational Mk X. Much internal restoration and a new paint scheme is needed, which should do a great deal to remind us of the true nature of this great aircraft.

THE LAST OF THE LEVIATHANS

Slightly misnamed, since it didn't like to go above 25,000 feet, the sluggish but luxurious Stratocruiser, with its unique double-bubble fuselage and upstairs-downstairs configuration, marked the beginning of the end for the long distance piston engined airliner. Dr John Whittle relates its story.

Northwest Airlines Stratocruiser N75601 photographed over the Rocky Mountains on a test flight. (Photo Boeing)

In the years before World War II, trans-oceanic airline service steadily progressed from a mere idea in the minds of visionary pioneers to a practical, if somewhat expensive, means of high speed travel.

Pan American Airways, under the skilful guidance of Juan Trippe, mastered the Pacific with island-hopping Sikorsky S-42 and Martin 130 flying boats. Pan Am was in the process of conquering the much less hospitable North Atlantic with its Boeing 314 flying boats, in concert with Imperial Airways and Short S.30 Empire Class flying boats.

But the problems of weather and westerly winds, especially on the northern North Atlantic routings during winter, were only going to be overcome in Pan Am's view by the use of pressurised, long range, land based aircraft flying above the weather at 20,000 ft. So, even though the meagre payload possible on Atlantic flights would not be economical, orders were placed for three Boeing 307 Stratoliners. These were constructed, in essence, by attaching B-17 wings complete with engines and undercarriage, and tail units to a new circular cross section pressurised fuselage.

Late in 1941, when the United States found itself embroiled in a war on two separate continents, each removed from its mainland by a great ocean, all available transports with true trans-oceanic capability not already in military hands – a mere 15 aircraft, comprising eight Boeing 314s, five Boeing 307s and two Martin 130s – were requisitioned.

But it immediately became clear that these aircraft were completely inadequate in numbers to cope with demands. Orders already placed for every aircraft in production or development were massively increased, but only the Douglas C-54, alias the DC-4, was anywhere near production. Work was progressing on the Lockheed Constellation, although Lockheed was heavily engaged in P-38 Lightning production.

The year 1942 saw the US military scrambling to fill the gap. Among the projects presented to the Army Air Force was a proposal from Boeing for a transport version of the B-29. This had yet to fly for the first time, although production commitments totalled well into four figures. The Army accepted the proposal and ordered three XC-97 (Boeing 367) prototypes in January 1943. Imitating the

successful B-17 to Boeing 307 translation, Boeing elected to use the wings, engines and tail unit of the B-29.

Instead of a single circular section for the fuselage, Boeing cleverly adopted a "double bubble" or inverted figure eight section. The lower portion, including the wing centre section, was a slightly modified B-29 structure. The cabin floor was then conveniently attached to fittings at the intersection of the two circular sections. Clamshell doors in the underside of the rear fuselage, in the region where only the upper lobe remained, provided access to the main cargo deck via an integral ramp.

Following the successful maiden flight of the XC-97 on November 15, 1944, the Army Air Force ordered ten pre-production (or service test) C-97s in July 1945. The first six were completed as YC-97s, very similar to the XC-97s, but with revised nacelles developed for, but not used, on later B-29s. Oil coolers were moved aft, eliminating the characteristic "chin" of the B-29 nacelle.

At no stage had the airlines or manufacturers lost sight of the post-war potential for air travel on a scale barely imaginable in the late thirties. Even in 1941, Pan Am circulated its requirements for a long range transport with 17,500lbs payload, cruising speed of 375mph and range of 5,000 miles.

Throughout the war, Pan Am kept in touch with Boeing, just as TWA did with Lockheed, and American and United with Douglas. Out of these collaborations came the Boeing Stratocruiser, the Lockheed Constellation and the Douglas DC-6, derived from the C-97, the C-69 and the C-54 respectively.

Provisional orders had been placed back in 1940 for the Constellation by both TWA and Pan Am, but war intervened and it was mid-1944 before serious planning was commenced by the airlines.

Pan Am scaled down its commitment to the Constellation and continued to prod Boeing to increase the range – and thus the gross weight – of the Stratocruiser. In June 1944, the proposal was for a 120,000lbs aircraft with 2,200hp Wright R-3350s (á la B-29). But Pan Am persuaded Boeing to adopt improvements slated for the B-29D (redesignated B-50A for production) for the Stratocruiser.

These comprised 3,500hp four row 28 cylinder Pratt and Whitney R-4360 (Wasp Major TSB3-G) engines, a switch to a newer light alloy for the wing structure, resulting in a 16 per cent stronger structure from a 600lb lighter wing, larger flaps and higher tail, reversible pitch propellers, hydraulic rudder boost, nose wheel steering and better de-icing and undercarriage retraction systems.

Pan Am ordered 20 of these Boeing 377 Stratocruisers on November 28, 1945 at a cost of about 1½ million dollars each, and orders followed from SILA, the Swedish international airline soon to be absorbed into Scandinavian Airlines System, American Overseas Airlines (AOA), Northwest Airlines and United.

Having been forced to acquire Constellations, BOAC struggled valiantly to abide by Government exhortations to support the British aircraft industry and not to spend dollars. They put on a brave face by planning to use Avro Tudors across the Atlantic. Six Stratocruisers were, however, ordered on October 18, 1946, a fact which was not officially confirmed until mid-1947.

TWA progressed sufficiently in discussions with Boeing for 14 serial numbers to be reserved, but no mention of the potential order appeared in the contemporary press.

In a spirit of war time "can do", Boeing boldly promised delivery to Pan Am late in 1946 and to other customers approximately one year after receipt of order. But the transition from war to peace turned out to be a very difficult one for Boeing in Seattle. It was not until March 11, 1947, that the first of six YC-97s was flown. These were introduced into Air Transport Command service between Fairfield-Suisan (now Travis AFB), California, and Hawaii on October 11, 1947.

Meanwhile the prototype Model 377 (NX90700) was rolled out on July 2, 1947, and made its 1hr 24min maiden flight on July 8, 1947, with J B Fornasero at the helm. The first production Stratocruiser (Pan Am's "Clipper Good Hope" NX1939V, later N1039V) was rolled out at Seattle on September 17, 1947, and joined the prototype in the test programme on September 28.

There remained four aircraft from the Army Air Force pre-production batch, and three were finished as YC-97A freighters, with the "B-50" improvements. The first flew on January 28, 1948. The last aircraft became the sole YC-97B, and was essentially a slightly militarised airliner-type Stratocruiser with circular windows, an 80-passenger interior, and with the clamshell doors deleted.

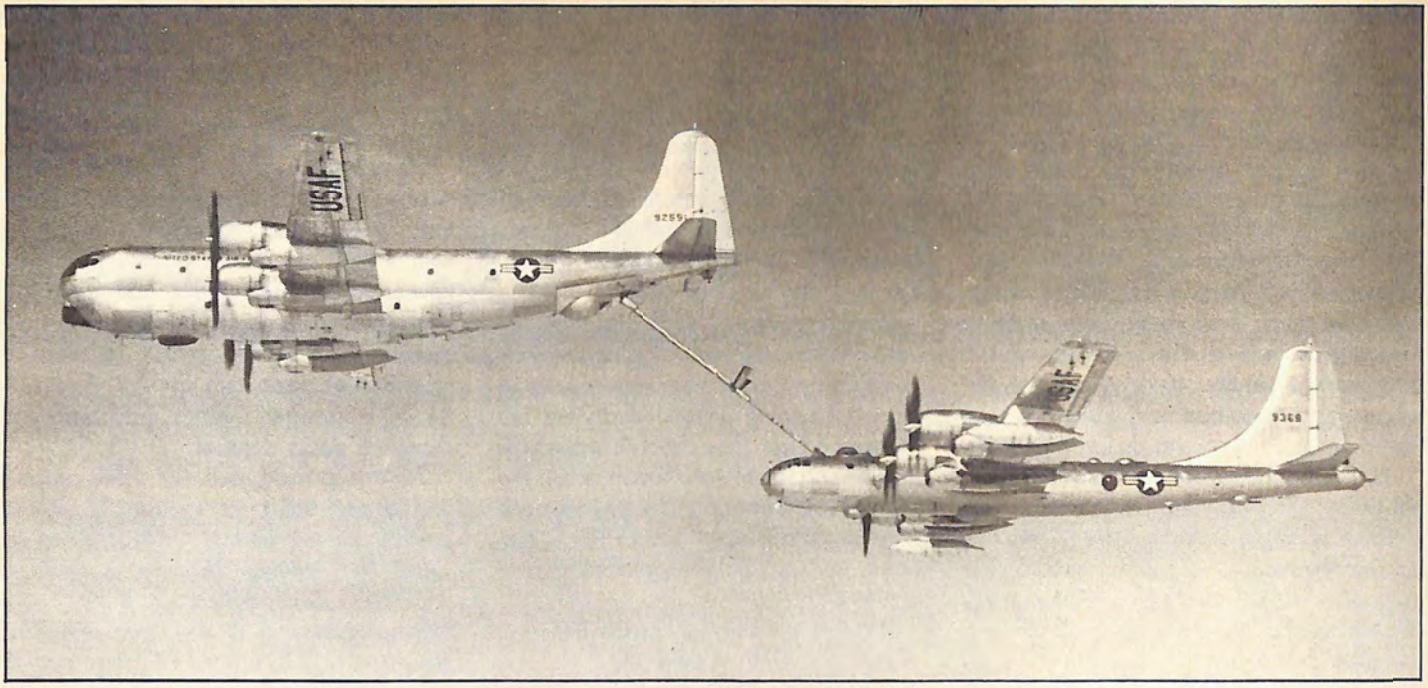
As time passed, delivery dates slipped and slipped and it was January 13, 1949, before one of several Stratocruisers to wear the name "Clipper America" (N1025V), was delivered to Pan Am. Northwest, having initially been promised first delivery in January 1947, became so exasperated when none had arrived by June 1949 that it took legal action against Boeing, claiming twenty-five million dollars in damages for late delivery.

Other customers were equally unhappy, and in all probability only the traffic drop caused by the post-war recession prevented much more vocal public expression of their chagrin.

Pan Am, its flair for publicity as effective as ever, took "Clipper America" (N1025V) to Washington National Airport for a ceremonial naming by the first lady, Mrs Truman, on March 5, 1949. Although the Stratocruiser had been clearly intended for the Atlantic services, Pan Am elected to put the aircraft into service first on the San Francisco to Honolulu route on April 1, 1949.

The New York to Bermuda route, by

This shot was taken by Vauxhall Motors to publicise the Bedford crew bus used by BOAC at the time. The crew's uniforms give ample reminder that this was taken in the 1950s. (Photo Vauxhall Motors, via K Brookes)



An early USAF KC-97 tanker version of the Stratocruiser refuelling a B-50. (Photo Boeing)

now a traditional stepping stone to full trans-Atlantic service, followed on April 15, 1949. "Clipper Flying Cloud" (N1028V) arrived at London Heathrow on a first proving flight on April 4, 1949, while regular New York to London services began on a thrice weekly basis on June 2, beginning the replacement of Constellations on the route.

The westbound crossing could sometimes be achieved non-stop, as on a proving flight on April 28, when a new record time of 9hr 46min New York to London was established. But a stop at Gander was the rule on most occasions.

Pan Am originally projected the Stratocruiser as a 75-seat dayplane, but on the competitive, if high fare trans-Atlantic route, luxury was the order of the day.

Pan Am's "Clippers", named after the Clipper ships which formed the backbone of the British and American merchant marine of the 1850s, were, as early as June 10, 1949, offering "President" sleeper service with 39 "sleeperette" seats, plus 13 or 14 sleeper berths and two two-passenger state rooms. The later "President Special", for which an additional 50 dollars was charged, was flown with Stratocruisers in a 47-berth configuration.

The cavernous lower lobe of the Stratocruiser allowed a lounge or cocktail bar in the lower deck immediately aft of the wing centre section. Access to this lounge, which could hold 14 passengers, was via a spiral staircase.

Nor was the flight crew any less comfortable, for the Stratocruiser had a rather bulbous nose section, providing the most spacious cockpit and most superb visibility of any large aircraft before or since.

In 1949, AOA and Pan Am competed on the London run, and the former became the second Stratocruiser operator when it committed its "Flagships" twice weekly from August 17, 1949, New York-Gander-London and vice versa. On November 15, AOA increased to a daily frequency, extending to Frankfurt four days a week. Pan Am responded with a New York–Shannon–Brussels–Frankfurt service, once weekly from November 5, and three times weekly from December 15.

After the debacle with the Tudor, BOAC found itself in need of more long range aircraft. Following success in acquiring five Irish Constellations for sterling BOAC purchased the four as yet undelivered Scandinavian Airlines System Stratocruisers for £3 million, again in sterling. It was the first of these, "RMA Cathay" (G-ALSA), which arrived at London on October 15, 1949, after a 10hr 15min non-stop flight from New York, with Capt W S May, an Imperial Airways veteran, in command.

The first scheduled service on December 6, London-Prestwick-New York (Idlewild) by "RMA Cathay" was the start of a process whereby Constellations were redeployed to increase services from London to Montreal, enabling long-serving Liberators to be honourably retired from the Prestwick-Montreal run.

BOAC's Stratocruisers were named after the more long-lived of the famous Short "C Class" Empire Flying Boats which had pioneered the route to Australia in the 1930s. The flagship of the fleet, "RMA Caledonia" (G-AKGH), was formally christened at Prestwick on January 7, 1950, by the Minister of Aviation, Lord Pakenham.

Routes to the Orient were not so well patronised as the Atlantic runs, and Douglas DC-4s proved adequate in the early post-war years, although Pan Am used some Constellations from Spring 1946 to early 1947. After a leisurely pre-inaugural Stratocruiser flight with 75 passengers from San Francisco to Honolulu-Midway Island-Tokyo and return between September 22 and 30, 1949, Pan Am began regular service twice weekly on October 17, 1949, with an elapsed time of 25hrs 50mins westbound, 22hrs 45mins eastbound. The Honolulu-Fiji-Sydney segment was added on June 1, 1950, while sleeper service to Tokyo and Manila with Stratocruisers in a 56-passenger configuration followed on June 13, 1950.

With its bloated, almost whale-like shape, the Stratocruiser was majestic in flight, if a little ponderous on the ground. The flying characteristics were of a high quality, with only minor flaws.

The US Civil Aeronautics Authority insisted on spoilers being placed between the inboard engines and the fuselage. The purpose was to prevent the aircraft from entering a secondary stall – not something it did easily or willingly – but the effect was to produce an early, primary stall if the nose was raised as in a normal landing on any other type. Thus an attempted nose high landing was generally rather firm or even heavy.

The US Air Force removed spoilers from its C-97s after a few months, and most military pilots reverted to the nose high or stall landing. It took several years to

A Pan American Stratocruiser in its original colours flying out of Rio de Janeiro

convince the CAA that the spoilers could be removed without detriment to safety, by which time the nosewheel-first technique had been ingrained in most airline pilots.

With the spoilers in place, it was necessary to keep the nose down and, if bounced into the air a few knots early, to put the aircraft back on the runway until flying speed was attained. The natural reluctance to raise the nose at low speed made the Stratocruiser slow to climb out and gave it the appearance of being nose heavy.

The Stratocruiser was particularly sensitive to weight and temperature, both in take off performance and altitude attainable. Stratocruisers flying down to Rio de Janeiro from the States could rarely get above 12,000ft – certainly not high enough to clear the tropical cu-nims and thunderstorms. But on the late stages of a flight to London or Paris, 25,000ft could be reached.

While comparison of cruising speeds is notoriously difficult, it is fairly certain that unless a Stratocruiser was at or above 25,000ft, it was slightly slower than a DC-6 or a Constellation in an equivalent operational situation.

The range of the Stratocruiser – again difficult to evaluate realistically – appears to have been significantly greater than the L.049 Constellation, similar to the DC-6B and L.749 Constellation and a little less than the L.749A.

The long delays in getting Stratocruisers into production were partly caused by engine problems. Even so, when the aircraft went into service, the engine was far from snag free. The much touted engine analyser, was the manifestation of a high spark plug failure/fouling rate. Changing 56 spark plugs, two on each cylinder, just to cure a few misfires was expensive. The analyser allowed flight engineers to pinpoint problem plugs.

Early engines suffered valve problems to such an extent that cylinders had to be changed after a mere 150 hours. Oil consumption was also a problem, and white smoke trailing behind a taxying Stratocruiser was the norm rather than the exception.

Failures were frequent, and aggravated in the early days by diluting engine oil with fuel on shutdown to facilitate the next start in cold conditions. The fuel however, freed a lot of engine sludge which blocked oil lines on the next flight, causing a rather precipitous engine seizure.

In January 1953, BOAC began to experience seizures on newly overhauled engines, and grounded its fleet for about two weeks until the problem was traced to a crankshaft bearing lubrication problem.

The propeller was perhaps the Achilles heel of the Stratocruiser. AOA and United used Curtiss Electric propellers, but all other customers opted for Hamilton Standard units which were more aerodynamically efficient and weighed some 650lbs less per set.

The Hamiltons were hollow steel forgings filled with sponge rubber or, nylon, but proved prone to fatique failures. The records contain many instances of propellers and even complete engines shed. Propellers were directly involved in at least three major Stratocruiser accidents.

One peculiarity of the Stratocruiser was the variety of window arrangements. Pan Am aircraft had circular "portholes" on both the main and lower decks. AOA also had circular windows on the main deck, but rectangular ones on the lower deck. BOAC aircraft had circular main deck windows, but with nine rather than six on the port side aft of the wing. The lower deck windows were round on aircraft from the SAS order, rectangular on aircraft of BOAC's own order. Northwest had rectangular windows on both the main and the lower decks. United had rectangular windows on the upper deck, and circular lower deck windows.

In an almost unprecedented move, Pan Am retained its Stratocruisers on the luxury "President" and "President Special" Atlantic services and introduced its fleet of newer, faster DC-6Bs in an 82-seat configuration on the all tourist "Rainbow" services on May 1, 1952. In fact, late in 1953, Pan Am decided to spend 1 million dollars to add to ten of its Atlantic Division Stratocruisers, six additional cells to each outer wing tank increasing total fuel capacity from 7,790 to 8,150 US gallons. New turbochargers were also installed. These "Super Stratocruisers", introduced on November 15, 1954, were able to fly non stop New York to London (eastbound) with reasonable regularity all year round.

But the DC-7B, introduced on June 13, 1955, and especially the DC-7C introduced on June 1, 1956, brought westbound non stop London-New York services under nearly all weather conditions, and by 1957, only a few Pan Am Stratocruisers plied the Atlantic.

Pan Am acquired eight additional Stratocruisers in their September 1950 take-over of AOA. These aircraft, after some standardisation, were assigned to the Pacific Division.

The first scheduled Pan Am Stratocruiser flight to Buenos Aires left on May 7, 1950, but a preview and publicity flight took "Clipper Friendship" (N1027V) from New York (June 29, 1950) to Rio de Janeiro (June 31), Montevideo (July 2) and on to Buenos Aires (July 3) where it was christened by Eva Peron, wife of the Argentinian dictator.

Pan Am expansion in the Pacific was limited. Island hopping was not particularly convenient, and techniques for using the jetstream enabled winter non-stop Tokyo-Honolulu service to begin on November 1, 1954, overflying Wake Island most of the time. During the peak of the Korean Air Lift in the early fifties, Pan Am had two Stratocruisers in service on the Fairfield-Suisan (Travis AFB)-Tokyo run.

As the Atlantic operations began to wind down, Stratocruisers replaced DC-6Bs on Pan Am's Seattle-Alaska services

on July 1, 1956, while one aircraft (changed from time to time!) operated an Auckland-Nandi (Fiji) shuttle to connect with the Sydney-Honolulu-San Francisco service from about August 1956 until September 25, 1960, when Auckland's airport was improved to accept DC-7Cs.

"Clipper Celestial" (N1025V) was the aircraft used for most of 1960. It continued on a twice weekly Honolulu-Manila-Saigon-Singapore service until December 18, 1960, when it returned from Honolulu to San Francisco on Pan Am's last revenue earning Stratocruiser flight.

All other Stratocruisers had been withdrawn at Miami early in 1960. Many were traded to Boeing in 1960/61 and later sold to Aero Spacelines for use in the Guppy programme.

BOAC cashed in on the popularity of the Stratocruiser with the luxury trade by commencing on March 1, 1951, with much fanfare, the "Monarch" service from London to New York with a fuel stop at Gander. This service, which commanded a surcharge over normal first class fares, was operated with 50-seat versions.

Stratocruisers had also replaced Constellations on two of four London-Prestwick-Toronto services on April 2, 1950, later operating all the flights. Service to Montreal began November 8, 1950.

Although only five Comet Is remained in service with the airline when the type was withdrawn in April 1954, BOAC had been counting on the Comet for many of its Eastern, African and Australian "Empire" services. A scramble for additional propeller driven aircraft followed. In July 1954, United's fleet of six Stratocruisers were purchased and sent to Lockheed Aircraft Services at Idlewild for conversion to 81-passenger tourist class configuration.

One Pan Am aircraft was bought in June and delivered in similar configuration two months later. The United aircraft were delivered to BOAC in the second quarter of 1955, and began tourist class "Coronet" services London-Montreal on April 13, 1955 and London-Manchester-New York on May 24, 1955.

The aircraft continued to do excellent work until Douglas DC-7Cs began to take over the first class services in January 1957, operating from May in a mixed class configuration. At the end of that Summer Stratocruisers were largely withdrawn from the Atlantic and the DC-7Cs were supplemented by Britannia 312s from December.

Those released from the Atlantic were redeployed on services to West Africa for a while.

Fourteen of BOAC's fleet were eventually sold to Boeing (in part exchange for Boeing 707s!) and resold to Transocean. The remaining two, "RMA Calypso" and "RMA Clio" were broken up at Stansted.

In ten years, BOAC's Stratocruisers carried 680,000 passengers, flew 247,500 hours, and made 12,804 Atlantic crossings and 53,974 landings.

United Airlines was less than happy with the operating costs of Stratocruiser, and after some consideration of operating them in US trans-continental service, took advantage of BOAC's urgent needs to sell its entire fleet in 1954.

Northwest, on the other hand, with fleet problems caused by its decision to withdraw the Martin 2-0-2s, operated its Stratocruisers extensively in US domestic service.

On the military scene, the US Air Force followed up its initial orders with a ticket for 50 C-97As, very similar to the YC-97A, but with APS-42 radar in the characteristic chin radome.

The C-97As were followed by 14 C-97C (or MC-97C) versions, equipped to carry Korean War casualties back to the United States. Following trials with a converted C-97A, orders were placed for 60 KC-97Es with four upper deck fuel tanks totalling 7,200 US gallons and an in-flight refuelling pod and boom.

There followed 159 KC-97Fs with engine differences, and 592 KC-97Gs with detail changes such as an ability to operate in a cargo configuration without removing the refuelling pod, and 700 gallon underwing fuel tanks outboard of the outer engines. All these military aircraft were built at the Renton plant near Seattle.

Two YC-97Js were KC-97Gs in cargo configuration fitted with Pratt and Whitney YT-43 turboprops for service test purposes.

The KC-97s were used primarily by Strategic Air Command for refuelling B-47s until replaced by KC-135s. In 1963/64, 135 KC-97Gs were converted to C-97G by deletion of the in-flight refuelling equipment and main deck tanks for use by Air National Guard units. Twenty-six KC-97G were converted to C-97Ks for Military Airlift Command passenger operations with the cargo door sealed.

Some KC-97Gs were equipped as KC-97Ls with two auxiliary J-47 turbojets taken from surplus KB-50Js, using the wing tank attachment points, to make their cruising speed more compatible with jet receiver aircraft. They were operated by Air National Guard squadrons until about 1978, when KC-97Ls of the Illinois Air Guard could still be seen operating from O'Hare airport, Chicago.

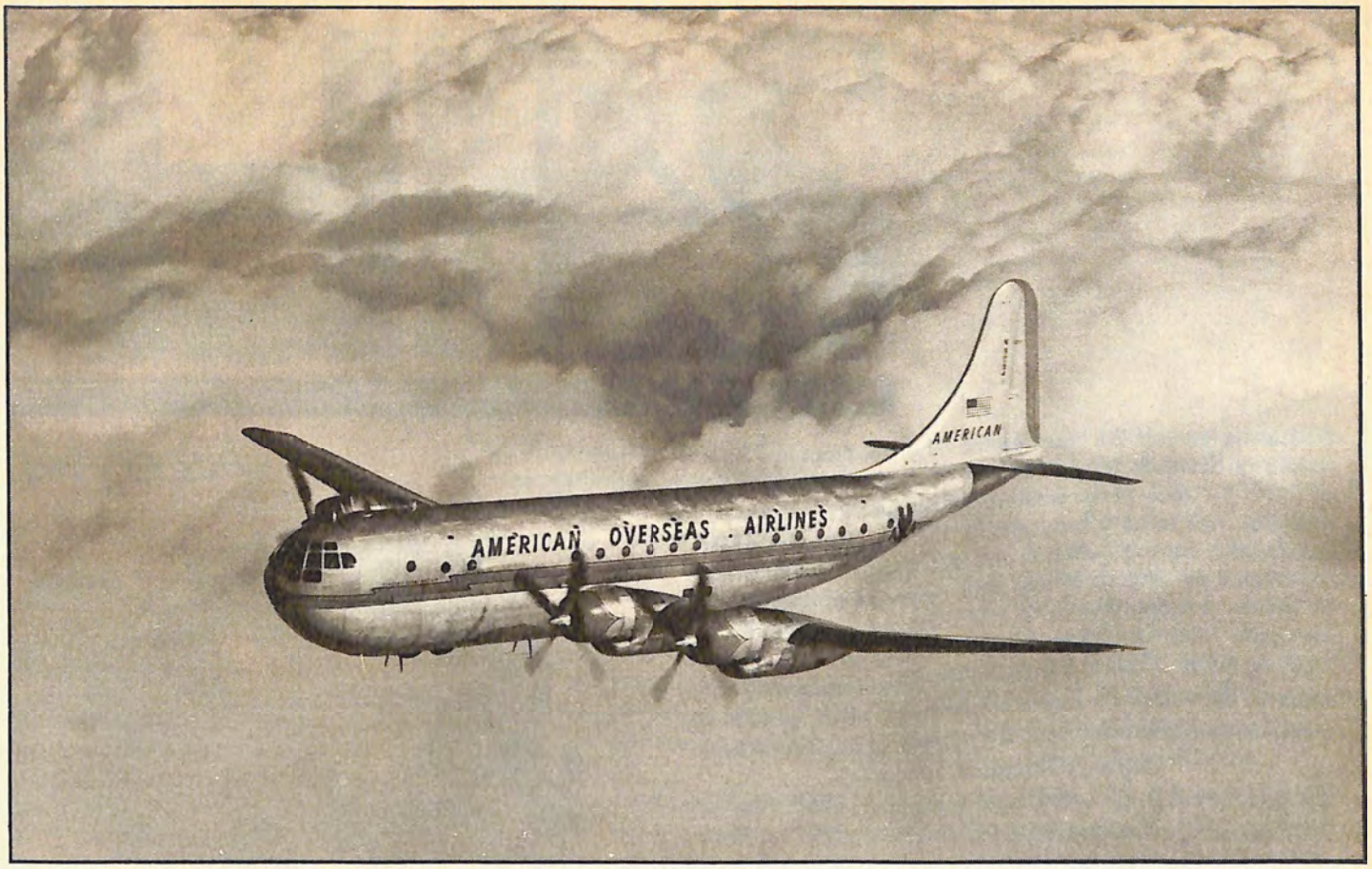
Perhaps the most bizarre use of the Stratocruiser followed the acquisition by Aero Spacelines of Santa Barbara, of 27 ex-Pan Am, Transocean and Northwest aircraft. Aero Spacelines has since produced a number of different "Guppy" conversions for oversize freight carrying, with added upper fuselage sections ranging up to 25 feet in diameter.

Production so far has comprised a 377PG "Pregnant Guppy", a 377SG "Super Guppy", a 377MG "Mini Guppy", a 377MGT-1 "Mini Guppy" (which crashed on an early test flight) and two 377SGT "Super Guppies" with Allison 501-D22 engines.

Such is the demand for the capacity of these conversions that NASA has purchased the 377SG to continue flying S-IVB stages of the Saturn rocket and similar cargoes across the US, and Airbus Industries has contracted with Aero Spacelines to build two more 377SGTs to add to the two it now operates to carry A300 wings and other components to Toulouse.

Ten Stratocruisers out of a total of 57 civil examples built were written off in major accidents. This was not a particularly impressive record, even for its day. The first total loss, United's "Mainliner Oahu" (N31230) was the result of an inadvertent

The now familiar bloated shape of the Super Guppy used by NASA for transporting larger items of hardware. This is the G-201 N212AS. (Photo G J M G Gradidge)



American Overseas Airlines Stratocruiser (N90941) "Flagship Great Britain." (Photo Boeing)

stall while operating on three engines over San Francisco Bay at 300ft during a training flight on September 12, 1951. The three crew members lost their lives.

On April 28, 1952, Pan Am's "Clipper Good Hope" (N1039V) crashed in the Brazilian jungle near Carolina with the loss of all 41 passengers and crew. Extensive investigation led to the conclusion that the number two engine and propeller had detached from the aircraft in flight.

With a low overcast and light drizzle falling, BOAC's "RMA Cathay" (G-ALSA) undershot by about a hundred feet on a GCA approach to runway 31 at Prestwick in the early morning of Christmas Day 1954. The undercarriage sank into soft ground and the aircraft overturned and caught fire. Twenty-four passengers and four crew were lost.

On March 26, 1955, Pan Am Stratocruiser "Clipper United States" (N1032V), 42 mins out from Seattle en route to Hololulu and Sydney, shed number three engine and lost control of the other propellers. The aircraft broke in two after ditching, but 13 of 15 passengers and six of eight crew escaped.

Northwest Stratocruiser "Tokyo" (N74608) experienced severe buffet on take off at Seattle on April 2, 1956, and ditched with the loss of four passengers and one crew.

Perhaps the most publicised Stratocruiser accident occurred on October 16, 1956, when Pan Am's "Clipper Sovereign of the Skies" (N90943) experienced a runaway propeller, resulting in the failure of two engines. Unable to either return to Honolulu or continue to San Francisco, Capt Dick Ogg ditched the aircraft in the Pacific next to the US Coast Guard cutter "Pontchartrain" on weather station 1,000 miles west of San Francisco. All 24 passengers and seven crew were rescued. The Stratocruiser was taken in tow, but later sank.

"Clipper Romance of the Skies" (N90944) crashed in the Pacific 900 miles east of Honolulu on November 9, 1957, with the loss of 36 passengers and eight crew. Only small parts were recovered and the cause was never discoved.

As the Stratocruisers came towards the end of their useful lives, accidents from which they might have recovered when they were newer were sufficient to cause write offs. "Clipper Golden Gate" (N1023V) was written off after a heavy landing at Manila on June 2, 1958, in which a propeller entered the fuselage killing a passenger. "Clipper Midnight Sun" undershot at Juneau, Alaska, on April 10, 1959, and was damaged beyond economical repair in the ensuing fire. Fortunately, there were no casualties.

"Clipper Australia" (N90941) belly landed at Tokyo on July 9, 1959, also without casualties, and was written off. This is the aircraft illustrated in the Michael Turner painting on pages 34 and 35.

Where then does the Stratocruiser stand in the annals of aviation history? Its forté was clearly the luxury trans-oceanic services of the early fifties. Its long gestation period apparently lost an order from TWA which might have led to further successes.

With an earlier appearance it might also have overcome the engine problems and the fact that it was slightly slower than the DC-6 and Constellation.

SPECIFICATIONS

Boeing 377 Stratocruiser

ENGINES: Four Pratt & Whitney R-4360-TSB-6 Wasp Major.
SPAN: 141ft 3in.
LENGTH: 110ft 4in.
HEIGHT: 38ft 3in.
WING AREA: 1768sq ft.
EMPTY WEIGHT: 83,500lbs.
MAXIMUM GROSS WEIGHT: 145,800lbs.
MAXIMUM SPEED: 340mph.
CRUISING SPEED: 300mph.
INITIAL CLIMB: 1100ft/min.
CEILING: 32,000ft.
RANGE: Approximately 3,000 miles with airline reserves.

24 HO

A special analysis

THIS is the story of 24 hours on the Channel Front in 1941. It opens at dawn on May 8 and narrates all air combats that took place until sunrise on the 9th.

The day was to be a busy one for the Royal Air Force and Luftwaffe, coming during a period of transformation when Britain's air strategy turned from defensive to offensive.

During the opening months of 1941 the majority of Luftwaffe day fighter units had returned to their bases on the Kanalfront, having taken a rest in the Reich. They firmly believed that mass daylight raids on Britain would begin anew as soon as weather permitted and that the postponed invasion would come to fruition in Spring.

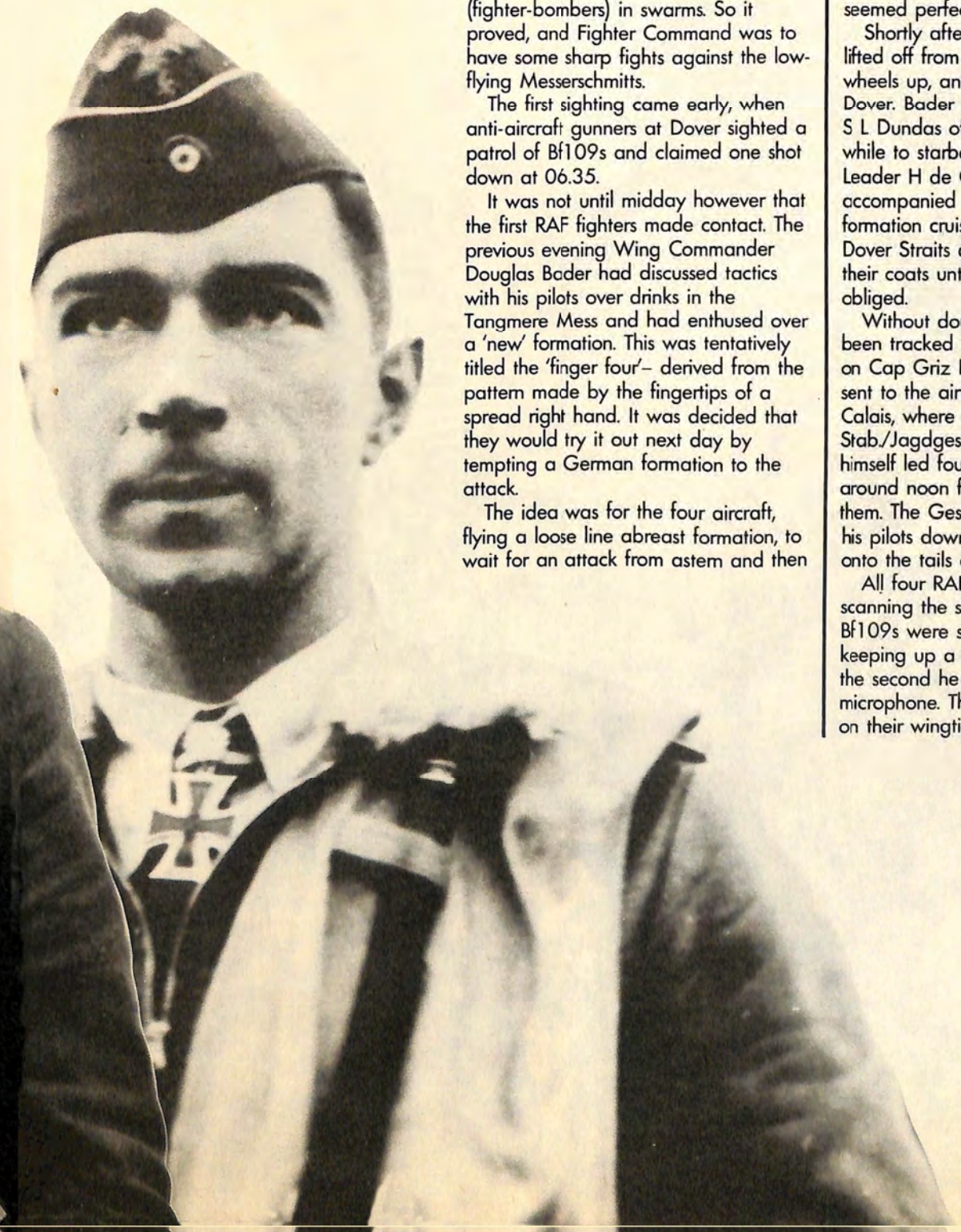
By June, however, all heavy night raids had ended. And far from repulsing mass attacks the RAF was sending out twice daily bomber raids against targets in France, sometimes escorted by up to 250 fighters on a single mission!

The way was paved with danger and difficulty; the struggle for initiative costly in lives and aircraft. For many, May 8 was not just another day....

Two fighter aces on opposite sides met in combat at high noon on May 8 – the RAF's Wing Commander Douglas Bader and Luftwaffe veteran Major Werner Mölders.

OURS

by John Foreman



FINGER-FOUR

The morning dawned bright and clear along the English Channel and promised to bring out Luftwaffe Jabos (fighter-bombers) in swarms. So it proved, and Fighter Command was to have some sharp fights against the low-flying Messerschmitts.

The first sighting came early, when anti-aircraft gunners at Dover sighted a patrol of Bf109s and claimed one shot down at 06.35.

It was not until midday however that the first RAF fighters made contact. The previous evening Wing Commander Douglas Bader had discussed tactics with his pilots over drinks in the Tangmere Mess and had enthused over a 'new' formation. This was tentatively titled the 'finger four'– derived from the pattern made by the fingertips of a spread right hand. It was decided that they would try it out next day by tempting a German formation to the attack.

The idea was for the four aircraft, flying a loose line abreast formation, to wait for an attack from astern and then to break, each pair turning in opposite directions with the object of coming in behind the surprised German pilots and then shooting them down. In theory, it seemed perfect, but in practice....

Shortly after 11.30, the four Spitfires lifted off from Tangmere, tucked their wheels up, and headed east towards Dover. Bader led, with Flying Officer H S L Dundas of 616 Squadron to port, while to starboard flew Squadron Leader H de C A Woodhouse, accompanied by Sergeant Mains. The formation cruised up and down the Dover Straits at 10,000 feet, trailing their coats until the Luftwaffe duly obliged.

Without doubt the British fighters had been tracked by the Freya radar station on Cap Griz Nez. Orders were quickly sent to the airfield at Mardyck, near Calais, where Major Werner Mölders' Stab./Jagdgeschwader 51 lay. Mölders himself led four Bf109Fs away and around noon found the Spitfires below them. The Geschwaderkommodore led his pilots down in a gentle, slanting dive onto the tails of the Spitfires.

All four RAF pilots had been scanning the sky anxiously and the Bf109s were seen in good time, Bader keeping up a running commentary until the second he snapped "Break!" in the microphone. The four Spitfires wheeled on their wingtips in a vision-blurring

turn. As they pulled out, expecting to see the German aircraft in front of them, Dundas and Mains were shocked to feel cannon shells exploding in their aircraft. It would appear that they had actually turned inside all four of the 109s, leaving the German pilots with easy no-deflection shots.

Major Mölders claimed one Spitfire shot down and Oberleutnant Geyer claimed two more. Mains fired at a 109 as it flashed past after overshooting him, and he submitted a claim for a 'destroyed'. Then he drew a bead on another, claiming this probably destroyed, before he was attacked again and his tail unit riddled with cannon-fire. Bader also claimed a 'probable' as the Bf109s, wisely choosing not to dogfight the Spitfires, dived for home.

In truth, if any damage had been done to any of the German aircraft, it was minor, since all the German fighters returned safely. Bader and "Paddy" Woodhouse escorted the two crippled Spitfires back to the coast, Mains landing safely at Tangmere while Dundas forcelanded at Hawkinge, almost wrecking a line of new Spitfire Vbs of 91 Sqn in the process.

Paradoxically, it was Mölders himself who had developed the 'finger four' formation some three years earlier wher leading Jagdgruppe 88 in Spain with the Condor Legion. During the Battle of Britain Luftwaffe fighter pilots had viewed almost with amusement the normal 'vic' formation of three aircraft used by RAF fighters. They termed it the 'Idiottenreihe' – literally 'line of idiots' – since the formation was suitable only for air display aerobatics.

Twenty minutes after the Tangmere Spitfires had departed from their base, six Hurricanes of 302 Sqn took off from Kenley to patrol the area between Ashford and the coast in order to intercept a Staffel of Messerschmitts reported heading inland. These were from I./JG3, airborne from St Pol, and the Hurricanes succeeded in surprising them in the Dover area.

The Czech pilots attacked with determination, Pilot Officer Kinel claiming one destroyed, the pilot baling out, and Plt Off Krol claimed a second, which blew up over Tenterden, while Sgt Rytka reported a 'probable' in the same area. In fact Kinel and Krol had double-claimed the aircraft flown by Leutnant Pöpel of 1 Staffel, who baled out of his orange nosed Bf109F before it exploded over Tenterden. He reached the ground safely and was taken prisoner. A third claim – for this same aircraft – was submitted by Dover AA gunners!

At 12.35 a second flight of six 302 Sqn Hurricanes took off to meet another Bf109 sweep, this time from II./JG3 based at Monchy-Breton. The Hurricanes intercepted near Maidstone around 13.25, and chased them back to the coast. Only one of the Czech pilots was able to close sufficiently to fire however, Sgt Nowakiewicz shooting down a machine from 4 Staffel into the sea off Sangatte. The pilot baled out and having descended into the Channel was seen to climb into his dinghy. This particular pilot was to be the direct cause of a large combat later in the day.

Around 15.00, I./JG3 was airborne again, Hauptmann Hans von Hahn leading his pilots in a Jabo raid against Lympne. The Bf109s came in low over the sea, hedgehopped the airfield boundary and dropped their 250 kilogram bombs on the base. Steep-turning, they came back again, strafing

Pilots of 609 Squadron pictured in 1941. Standing (left to right): Bob Boyd, Baudouin de Hemptinne, Peter Mackenzie, Paul Richey, John 'Bishop' Bisdee, 'Pyker' Offenberg and Jimmy Baraldi. Sitting: Vicki Ortmans, Tommy Rigler, Keith 'Skip' Ogilvie and Bob Wilmet.

with their cannon before rocketing out to sea again. Airfield defences opened fire as they departed and the aircraft flown by Feldwebel Grundmann, of 3 Staffel, took several direct hits and went into the sea at high speed, killing him instantly. Meanwhile Biggin Hill had also been attacked, AA gunners claiming a Bf109 destroyed at 15.19, but this cannot be confirmed.

BATTLE OF THE DINGHY

In the early evening further Bf109 patrols were reported in the Dover Straits, covering a rescue flight from JG3 who were searching for their shot down comrade. Six Spitfires from 74 Sqn had taken off a little earlier from Gravesend, and these met eight Messerschmitts off Gravelines at 17.00, one Bf109 being claimed destroyed by Plt Off Armstrong.

At the same time the Spitfires of 609 Sqn had been ordered away from Biggin Hill, also to seek the unfortunate German pilot still floating in his dinghy. The squadron had become airborne at 16.49 and headed for the Channel at full throttle. By this time the German pilot had already been found – by both an RAF Air-Sea Rescue launch and by the Messerschmitts of I and II./JG3.

The Luftwaffe pilots reported the vessel as a motor-torpedo boat – a legitimate target – and proceeded to strafe it. It was at this point that Sqn Ldr Michael Lister Robinson's Spitfires arrived. The launch was seen under attack and on fire, and the RAF pilots considered that the German pilot must have been a man of considerable importance to warrant this scale of activity: "... possibly the German ace Mölders" as the 609 Sqn diarist noted.

In fact the German Air-Sea Rescue Service was very efficient and always took great pains to rescue a shot down flyer of whatever nationality.

Seeing the burning launch, Robinson acted swiftly. Ordering one section under Flt Lt Paul Richey to remain above as top cover, he led the remainder of the squadron down to the attack. A wild melee began. At the instant that the main group of Spitfires dived, the top cover was 'bounced' by more Bf109s lurking above. Sgt Mercer's fighter was hit at once. He managed to register strikes on one of his assailants and claimed a 'probable' before breaking off and heading home.

Robinson abandoned his attack and pulled up to assist Richey's section. When Mercer was safely on his way home he dived again to help the launch crew who were still being strafed.

The fight that followed was confused and savage. Robinson took a 109 in his sights and claimed it shot down into the sea. Then Flt Lt John Curchin claimed another and, together with Sgt Hughes-Rees, despatched a third.

Sgt T C Rigler claimed two victories – in his first-ever combat – while Robinson went after another, chasing it to the French coast where he opened fire. he later said of this combat: "He tried to force-land on the beach – I hoped he would, but he didn't make it .... I felt sick .... it might so easily have been me."

Now Robinson was in trouble; with his ammunition exhausted, a Staffel of Messerschmitts fastened onto him, determined to shoot him down. Twisting and turning as never before he called into the R.T. "Beauty Leader being fired on!" and Sgt Palmer dropped down to help, breaking up the German attack and claiming a 'probable'.

Robinson, an acknowledged master of aerobatics, had used his skill to the full. Both he and Spitfire P7881 escaped without a scratch. Flt Lt Curchin's fighter was badly shot-up however, and his cockpit hood liberally smeared with German oil. But he returned safely.

This fight was, according to the claims, 609 Sqns greatest single victory up to that time – six Bf109s destroyed and two 'probables' at the cost of two Spitfires damaged. The German view is rather different. One German fighter was shot down, this being from 3./JG3, which went into the sea killing the pilot. A second Messerschmitt, flown by Fw Kaul, was also hit, and this crash-landed but was repairable. From the account of the battle it would seem probable that Kaul's aircraft was Robinson's opponent, which crash-landed in shallow water, and that Curchin and Hughes-Rees got the second, as evidenced by the oil on Curchin's fighter.

One claim was made by the Luftwaffe, Fw Küpper reporting a Spitfire shot down, this being almost certainly Curchin's. Accurate or not, the claims were celebrated by the 609 Sqn pilots as "The Battle of the Dinghy", and Robinson referred to it as his "Birthday Party" for it was indeed his birthday!

The German pilot in the dinghy, for the record, was later picked up unharmed by the German Air-Sea Rescue Service.

Approximately an hour later two more fights took place. 92 Sqn had put three Spitfires up from Biggin Hill to partol the Dover area and these met Bf109Fs from Hauptmann Hermann-Friedrich Joppien's I./JG51 near Folkestone. In the short dogfight that followed, Bf109s were claimed shot down by Plt Off T S Wade and Sgt Bowen-Morris, but Flt Lt Maitland-Thompson was shot down by Joppien himself, and took to his parachute, wounded by shell fragments.

302 Sqn was also in the area, Sqn Ldr Philip Laguna having led a formation of six Hurricanes off at 17.35. These met Joppien's fighters near Dymchurch and were badly handled in the encounter. Joppien and Fw Erwin Flieg each claimed a Hurricane, Sqn Ldr Laguna and Sgt Domalga both bailing out unhurt. Although a 109 was claimed probably destroyed by Plt Off Wroblewski, his claim was disallowed. Rightly so, for once again all the German fighters returned safely.

One further combat was reported by the Luftwaffe on this date, when Stab./JG51 allegedly met a fighter formation around 19.00. Oblt Balfanz fired at a British aircraft, considered it destroyed, but made no claim due to lack of witnesses. No trace of this can be found in RAF records.

SEARCHLIGHTS, FLAK AND FIGHTERS

That night Bomber Command ordered a maximum effort, attacking the well defended ports of Hamburg and Bremen with 186 and 152 aircraft respectively. A further five bombers were despatched to Berlin, 11 to Kiel, four to Rotterdam, three to Emden and four to the Schelde Estuary, while three Hampdens laid mines off the Frisian Islands. Coastal Command joined in by sending the Blenheims of 53 Sqn to raid the U-boat pens at St Nazaire.

For the first night in a quite considerable period, conditions were in favour of the Luftwaffe nightfighters and many combats took place.

As the first of the bombers entered German airspace, the Bf110s from II./Nachtjagdgeschwader 1 were already up and waiting for them. Fw Hans Rasper, of 4 Staffel, was the first to claim, shooting down an early Wellington at 00.48. This was well away from the planned track of the raid, which did not cross enemy territory until Schleswig was reached.

Over Hamburg and Bremen the ferocious flak defences blazed away, claiming five bombers shot down. Two of these would appear to have been Wellington R1506 of 149 Sqn, flown

by Sgt Burch, and Whitley T4147 of 78 Sqn, piloted by Sgt Thorpe. Both machines fell near Bremen.

The first of the bombers began to cross the 'Kammhuber Line', heading southwest, when the fighters struck again. At 02.13 Oberleutnant Reinhold Eckhardt, of 6./NJG1, claimed a Blenheim, possibly Wg Cdr Christian's 105 Sqn aircraft (V5828), and this was followed at 02.35 by Lt Rolf Bokemeyer, of 5 Staffel, destroying a 10 Sqn Whitley. Oberfeldwebel Paul Gildner of 4./NJG1 was also in the hunt, claiming his ninth night victory at 02.47. This was also a 10 Sqn Whitley, both Plt Off Guest (P4945) and Plt Off Gough (P5058) being reported missing with their crews. Within a minute a Wellington had fallen, shot down by Oblt Egmont, Prinz zur Lippe-Weissenfeld, also of 4 Staffel.

Last claim for the defensive fighters came at 05.15, when Ofw Schönherr of 6./NJG1 chased a Wellington out to sea and shot it down off Heligoland. This machine was possibly W5400 of 99 Sqn, piloted by Sqn Ldr Jackson, the wreckage of which was never found.

Apart from the defensive nightfighter Staffeln, the long-range intruders from I./NJG2 based at Gilze-Rijn were also airborne, heading for the bomber bases in England. Four claims were made by these aircraft, Oblt Paul Semrau, Ofw Wilhelm Beier and Unteroffizier Alfons Köster each reporting a Wellington shot down – Semrau's over Nottingham, Beier's over Wells and Köster's probably over the sea. The latter pilot also claimed a Blenheim at an unknown location.

Bomber Command lost a total of 12 bombers. Excluding those noted above, 214 Sqn lost two Wellingtons (Sqn Ldr Eddison R1226 and Sgt Browell R3208), one of these going into the sea. Further Wellingtons were lost by 301 Sqn (Sgt Bojakowski R1227), 304 Sqn (Flg Off Lynes R1473 crashed at Plantlünne) and 305 Sqn (Sgt Dorman R1322). One last loss, Flg Off Gill's 83 Sqn Hampden minelayer, is known to have crashed into the sea. The night intruder claims are difficult to determine, but one NJG2 pilot succeeded in destroying two Defiants on the ground during a strafe of Wittering.

The German nightfighters did not escape unscathed however. One Bf110 of 4./NJG1 crashed near Opeude due to pilot error, killing one of the crew, and a Vechta-based Bf110 of I./NJG3 was shot down by a turret gunner near Lippe, crash-landing badly damaged.

The Luftwaffe did not hold a monopoly on night intruder fighters, and several Defiants of 264 Sqn had been sent out to France to seek targets of opportunity. One was successful, Plt Off M H Young finding and destroying a Bf110 of 1/Schnellkampfgeschwader 210 over Merville, the German crew baling out.

BLITZ

Even as the night bombers of the RAF were heading out across the North Sea their Luftwaffe counterparts were taking off from France, Belgium and Holland to attack Britain. Their objectives were three-fold: 120 bombers to Hull, 95 to Nottingham and 34 to Sheffield. As the first of them began to cross the Channel and the North Sea, many RAF nightfighters were scrambled, and the first engagement took place at 23.15, when Sqn Ldr Wheeler, of 85 Sqn, intercepted an incoming Ju88 near Cromer. The Havoc pilot claimed it damaged before contact was lost.

Fifteen minutes later a 29 Sqn Beaufighter pilot, Plt Off Lovell, took on another Junkers near Malden Surrey, claiming it destroyed. This would appear to have been a machine from 6./Kampfgeschwader 1, based at Rosieres-en-Santerre, which failed to return this night. Five minutes later came the next claim, a Beaufighter of the Colerne-based 600 Sqn, flown by Flt Lt Denby, attacking and damaging a Ju88 over Watchet.

Single-seat fighters were also aloft and a Hurricane pilot from 257 Sqn, off from Coltishall, engaged a Helll off the east Anglian coast. The meeting was brief and Sgt Uher was unable to fire more than a couple of rounds before the big bomber slid away into the darkness.

For two Spitfire pilots from the Wittering-based 266 Sqn, the night was more successful. Sqn Ldr P G Jameson and Plt Off A H Humphrey had taken off around 23.30, and were hunting in the area of Derby. First to score was Humphrey, who sighted a Heinkel 111 near Grantham and attacked from astern. The bomber, an aircraft of 6./KG53 "Legion Condor" based at Lille-Vendeville, blew up at 01.05 after four men had baled out.

Thirteen minutes later, Pat Jameson's lonely vigil was rewarded by the sight of an Helll near Nuneaton, Warwicks. He stealthily closed in and opened fire from behind and below. With stunning suddenness the big bomber exploded. Not one of the crew from the Tours-based 2./KG27 "Boelke" survived.

Main picture: Boulton Paul Defiants of 264 Squadron destroyed a Bf 110 during the night. Inset: Menacing lines of a Messerschmitt Bf109F.

Two minutes later came the first of several claims around Hull. 255 Sqn had sent many Defiants and a few Hurricanes up from Kirton-in-Lindsay to patrol this area, and it fell to the Commanding Officer, Sqn Ldr Smith, to score first, stalking a Heinkel off the coast and shooting it down into the sea in full view of ground observers. He then had a fleeting combat with another, but in this case the Germans were wide awake and his Hurricane received a burst of machine-gun bullets which forced him to abandon the sortie and return to base.

At 01.20 AA gunners on the Humber had claimed a bomber shot down. Four more claims were made by 255 Sqn around this time, all by Defiant crews. Plt Off Wyrill attacked and shot down a Heinkel south of Hull, which proved to be '1H+ST' of 9./KG26. This aircraft crashed on Sunk Island (possibly double-claimed with Smith) and one man survived.

At about the same time, Plt Off Wynne-Wilson intercepted and destroyed a Heinkel from 4./KG53, which fell upon Wellings Farm, Patrington, Yorks, again with a single survivor. Flt Lt Trousdale had an excellent night, reporting two Heinkels shot down in quick succession, one off Spurn Head and the second, at 01.40, to the south-west of Leconfield. The latter was without doubt the aircraft flown by Fw Gerhard Ender, of 6./KG55 "Greif", and two of the crew took to their parachutes before 'G1+EP' went into the ground at Catwick, Yorks.

In the meantime, AA gunners had made two claims. Derby gunsites claimed a bomber shot down at 01.22 and Digby airfield defences another 'destroyed' at 01.35. At this later time, Sgt Uher, of 257 Sqn had his second combat of the night – and fared no better. Seeing a Ju88 loom up in his windscreen, he pulled the nose of the Hurricane up and fired a short burst as the Junkers passed him head-on, but saw no strikes. Yet another 255 Sqn pilot, Plt Off Wright, claimed destruction of a Ju88 east of Hull at 01.30.

At 02.00 AA gunners at Birmingham reported a bomber destroyed, and another Beaufighter pilot, Sqn Ldr H P Pleasance of 25 Sqn, who had taken off from Wittering at around midnight, found a twin-finned bomber off the Norfolk coast and claimed a 'Dornier 17 destroyed'. In truth this was a Messerschmitt Bf110 from 5./SKG210, which was reported missing in action this night.

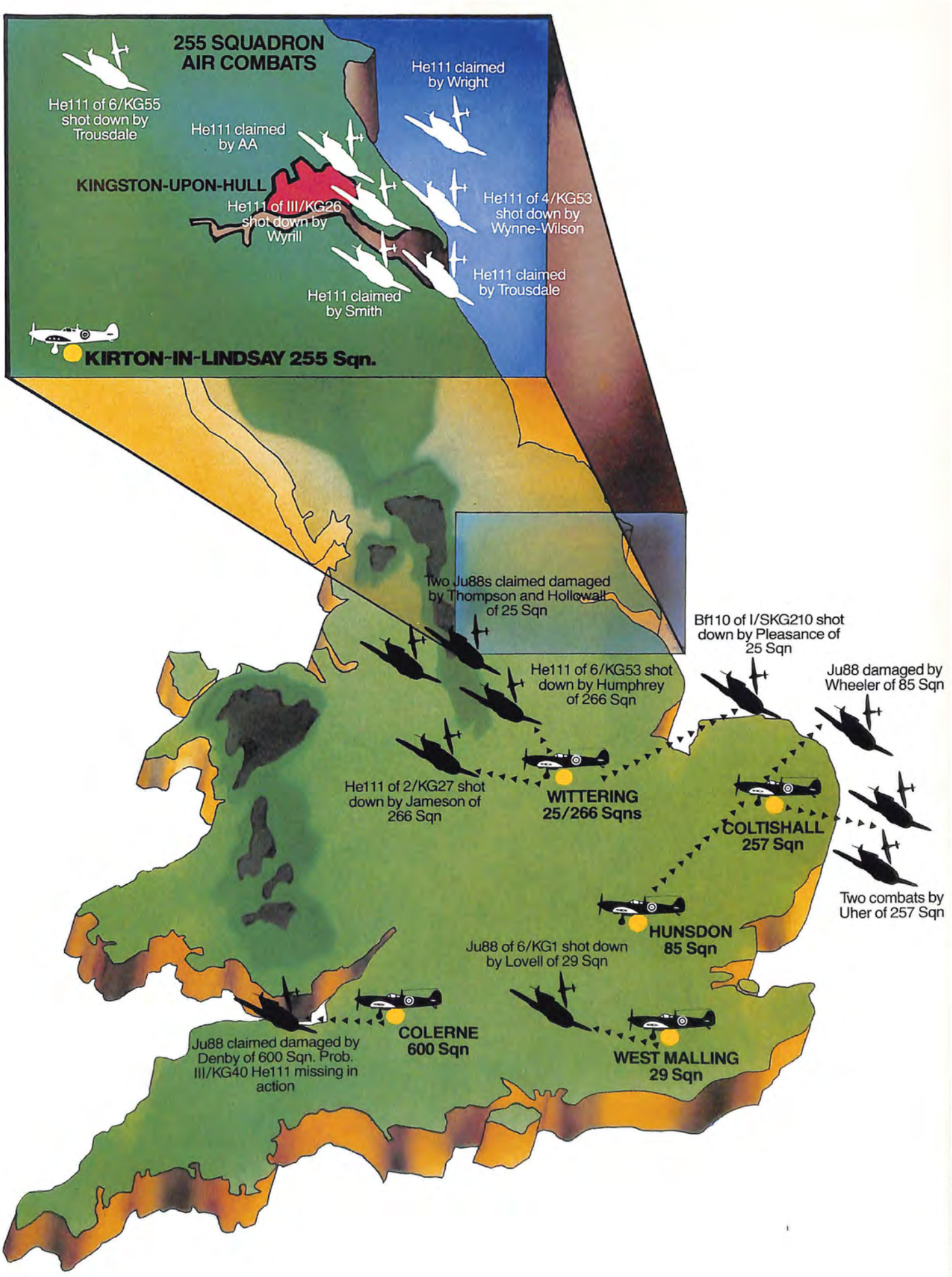
Within 30 minutes Sgt Hollowell, of 25 Sqn, found a Ju88 near Grantham. The Beaufighter pilot claimed a 'damaged', while Plt Off Thompson of the same unit reported hits on an unidentified bomber in the same area – possibly the same one. The last claimed success came at 04.16, when AA gunners at Portland reported a bomber damaged as it headed out to sea.

Total claims for the night amounted to ten destroyed and four damaged by fighters, plus four destroyed and one damaged by AA fire. Apart from the seven Luftwaffe losses mentioned, one Heinkel of III./KG40 failed to return from a sortie to the Bristol area, this possibly succumbing to the fire of Denby, of 500 Sqn, and misidentified as a Ju88. The ninth and last Luftwaffe loss was a Ju88 of II./KG54, which crashed near Cherbourg due to technical failure.

And then came the dawn....

Below: Wing fragment of one of the Luftwaffe aircraft, probably an HE111 – shot down over England during the night of May 8. Bottom: If, as is claimed, this photograph was taken on the morning of May 9, the machine would appear to be the Ju88 claimed destroyed by Lovell of 29 Squadron, near Malden.

Photographs: Fox Photos.


255 SQUADRON AIR COMBATS
He111 of 6/KG55 shot down by Trousdale
He111 claimed by AA
He111 claimed by Wright
KINGSTON-UPON-HULL
He111 of III/KG26 shot down by Wyrill
He111 of 4/KG53 shot down by Wynne-Wilson
He111 claimed by Trousdale
He111 claimed by Smith
KIRTON-IN-LINDSAY 255 Sqn.
Two Ju88s claimed damaged by Thompson and Hollowell of 25 Sqn
Bf110 of I/SKG210 shot down by Pleasance of 25 Sqn
Ju88 damaged by Wheeler of 85 Sqn
He111 of 6/KG53 shot down by Humphrey of 266 Sqn
He111 of 2/KG27 shot down by Jameson of 266 Sqn
WITTERING 25/266 Sqns
COLTISHALL 257 Sqn
Two combats by Uher of 257 Sqn
HUNSDON 85 Sqn
Ju88 of 6/KG1 shot down by Lovell of 29 Sqn
COLERNE 600 Sqn
Ju88 claimed damaged by Denby of 600 Sqn. Prob. III/KG40 He111 missing in action
WEST MALLING 29 Sqn

FlyPast

This Michael Turner painting shows Clipper America, a Pan American Airways B377 Boeing Stratocruiser N90941. Built in 1950 and put into service by PanAm on September 25, 1950, the aircraft was later sold to Australia and written off in a landing accident at Tokyo on August 5, 1959.


N AMERICAN WORLD AIRWAYS
MICHAEL TURNER
77

Right: Rare USAF inventory listing, TF-104D Starfighter serialled 71323. Below left: Nose detail of Indian AF B-24J. Below right: Largest twin engined transport to see service in World War II, the Curtiss C-46 Commando. Bottom: Douglas VC-118 used by both President John F Kennedy and Lyndon B Johnson.

Pictures: Louis B Allen

PIMA:

A museum with 5,000 'spares' next door

Few of the aircraft at Pima County Museum, Arizona, will ever fly again but, as David Kirkman explains, they are preserved in ideal conditions.

Any Martian invader who happened to make his landfall in a certain part of the Arizona desert could possibly be forgiven for thinking he had landed in some sort of Dinosaur's graveyard. For he would be confronted by no less than 5,000 mothballed aircraft, aligned row upon row, waiting for the call that will never come for most of them.

The aircraft of this 3,000 acre site are stored by the Military Aircraft Storage and Disposition Centre (MASDC) who mothball and maintain US military aircraft which are currently surplus to requirements, but which might just be returned to active service should the need arise.

Adjacent to the MASDC site is the Pima County Air Museum which is now claimed to have the third largest collection of factory built aircraft in the United States.

The proximity of MASDC to the Pima museum is no coincidence, for many of the aircraft have been acquired from MASDC, as have countless spare parts as well as the technical skills of service personnel. With over 90 aircraft currently on display, this museum is probably unique in that all the aircraft are sited in the open air – not a great disadvantage in the arid, dry climate of the Arizona desert.

The idea of supporting a museum in the desert of the central North American continent was first suggested in 1966 and soon won approval of the Pima County Board of Supervisors. As operators of the museum, the Tucson Air Museum Foundation of Pima County was formed and chartered as a non-profit educational corporation under the laws of the State of Arizona. The Foundation provided funds for the purchase of land

The Bell P-63E King Cobra was used by Russia during World War II in the ground attack role.

and shortly the first acquisition, a BT-13A Vultee, was obtained by donation from Tucson School District No. 1. Restoration of this aircraft was undertaken by employees from MASDC.

In Autumn 1969, the Foundation assumed custody of 35 Army, Navy and Air Force aircraft which had been languishing along the northern boundary of Davis-Monthan Air Force Base. Although in reasonable condition, some of these aircraft, all ex-MASDC machines, required further restoration, so a new permanent site for the rapidly expanding collection was sought. In Spring of the same year the first international donation had arrived from the Government of India. The Consolidated B-24J Liberator, which had been used by the Indian Air Force for coastal patrol duties, was being phased out of service and the Indian Government generously agreed to donate one of the aircraft to the Museum.

Main problem was the delivery flight to Pima, as the cost had to be covered by the Foundation. A call went out for financial help and after an initial start by some 300 individuals, many of the companies who were once producers of B-24 components, among them Pratt & Whitney, General Dynamics and Honeywell, made sizeable contributions. Shell Oil offered to supply the fuel and oil required and Pan American and Trans World provided maintenance and communications support.

With a volunteer crew, and after only four days of training aided by Indian Air Force personnel, the B-24J took off from Poona on the first leg to Tucson. After 12 stops and 31 days the Liberator made it to Davis-Monthan. The aircraft, HE877/A, is now lovingly preserved to represent a No. 6 Squadron Indian Air Force machine with whom it had operated since 1945. It was honoured to take pride of place by leading the parade of 75 vintage and veteran aircraft on August 23, 1973, to their final resting place in the 30 acre fenced and lighted enclosure of their current location.

The display was officially opened at the new site on May 8, 1976, the Bicentennial Year, as the Pima Air Museum. All of the aircraft are exhibited outside, with a small indoor display containing changing collections of aviation memorabilia. A portion of this building is laid out and furnished as it might have been in the 1940s.

It is not the object of the Foundation to maintain the aircraft in flying condition – although many could be made so with very little effort – but rather to restore them as 'everlasting' exhibits as authentically as possible. To undertake this has, and does, necessitate a considerable number of man-hours of volunteer labour. It is to the credit of a dedicated group of workers and their tireless efforts that the large collection has been brought together.

Many of the aircraft preserved at Pima are quite unique. For example the PBM-

5A Mariner is the sole survivor of 500 such anti-submarine flying boats that saw service during the Korean conflict of 1950-53. Developed from the XPBM-1 prototype of 1937, and through various series of marks which included the PBM-3D and -3S that were lend-leased to Britain during World War II, the -5A was the final and most powerful of the Mariners.

Powered by two Pratt & Whitney R-2800-34 Wasps developing 2100hp on take off, a total of 589 PBM-5s were delivered from August 1944 to the end of hostilities in 1945. Armament comprised eight .50 calibre guns, 1067lbs of armour and APS-15 surface search radar. The Mariner was better protected than the better known Catalina and proved itself reliable throughout the War and subsequently in Korea.

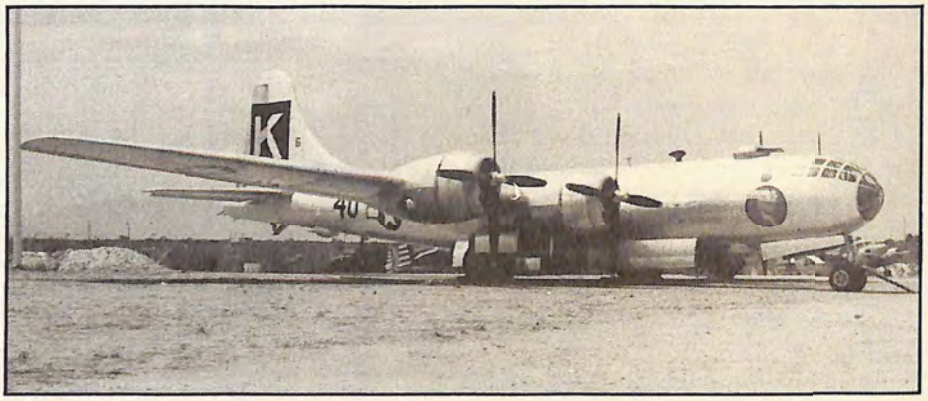
An F6F Hellcat is 'preserved' in its present derelict state, having been salvaged from the ocean bed 12 miles off the coast of San Diego. The Hellcat had remained in its watery grave 3,400 feet down, having ditched after engine failure on January 12, 1944, for a full 26 years before being discovered by the Lockheed research submarine "Deep Quest".

It was brought to the surface in October 1970 and subjected to a series of tests to study corrosion effects, during which the inboard gun from the port wing was ultrasonically cleaned, inspected and lubricated. The machine gun, a Browning M2 calibre .50, was subsequently fired and no mechanical difficulties were experienced with its operation. Quite a startling performance after 26 years submersion in salt water!

Another rare exhibit is the L-049 (C-69) Lockheed Constellation. This is the oldest surviving 'Connie' and the only remaining C-69 military version, although its service career was extremely limited. It was delivered from Lockheed on April 28, 1945, as 42-94549 and after only 279.7 flying hours was placed in storage in March 1946. However, in 1948 it was purchased by TWA with whom it flew for 13 years as N90831 "Star of Switzerland" and accumulated 37,905 hours of service.

The end of its active career with TWA was somewhat unfortunate as the port main undercarriage landing gear collapsed on the ramp at Las Vegas, causing considerable structural damage to the airframe. Nevertheless, after resale as a wreck it was restored to flying condition and served in a variety of roles from 1961 to 1970 until it came to rest at Tucson International Airport under the ownership of Harlow L. Jones of

This Grumman F6F Hellcat is 'preserved' in the state that it was found, 3,400 feet down on the ocean floor off San Diego. It had lain there for 26 years before being discovered by the research submarine "Deep Quest".



B-29 'City of Philadelphia', similar to the machine which dropped both atomic bombs on Japan in 1945.

A P2V-7 Neptune maritime patrol aircraft registered 135620. The type set a non-stop flight record of 11,235 miles from Perth, Australia, to Columbus, Ohio.

The sole surviving PBM-5A Martin mariner in the world. A World War I maritime patrol and anti submarine flying boat, 500 examples saw front line service in Korea during the conflict of 1950-53.

Navalised version of the F-86 Sabre at Pima is this FJ-4B, a considerably redesigned type having a larger wing, new landing gear and fuselage, and a higher tail fin.

Albuquerque. After brief negotiations the USAF traded the 'Connie' for a Grumman SA-16 Albatross and so this historic aircraft arrived at Pima to be carefully restored to its past glory as the "Star of Switzerland".

The Bell P-63 Kingcobra is another interesting aircraft to be found at Pima. When the United States entered the War after the destruction of Pearl Harbour there were no less than nine new single-seat fighter designs on the board, all of which flew in the ensuing two years. Only one of these designs, the P-63, ever reached mass production. Intended primarily for lend-lease and in particular for the Soviet Union, the P-63 was considered to be good at low level fighting.

Design stemmed from the XP-39E which was a laminar flow winged Airacobra that first flew in 1942. However, the next two aircraft, known as XP-63, crashed in January and May 1943 and all but put an end to the Kingcobra. If it had not been for a third prototype, the design could have finished there, but fortunately for Bell and the Soviet Union, this aircraft passed its trials in good style and series production commenced.

The first of 1,725 P-63As were delivered in October 1943 followed by 1,227 P-63Cs. A total of 2,456 Kingcobras went to Russia with 300 P-63Cs being supplied to the Armée de L'Air. Two P-63As were evaluated in England. The USAAF lost interest in the aircraft as they already had the P-51 Mustang and P-47 Thunderbolt, but the Soviet Union used them successfully for close support and ground attack. The P-63 developed a reputation for being able to absorb considerable battle damage and yet continue flying.

The P-63E was a development of the D-Model and 2,943 were ordered for supply under lend-lease. But the majority were cancelled after V-E Day and only thirteen examples were ever completed, none of which found their way to the Soviet Union. Hence, not only is the P-63E at Pima in the guise of the Soviet Air Force incorrect, it does not really belong in the US inventory either.

The FJ-4B Fury, on the other hand, was a highly utilised warplane in the US arsenal. Having been confronted by Mig-15s in Korea, the US Navy anxiously looked around for a suitable fighter with which to compete. There was an obvious contender in the Air Force's F-86 Sabre and, in February 1951, it was decided that a navalised version could fill the gap before more specialist designs became available.

The first Fury prototype, designated XFJ-2, flew on February 19, 1952, and apart from four 20mm guns and arresting gear, was similar in appearance to the F-86E. FJ-2s quickly reached production at Columbus, Ohio, and maintained the armament and navalisation of the prototype with the addition of folding wings. By July 1953 the FJ-3 had flown, fitted with a 7,200lb thrust Wright J65-W-2 engine – an improvement of over 1,000lb thrust – and work was well advanced on a much improved derivative, the FJ-4.

The prototype -4 first flew on October 28, 1954, with deliveries commencing the following May. The engine had been further uprated to 7,700lbs as the J65-W-16A and the aerodynamics dramatically altered, with a larger wing, new fuselage, high tail fin and new landing gear. The FJ-4B was generally issued to carrier attack squadrons with a 540lb air-to-surface missile known as 'Bullpup' which delivered a 250lb warhead. Any loads up to 26,000lbs gross could be handled, which included atomic weapons.

Future of the Pima Air Museum looks decidedly rosy. Situated so close to the Davis-Monthan MASDC facility it is virtually assured of a continual stream of aircraft as they are phased out of active military service and, once released from the inventory, made available for display. Plans are in hand to provide sheltered facilities for other civilian types that may become available and the memorabilia exhibits will be expanded as the buildings to house them are constructed.

It is certain that Pima will soon become one of the world's major air museums.

THE RARE KIND

A series by Chaz Bowyer

ALBERT BALL THE MAN WHO FOUGHT ALONE

OF THE 19 airmen awarded Britain's supreme honour, the Victoria Cross, during the 1914-18 war, it is doubtful if any received even a worthy proportion of the publicity and national adulation accorded in his lifetime to a young Nottingham pilot, Albert Ball.

Fated to die in combat before he was 21, in the last 15 months of his life he rose from obscure subaltern pilot in a reconnaissance squadron to become the leading contemporary fighter pilot in the Allied air services, wearing the ribbons and tokens of five gallantry awards on his tunic breast, and the posthumous recipient of both Britain's and France's highest decorations.

At a period of that devastating war, when Allied fortunes were at their lowest ebb, Ball's deeds gave hope, epitomising the courage and determination needed to achieve ultimate victory.

To a nation appalled and grieving for the carnage of British losses along the Western Front, Ball represented an ideal hero-figure; young, apparently fearless, and simply motivated by the ideals of duty to his God, his country, and his beloved family.

His method of fighting enhanced his image of unfettered courage, always preferring to fight alone. His tactics owed nothing to any textbook; to Ball there could only be one 'tactic' – attack, anywhere, anytime. His unquenchable fighting spirit became an example and inspiration to his fellow fliers, and he eventually died as he lived – alone, fighting his country's enemies to the last.

The son of a master plumber, who later became mayor of Nottingham, Albert Ball was born in the shadow of Nottingham Castle on August 14, 1896, and educated variously in Nottingham, Grantham and finally Trent College. During those years he displayed a natural aptitude for all things mechanical and, by dint of private practice, demonstrated his qualities as a natural shot when using any form of firearm.

On leaving college in 1914, Ball started in business with a small electrical engineering and brass-founding firm in his home

town, but with the outbreak of war he immediately volunteered for the army, and was enlisted as a private in the 2/7th Battalion, Notts and Derby Regiment, on September 21, 1914.

Promoted almost immediately to Sergeant, Ball was then commissioned as a Second Lieutenant on October 29, 1914. His mundane duties frustrated his desire to 'join the fighting', and accordingly he obtained a transfer to the North Midlands Divisional Cyclist Company, but continued to remain in England, employed on routine duties.

Determined to reach the active zone of war, Ball turned to flying as a possible means of achieving that aim, and in June 1915 commenced private tuition as a pilot at Hendon with the Ruffy-Baumann School. His flying progress was relatively slow but on October 15, 1915, he was awarded his Royal Aero Club Certificate No. 1898, and immediately applied for transfer to the Royal Flying Corps.

After further instruction at Norwich and Upavon, Ball was finally awarded his RFC 'wings' brevet on January 22, 1916. Officially transferred to the RFC seven days later, Ball had a brief period as an instructor at Gosport before eventually arriving in France on February 18, where he reported to his first operational unit, 13 Squadron, based then at Marieux.

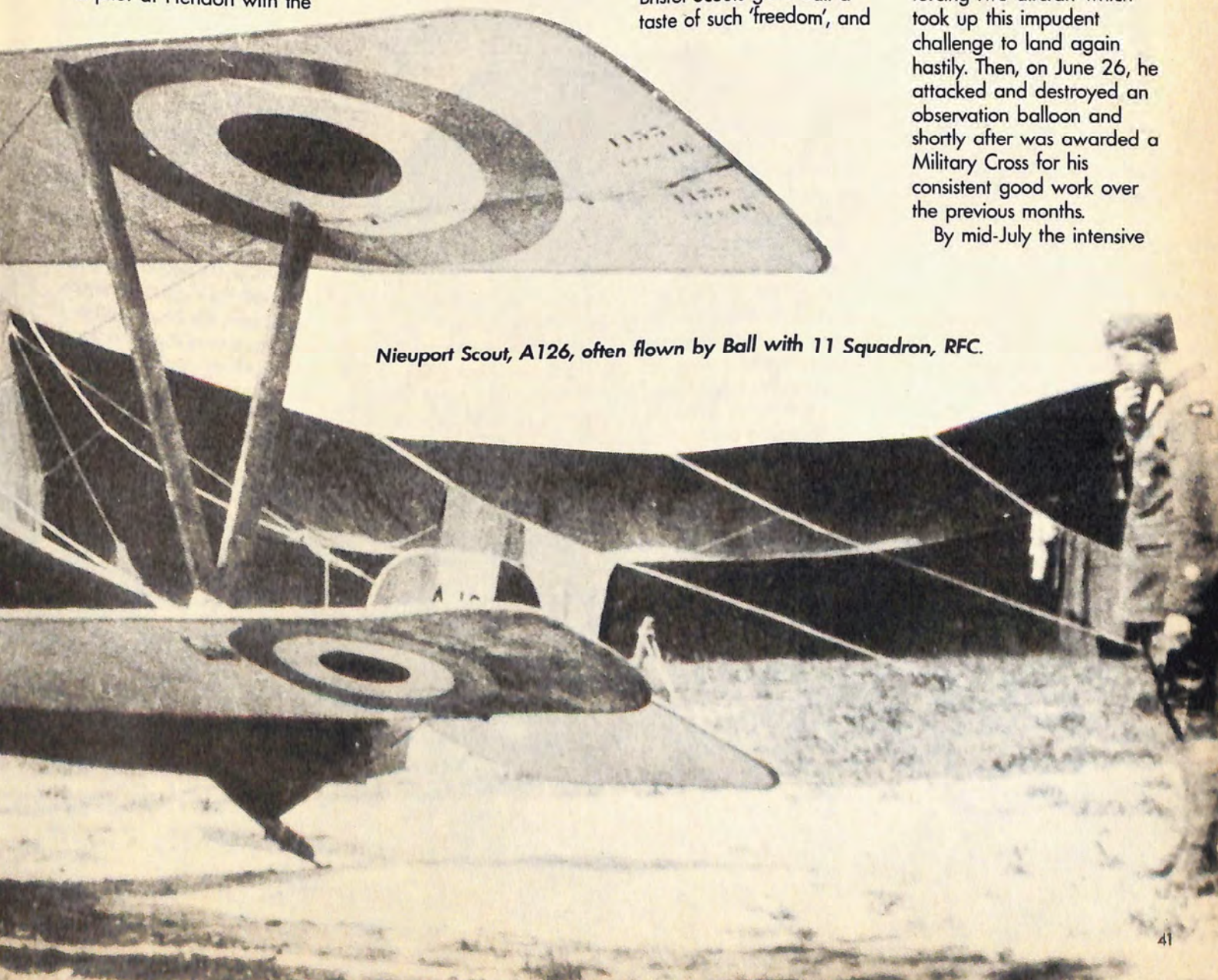
Equipped with two-seat BE2cs, 13 Squadron eventually settled at Savy Aubigny airfield by mid-March, and Ball was quickly into action, having his first close brush with death on March 20 when his BE2c, 4352, crashed on take-off due to engine failure. The following weeks saw Ball flying almost daily; bombing, reconnaissance, spotting for the guns of the artillery, and ever alert and eager to get to grips with any German aircraft despite the blatant unsuitability of his BE2c for any form of pure combat.

Though conscientious in carrying out every duty allotted to him, Ball became increasingly unhappy with the responsibility of flying with an Observer, preferring to fly alone unhampered by the thought of another man's life being dependent on him. An occasional flight in one of the squadron's two single-seat Bristol Scouts gave Ball a taste of such 'freedom', and on May 7, 1916, he achieved his ambition when he was transferred to 11 Squadron and given a single-seat Nieuport Scout to fly.

During his first month as a fighter pilot Ball flew on every possible occasion, having a series of clashes with German aircraft but without positive success. This urge for constant action was exemplified by the small wooden hut he personally erected next to his Nieuport's hangar shed on the airfield where he slept and lived, rather than join with his fellow pilots in the squadron Mess.

Still frustrated with a lack of success in combat, on June 1, in Nieuport Scout 5173, he deliberately circled above the German air base at Douai, inviting combat, and forcing two aircraft which took up this impudent challenge to land again hastily. Then, on June 26, he attacked and destroyed an observation balloon and shortly after was awarded a Military Cross for his consistent good work over the previous months.

By mid-July the intensive



Nieuport Scout, A126, often flown by Ball with 11 Squadron, RFC.

pace of his flying began to tell on Ball's highly sensitive nature and he informally requested a 'brief rest' from flying. Two days later, to his utter dismay, he was posted to 8 Squadron at Bellevue – flying obsolete BE2cs again! Ball was later to admit ruefully that his original request had been due, at least in part, to a certain amount of 'swell-headedness' but, overcoming his disappointment, he set out to 'earn' a return to the Nieuport Scout by badgering his latest squadron commander with numerous requests to volunteer for any unusual or dangerous tasks.

These voluntary sorties included spy-dropping behind German lines, while on August 9 he calmly attacked a German observation balloon in his lumbering BE and forced its crew to take to their parachutes. His near-desperate attempts to redeem himself in officialdom's eyes paid off, and on August 14 – his 20th birthday – he returned to 11 Squadron, where a brand-new Nieuport Scout had already been allotted for his personal use.

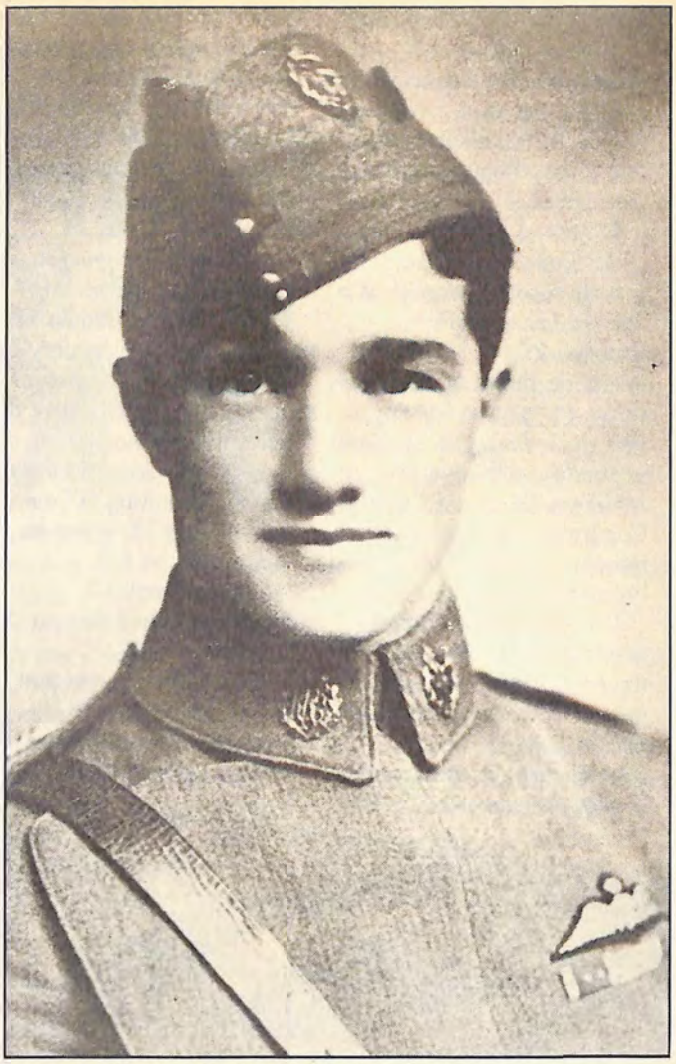
During the remaining weeks of August Ball began a string of combats and victories. On the 16th he tackled five Roland two-seaters single-handed and forced one down; then within minutes attacked a second gaggle of five Rolands, forcing one of these to land. Six days later he dived onto a batch of no less than seven Rolands and sent one down to destruction. He next attacked a formation of five Rolands – again alone – and the fury of his onslaught sent one down pluming smoke, while a second spun down hopelessly out of control and crashed into a house.

On August 23 he flew his Nieuport to Filescamp airfield to join 60 Squadron, and was allotted officially to 'A' Flight. But the squadron commander, Robert Smith-Barry, recognising Ball's individuality, gave him a roving commission to fly and fight as he pleased. Ball's response to this rare freedom was to intensify his efforts, and in the following weeks his tiny Nieuport, now sporting a bright red propeller boss spinner, was a constant sight over the bloody Somme battlefields.

On September 1 the squadron moved base to Savy Aubigny and Ball returned with delight to the little wooden hut which had been his former 'billet' there. On the same date his brigade commander, Brigadier-General Higgins, wrote of Ball: "... he has forced 20 German machines to land, of which eight have been destroyed. During this period he has (also) forced down two hostile balloons and destroyed one."

Ball was awarded a Distinguished Service Order (DSO) and sent on two weeks' leave to Nottingham, and on his return to 60 Squadron was promoted to Flight commander. On September 13 came an award of a Bar to his DSO, while two days later Russia awarded Ball her Order of St George, 4th Class.

Although now commanding a flight, Ball seldom led his men in combat, preferring always to hunt and fight alone. Even on the ground the Nottingham boy was something of a 'lone wolf' – always polite, usually smiling, but seldom interested in the social aspects of squadron life.



Captain Albert Ball, VC, DSO, MC.

To Ball he was in France for a single purpose – to conquer his country's enemies; nothing which might interfere with that purpose was worthy of his attention. His daily routine centred around his Nieuport Scout; always checking and maintaining it in top fighting condition.

Yet to label Ball as a 'killer' would be to do him a grave injustice. Deeply religious in private faith, Ball's sensitive nature suffered in immediate retrospect whenever he succeeded in a combat.

His private attitude to his 'job' and the war in general was probably best summed in a letter to his father, dated July 10, 1916: "You ask me to 'let the devils have it' when I fight. Yes, I always let them have all I can, but really I don't think of them as devils. I only scrap because it is my duty, but I do not think anything bad about the Hun. Nothing makes me feel more rotten than to see them go down, but you see it is either them or me, so I must do my duty best to make it a case of them."

Of the boy himself, Wg Cdr T B Marson later described Ball as "of striking appearance, medium height, sturdily built, with a mass of black hair, a fresh complexion, with deep-set, piercing dark eyes – rather a Red Indian type of countenance. He never wore goggles when flying. He always wanted to be in the air; during flying weather he was up and out by five o'clock in the morning and – completely exhausted by his efforts – would be in bed and asleep by six o'clock in the evening."

Another contemporary said of Ball: "He never flew for amusement, only the minimum requisite to test guns and engine apart from war sorties. Ball never boasted or criticised, but the example he set us all was tremendous."

Throughout September 1916 Ball had a total of at least 23 individual combats, from which he personally claimed six enemy aircraft as destroyed, eight more forced to land, and one out of control. A final day of fighting on October 1 brought him three more claims – bringing his overall 1916 tally to at least 30 officially recognised 'victories'. As such he was the undisputed leading fighter pilot of the Allied air services at that time; a position he was to maintain until his death.

On October 4 he was sent home to England for leave and then a 'rest' posting to instructional duties. His arrival in his home city was heralded with nationwide publicity and he was feted wherever he appeared. On November 18 Ball and his family attended an investiture at Buckingham Palace, when he received his DSO and Bar, and MC awards; while on November 25 the London Gazette cited a further award of a second Bar to his DSO, thereby making Ball the first 'triple DSO' in the British Army.

Civic pride in his prowess culminated on February 19, 1917 when he was made an Honorary Freeman of the City of Nottingham – a rare privilege for one so young. Such public adulation and publicity, though flattering, was never to Ball's liking and merely embarrassed him deeply. As a result he began agitating higher authorities for a posting back to operations in France.

His campaign for a return to a fighting unit was frustrated for several months, but persistence finally succeeded, bringing him a posting to 56 Squadron, a newly-forming fighter squadron soon to be sent to France. His arrival at 56's

Ball's SE5 is on the left in front of his 56 Squadron Flight about to take off from London Colney for France on April 7, 1917.

temporary base, London Colney, on February 25, 1917, coincided with his appointment as the unit's A Flight commander and shortly after the squadron began receiving its war machines, factory-fresh Farnborough-designed SE5s, which 56's men were to introduce to the operational scene.

Ball selected SE5, A4850 as his personal aircraft, and immediately set about extensively modifying it to his personal requirements. Then, on April 7, 56 Squadron left London Colney as a unit and flew to France, where it settled at an airfield just a few miles north of Amiens.

For its first two weeks in France 56 Squadron was forbidden to operate across the trench lines, due to its semi-secret SE5s being still unknown to the Germans. Much of the time was taken up in modifying the aircraft to operational standards, testing and generally working up to operational fitness. Ball meanwhile, having already forcibly expressed his personal dislike of the SE5 as a fighting machine, requested a Nieuport Scout for his private use, and was issued with Nieuport Scout B1522 for this purpose.

On April 22 Ball led 56 Squadron's first operational patrol, and the next day, flying his Nieuport, scored the squadron's first confirmed victory by sending an Albatros two-seater down to crash. In the afternoon, this time flying his SE5, A4850, he destroyed another Albatros, then forced a third down. On the 26th he claimed a double victory; followed by another pair of victims on the 28th. Four more victims fell under his guns on May 1 and May 2, another on May 4, and further claims on May 5.

From all these fights Ball usually returned with damaged aircraft – his invariable technique of closing tightly with any opponent, irrespective of the danger, led him into many hazardous situations. Yet he was never deterred from returning to the fray.

His return to France had been originally permitted by the GOC of the RFC, Hugh Trenchard, reluctantly. A condition was that Ball was only to remain in France for one month. During that period his example and experience would patently help the new squadron reach operational fitness quickly. But Trenchard had no wish to allow Ball to continue too long at the fighting front, being privately convinced that Ball's method of bald-headed onslaught in all combats could only have a fatal conclusion.

Making the most of his remaining days in France, Ball flew his Nieuport in the evening of May 6 and spotted four Albatros Scouts of Jagdstaffel 20 below. Diving headlong into the quartet, he followed his usual tactic of firing a quick burst to startle and confuse the opposition, then fastened closely under the plywood-

Ball (second from left) with other 13 Squadron aircrew on March 17, 1916.

skinned belly of the nearest Albatros. With his Lewis gun canted back, he poured a long burst into the red-painted Albatros and it spun down to crash near Sancourt. Evading the remaining three, Ball then returned to base.

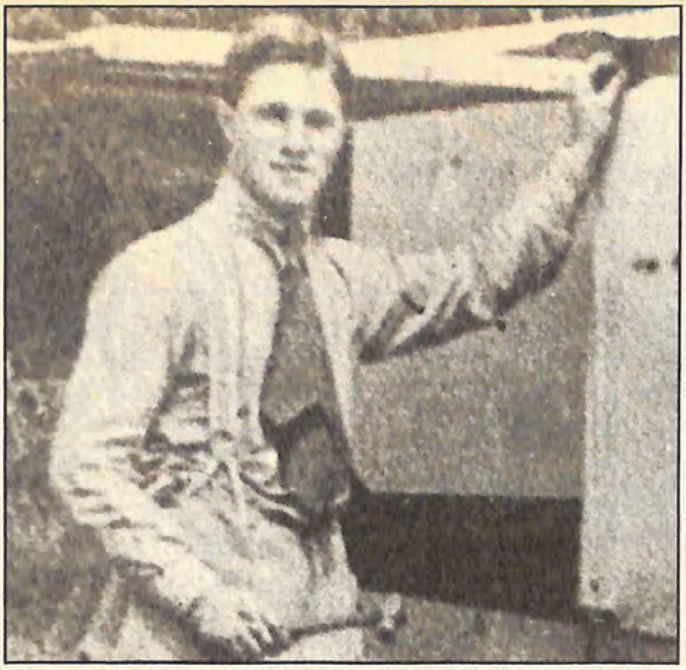
On May 7 Ball took part in a routine fighter escort patrol in the morning, shepherding some Sopwith 1½ Strutters of 70 Squadron RFC to and from their objective. Though several German scouts trailed the formation for several miles, none attacked and the Allied aircraft returned safely, without incident.

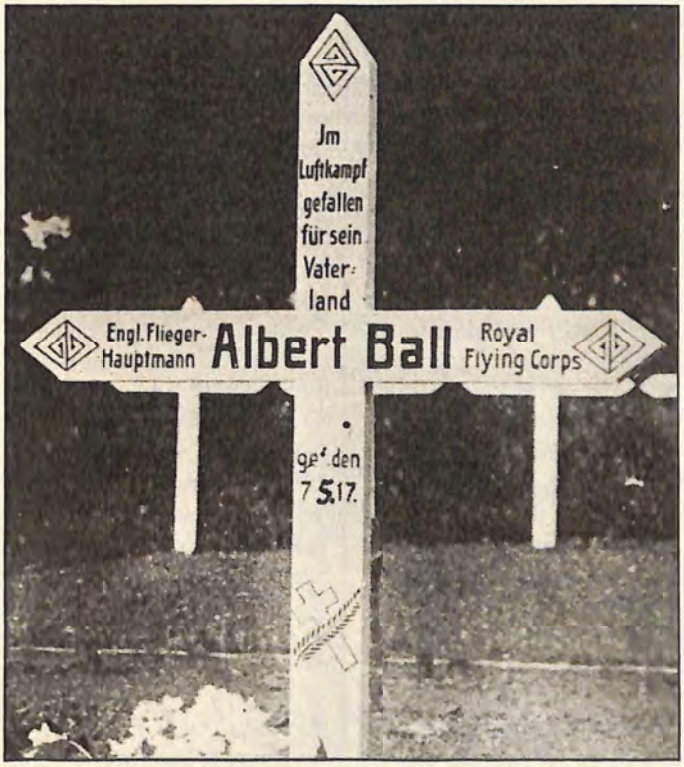
At 6pm Ball was again airborne, in SE5, A4850, spearheading an eleven-strong formation of 56 Squadron's SE5s, flying an Offensive Patrol, specifically seeking German fighters. The evening weather was poor, with drifting cloudbanks and intermittent rain showers, and before long the SEs became separated.

For the next two hours most became involved in isolated combats with roving German Albatros Scouts, with varying results. Some of their opponents are known to have been elements of Jagdstaffel 11, commanded normally by Germany's 'Ace of aces', Manfred von Richthofen, but led that evening by the 'Red Baron's' younger brother Lothar.

During the confused series of sprawling fighting which spread across many miles of the grey sky, 56 Squadron suffered heavily. Two of its pilots were killed, two seriously wounded, and two others forced to land with bullet-riven aircraft. One of the fatal casualties was Albert Ball.

The last Allied pilot to see Ball alive was Captain Cyril Crowe of 56's B Flight, when he joined Ball at about 8pm in attacking a lone red-painted Albatros Scout piloted by Lothar von Richthofen. After both SE pilots had made their initial





Above: The loner building his private hut at Savy. Below: Ball's original grave marker made by the Germans.

diving attacks on the Albatros, Crowe saw Ball and the younger von Richthofen disappear into a heavy cloudbank, but on skirting the cloud Crowe failed to find either of the two again.

As the evening light was slowly fading, Ball flew low over some rough ground near Seclin village, heading westwards towards Annoeullin village, still pursuing the red Albatros. Just before reaching Annoeullin, von Richthofen turned in one last attempt to ward off his relentless pursuer. Then, with a bullet-ruptured petrol tank, the German crash-landed, though without injury to himself. Climbing out of his wrecked Albatros, Lothar was just in time to see Ball's SE5 disappear into thick cloud in a shallow climb.

Only minutes later four German officers on nearby ground heard an aircraft engine's noise in the clouds, and through binoculars saw an SE5 emerge from low clouds – upside down, and with its propeller stopped, trailing a thin plume of black, oily smoke, descending in a shallow dive. As they continued to watch the SE5 disappeared briefly behind some trees and immediately crashed, still inverted, near a ruined farmhouse, just over a mile from Annoeullin.

All four Germans hurried to the crash site, to find that Albert Ball had died in the arms of a young French girl who had pulled him from his shattered cockpit. Ball's body was taken quickly to a nearby German field hospital and there examined. The German doctor's medical report stressed that death had resulted solely from injuries sustained in the crash – there were no bullet wounds in the body.

Careful examination of the SE5 wreckage also ascertained that it had not crashed due to any bullet or shell damage. The actual cause of the crash, therefore, remains a mystery even today. Back at his airfield, Lothar von Richthofen made a claim for Ball's death as his doing, but evidence now shows that he was mistaken.

On May 9 the Germans buried Albert Ball in Annoeullin village cemetery, according him full military honours. Once confirmation of Ball's death became known to the Allied authorities, the London Gazette of June 8, 1917, announced the posthumous award of a Victoria Cross to Ball while the French government announced its decision to enrol him as a Chevalier de Legion d'Honneur.

Albert Ball, a 20-years' old Nottingham boy who had left behind him a tradition of utter devotion to duty for later generations to inherit and embellish, lies today where he fell – an English boy in a cemetery surrounded by the graves of hundreds of his former foes.

bookshelf

by Chaz Bowyer

As a future regular feature of FlyPast, these columns will, as readers might expect, include in-depth reviews of the latest available aviation-related literature; a reader-service in that each title received from the publishers will be summarised in content, source, price, and particularly in the context of 'value for money'.

However, reviews will be only part of Bookshelf. There will also be news of forthcoming titles, ocasional reviews of past, rare 'classic' books, and succinct comments on various facets of the aviation literature scene today.

As an example of that last point, take the subjects of reviews and reviewers. Frankly, reviewers – like politicians – appear to require few, if any, esoteric or academic 'qualifications' for their task. Certainly, rather than simply presenting an objective summary of a book's content, far too many reviewers seem solely intent on impressing the readers with self-awarded oracular knowledge.

Overlapping this category of reviewer is the vast army of self-styled 'experts' – that horde of unpaid shop stewards of the international Nit-Pickers ' Union – who extract sublime joy from winkling out some minute printed error in books often containing thousands of facts and figures. It must be grand to live way up there on Olympus . . .!

Whether the reviewers in these columns will deserve such labelling will be for the readers to decide ultimately – and no doubt they'll soon let us know their views – but we can at least promise that all Bookshelf reviews will be by people with practical knowledge and long, hard experience of researching, writing, producing and publishing books on aviation subjects.

Turning to the current aviation publishing scene, if some of the British publishers' 1981 catalogues are any criterion the present industrial recession is being bravely challenged. Admittedly, book retail prices in the United Kingdom are already reaching near-prohibitive levels for the book-addict – and I speak as merely one book-buying nut since pre-puberty years – yet my guess is that provided a new title is ***well***-written, ***well***-produced, and fills a need or gap in the mountain of existing literature, then the true enthusiast ***will*** buy irrespective of cost.

But he or she demands ***quality*** in content, illustration reproduction, and reliable accuracy standards if hard-earned money is to change hands. This is especially true of such a specialised market as aviation literature and applies equally to the major professional publishers and the growing host of 'amateur' enthusiast-publishers.

So what's new on the aviation book scene? A plentiful bounty of fresh titles are due to be published over the next few months.

From William Kimber Ltd will come seven titles by June 1981. ***First Kill*** by Wladek Gnys, a Polish fighter pilot with the RAF's No. 302 and 317 Squadrons; ***Flight Most Secret*** by Gibb McCall, air missions of the SOE and SIS; ***Winged Hours*** by Frank Griffiths, DFC, AFC, a personal story of 'spy-flying' in World War Two and the French-organised evasion line for Allied aircrews shot down in enemy-occupied territories; ***Spitfire Saga*** by Roger H White, who flew Wellington bombers and Spitfires in the North African and Italian campaigns, 1943-45; ***Impact*** edited by Peter C Smith, a collection of first-hand accounts of experiences by dive-bomber pilots from all nations of the 1939-45 era; ***V for Vengeance*** by David Johnson, an account of the V1 and V2 'terror-weapon' attacks against London, 1944-45; and finally, a bulky (and rather pricey) tome ***To Ride the Storm,*** a complete account of the R101 airship disaster by the distinguished author Sir Peter G Masefield.

The Cambridgeshire-based firm of Patrick Stephens Ltd (PSL) are offering at least six new titles on aviation subjects. ***Action Stations 2*** by B B Halpenny is the second volume of a series devoted to detailed survey of all wartime airfields in particular areas of the United Kingdom, in this case Lincolnshire and the East Midlands. For the aircraft enthusiasts come ***Hawker Hunter – Biography of a Thoroughbred*** by F K Mason; and ***Lancaster Photo-Album*** edited by Neville Franklin; model and history enthusiasts alike will certainly welcome three titles devoted to ***Luftwaffe Camouflage, 1935-40*** by J Richard Smith, ***RAAF Camouflage & Markings, 1939-45, Vol 1*** by Geoffrey Pentland, and ***Australian Fighter Squadrons of World War Two, Vol 1 (Pacific Area)*** by Peter Malone.

Ian Allan Ltd of Shepperton, well-known for their large, copiously-illustrated book formats, apart from various annually-revised standard reference works, are about to publish ***Bomber Group at War*** by C Bowyer, an evocative recreation of No. 5 Group, Bomber Command's wartime story: ***Warplanes of the World 1918-1939*** by Michael J H Taylor; Nos 7, 8, 9 and 10 in their ***Modern Combat Aircraft*** monogram series, these being respectively, ***Buccaneer*** by Maurice Allward, ***B-52 Stratofortress*** by Jeff Ethell & Joe Christy, ***F-104 Starfighter*** by Arthur Reed, and ***F-105 Thunderchief*** by Jerry Scutts. Also available are the 1981 edition of ***Civil Aircraft Markings*** by Alan J. Wright, and ***Military Aircraft Markings*** by Peter March, both up-dated, much-revised editions of 'hardy annuals'.

From Arms & Armour Press of Hampstead, three aviation titles are about to hit the bookshops. ***Combat Aircraft of World War Two,*** originally published in hard-cover in 1977, is now re-issued in paperback covers; ***US Air Force Colours 1942-45*** by Dana Bell, the second volume of a series on this vast subject, in this case covering the European and Mediterranean war theatres; and ***Ships and Aircraft of the US Fleet*** by Norman Polmar, the latest revised edition of a well-established reference work.

Meanwhile, if any reader is seeking information about particular titles, publishers, ***et al,*** or has a specific aspect of the book scene to query, write direct to the Bookshelf editor at: 33 Laundry Lane, Thorpe St Andrew, Norwich NR7 0XG, Norfolk, but PLEASE enclose a stamped, self-addressed envelope if a personal reply is needed.

THE ODD ONES

PATRICK ABBOTT RECALLS ATTEMPTS TO DEFEAT SYMMETRY

Most aircraft, of whatever type, are of symmetrical form; that is, the right and left hand sides are mirror immages of each other. This is partly a logical response to the problems of design, but it is also subconscious conformity to the rule of symmetry that is violated so very occasionally in the natural world and for which mankind has a quite illogical respect.

For there is no real reason – aerodynamic, mechanical or structural – to prevent a flying machine from being lopsided, irregular or askew, provided only that appropriate measures are taken to prevent instability or lack of control. Flying machines built in this fashion are termed "asymmetrical" and from time to time they have been projected, designed and even flown.

Although intrinsically little different from normal aeroplanes, such machines have an odd and alien appearance. They disconcert the eye far more than do the symmetrical lines of other aircraft that, in reality, may be far more unorthodox.

Strangely enough, the first sucessful aeroplane of all – that of the Wright brothers in 1903 – may strictly be termed asymmetrical. The engine was placed slightly to one side of the centre of gravity and balanced by the weight of the pilot, who lay down alongside.

A later version, considerably modified by TOM Sopwith in 1912, took things further by incorporating an engine offset to port and balanced by a streamlined passenger nacelle to starboard.

But the first design which can really be described as asymmetrical was the one for which Theodore Wright (no relation), of the American Wright Corporation, applied for a patent in 1929.

The final two asymmetric aircraft to be made by Blohm und Voss were BV 141B V12 and V13. These were considerably modified from the proptype aircraft, having a circular fuselage, much modified wing shape, a more powerful 1,560bhp BMW radial and an asymmetric tailplane. (Via Pilot Press.)

This was a small, single-seater monoplane design, with an enlarged and thickened port wing. On the upper portion of this, attached by brackets, was the single radial engine, driving a pusher airscrew. The weight of the engine was counterbalanced by the extra lift of the port wing and the yawing effect was counteracted by having the propeller inclined inwards to give an offset thrust. Alternatively, this latter effect could be obtained by having the vertical tail fin suitably cambered.

Among the stated reasons for considering this layout were to give increased visibility, to have a practical aeroplane of the pusher type with only a single motor, and to reduce the effect of engine fumes. The designer also claimed that in the event of a crash, fire hazard would be reduced.

Whatever the merits of this design, however, it was apparently never constructed and it possessed the great disadvantage of increasing the drag beyond that of a normal single-engined aircraft, where the passenger compartment and motor are placed in line.

This handicap of "built-in headwinds", as one sarcastic comment had it, cannot as fairly be levelled at the very different asymmetrical design presented by an anonymous RAF officer in 1941, eight years after the final granting of the Wright patent.

He maintained that a single-engined aeroplane is usually faster than a twin-engined aircraft, since the former has one engine and airscrew to overcome the drag of the fuselage whereas the latter has two engines and airscrews, but these have to overcome the drag of three components – the fuselage and two nacelles.

The officer contended that one method of overcoming this handicap would be to modify a fighter aeroplane, such as a Hurricane or Spitfire, by adding another engine in a nacelle on one wing and

increasing the wing area on that side, to compensate. This arrangement should then produce a better performance, other things being equal, than either of the conventional layouts.

The mild interest that was aroused by this suggestion was probably due more to its novelty than to any merit it may have possessed although the viability of the project was generally conceded. However, no-one in authority was willing to put the idea to a practical test.

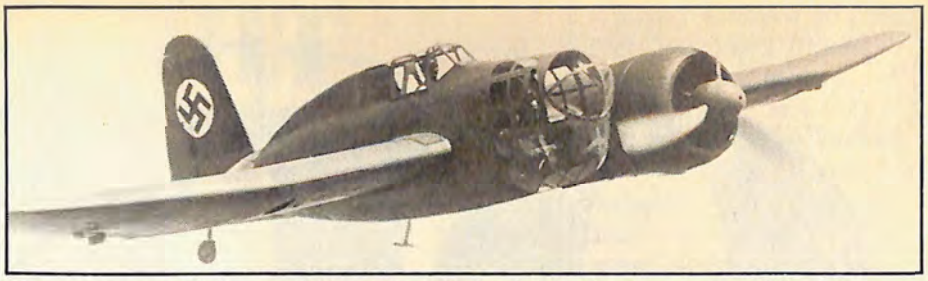
In 1943, when the next asymmetrical design appeared it was based on similar assumptions to those of its predecessor, but formulated in far more detail. This was a very attractive Swedish machine that was intended as a heavy fighter which could also be employed as a multi-purpose bomber or escort fighter.

In order to obtain high speed without sacrifice of armour or armament, the designer, Sigurd Isacson, proposed an asymmetrical layout with an offset fuselage balanced by a single engine nacelle on the port wing. So that the pilot and observer might withstand fierce manoevring without ill effects, they were to ocupy semi-prone positions; an arrangement that also allowed the cross section of the fuselage to be kept small.

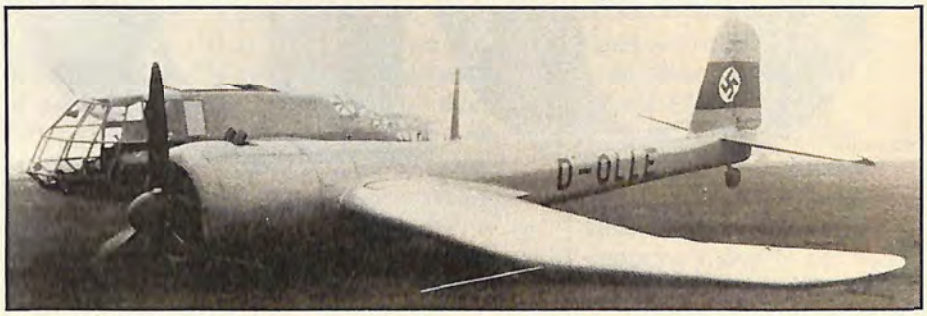
Combined with a high speed wing section and the comparatively small frontal area of two motors in one nacelle, this layout produced a design having very low drag. The nacelle was to house two powerful Napier Sabre engines placed in tandem, each driving contra-rotating airscrews, and the machine was calculated to have a top speed of perhaps 478mph. Two cannon were to be positioned underneath the nose and six machine guns placed in the wings, while compartments in the nacelle and the fuselage might be used for either bomb racks or additional fuel tanks.

One of the problems of designing asymmetrical aircraft is that of obtaining stability by ensuring that the payload is distributed symmetrically. Isacson overcame this inherent problem by having wings of symmetrical form and arranging that the bombs, fuel and ammunition should be kept in balanced loads equidistant from the centre of lift. The tailplane was offset to the left of the fuselage in order that its effect should be central. Although his machine was never to reach the stage of construction, the Swedish designer drew up his plans in detail and with a professional knowledge of the problems involved.

Considerably less explicit was the tentative proposal of Roger Tennant, which he put before a largely sceptical



The prototype Blohm und Voss Ha 141 had a fairly conventional looking cockpit, with glazed areas fore and aft. This deceptive shot gives the impression that the tailplane is attached to the cockpit. Via Pilot Press.



The Blohm und Voss BV 141 suffered several accidents, this one having an undercarriage leg collapse on landing. The odd angular glazed cockpit section can be seen. Via Pilot Press.

public in 1945. Like its Swedish predecessor, this was intended as a long range fighter which would be capable of escorting bombers for perhaps 2,000 miles and then of engaging enemy attackers on equal terms.

Unlike the arrangement favoured for the earlier machine, the crew were to be housed in the single nacelle, in front of an engine driving a single pusher propellor. Another engine and tractor airscrew were provided in the fuselage, while the tailplane, like that of Isacson's machine, was offset to one side. One advantage claimed by the designer was the concentration of weight around the centre of gravity, so ensuring good manoeuvrability.

Other anticipated benefits, however, were more debatable, such as the plan to provide extra fuel by storing this in an unmanned glider pulled behind on the end of a combined tow rope and pipe line. As the glider would have a lower wing loading than the powered aeroplane, it would become airborne first and so, according to the optimistic inventor, "assist the take-off of the larger machine."

But Tennant found little support for his ideas and the lopsided attractiveness of his aeroplane could not conceal its lack of any real advantage over conventional layouts. No detailed plans were ever drawn up and the project was soon forgotten.

But all the previously described designs were only suggestions. And except for Theodore Wright's, they were no more than afterthoughts to an earlier asymmetrical project which had been not only suggested, but also designed, built and actually flown.

In 1937, the German Luftwaffe issued a specification calling for a short range reconnaissance aircraft which should possess good visibility and carry a crew of three. In order to reduce those problems of maintenance which might be encountered on temporary landing fields, a single engine was also specified, and it was this last requirement that led Dr Richard Vogt, of the Hamburg firm of Blohm and Voss, to produce the most extraordinary looking aircraft of the Second World War.

It was originally the subject of a patent in 1937 and first known as the Ha 141, a low wing monoplane in which the crew were housed in a single nacelle on the starboard wing. This wing was of greater area than the port one in order to compensate for the offset centre of gravity, although during take-off the uneven weight distribution served a useful purpose by helping to counteract engine torque.

The fuselage, which was only a slim and extended engine nacelle, supportec the conventional tail unit and contained an 865hp BMW radial engine driving a tractor airscrew. Purpose of the asymmetrical layout was to provide the crew with the best possible visibility, a purpose splendidly achieved, albeit at the cost of increased drag.

On February 25, 1938, the first prototype took to the air and proved to

possess few defects. After being test flown by Ernst Udet, the World War I ace, who was then head of the technical department of the Luftwaffe, the Ha 141 (registered as D-ORJE) was accepted for further development. Two more prototypes followed, each improved in minor details, and these were designated as the Blohm and Voss BV 141 V1 and V3, while for obscure reasons the original machine now became known as the BV 141 V2.

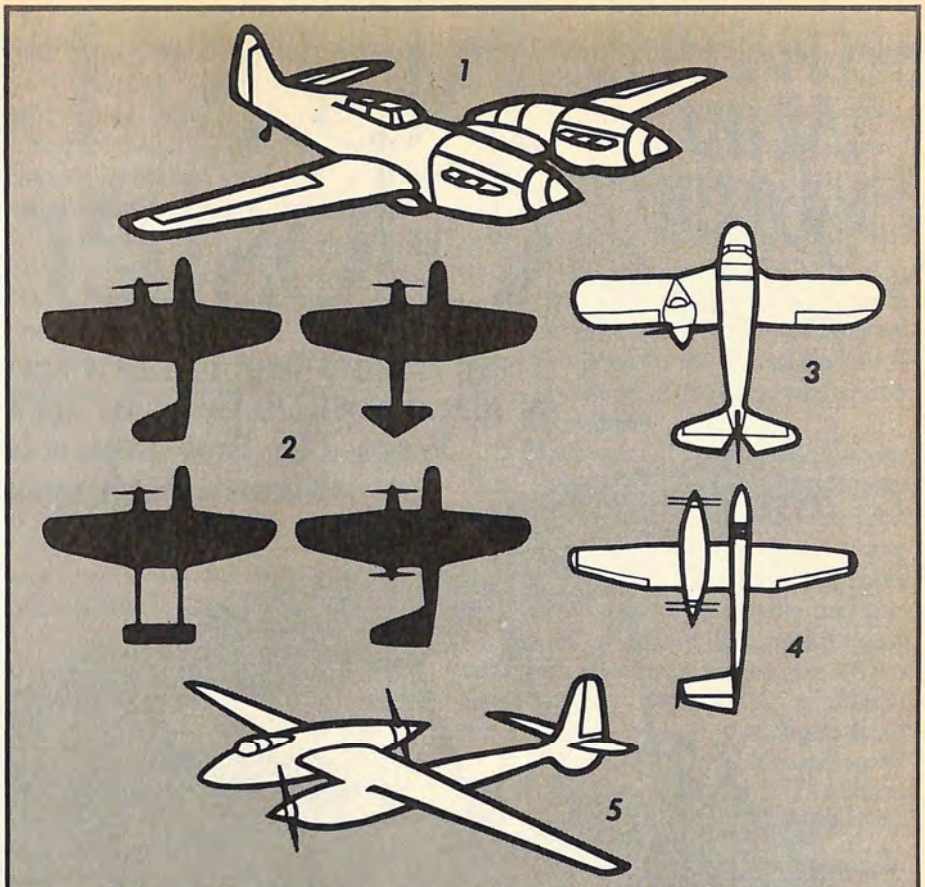
The Luftwaffe disliked the crew nacelle of the V2, which incorporated a normal stepped cockpit and glazed observation positions at front and rear, and for the two later aircraft this was completely redesigned. The new layout featured an angular forward section with many flat glazed panels and a pointed rear section, also extensively glazed.

Only the third machine, the V3, was armed, being fitted with two fixed forward-firing machine guns and two moveable guns pointing rearwards. An automatic camera formed part of the equipment and four 110lb bombs could be carried in racks under the wings.

Although the BV 141 V2 was badly damaged as the result of a forced landing, the BV 141 V3 was ready in time for evaluation tests to be completed satisfactorily. However, despite excellent handling qualities revealed by the official test programme and the fact that it fully complied with the original specification, Luftwaffe officials still nursed an illogical prejudice against the strange appearance of the aircraft. They even called it "unsymetrische" – unsymmetrical rather than the English asymmetrical.

It was with some reluctance, therefore, that a further order was placed for five more models, designated V4 to V8. Even though extended tests produced satisfactory results and those who had piloted the aeroplane were enthusiastic, senior officials remained unconvinced and in April, 1940, the decision was taken to order no production models, on the specious pretext that the aircraft was underpowered. However, Dr Vogt had already foreseen this eventuality and prepared for it by designing a more powerful version of his aeroplane, using a 1,560hp BMW radial engine, and known as the BV 141 B.

The new aircraft was different in several ways from the BV 141 A, the fuselage now having a circular instead of an oval section, and the outboard wing panels becoming equi-tapered instead of having swept back leading edges and straight trailing edges. Most noteworthy modification was substitution of the conventional tailplane by one of asymmetrical shape, with the greater part of its area of the port side, so allowing a clear field of view for the rearward firing gunner.



1: The modified Hurricane suggested by an RAF officer in 1941.
2: Four layouts from the drawing board of Dr Richard Vogt.
3: Theodore Wright's asymmetrical proposal of 1929.
4: Two Napier Sabre engines were to drive Sigurd Isacson's aircraft.
5: Racy idea from Roger Tennant for a long range fighter in 1945.

Interestingly, this was the opposite of the more obvious arrangement favoured by Isacson and Tennant, where the tailplanes were offset towards the nacelle. Dr Vogt had previously experimented with his layout on the BV 141 V2 and tests had shown that there was no discernible change in either stability or control.

The first of the new machines, the BV 141 V9, flew on January 9, 1941, and was eventually followed by four more examples. Unlike their predecessors, these new aircraft were beset by many problems, and substantial modifications were required before the snags were eliminated.

Apart from continual difficulties with production, most of the troubles were structural partly the result of having a more powerful engine; no faults were to be found with the offset tail arrangement or other peculiar features of the design. It was not until May, 1943, that the final version was delivered for official testing, but by then it had already been virtually superseded by the more reliable and more orthodox Foke-Wulf 189 which featured twin booms and a crew nacelle almost identical to that used by the BV 141.

There were tentative plans to send a squadron of BV 141s to the Russian Front, but these were cancelled and the unusual aircraft never saw any operational service. For a variety of reasons, the Luftwaffe decided to place no more orders, and development came to an end with the last of the line, the BV 141 V13. It had a span of 57ft 3in., a length of 45ft 9in., a wing area of 57Csq. ft. and an empty weight of 10,363 lbs. Its maximum speed at sea level was 230mph, only about 20mph faster than the first prototype, and it possessed a range of about 750 miles.

Dr Vogt proposed several similar designs before the end of the war, but none were built. Nevertheless, his thirteen earlier machines, however ungainly and angular they may have looked, at least achieved the distinction of being the only really asymmetrical aircraft ever to fly successfully and effectively.

1918 Between Wars Fighters 1939

No.1: The Gloster Grebe

Tony Harold begins a new series on the neglected subject of aircraft which first saw service between the two World Wars. His first choice is the Gloster Grebe, sadly without a single specimen to record its existence.

A rebuilt 'JR' series aircraft in late strut configuration with low pressure tyres, possibly an aircraft used by 4FTS of Abusueir. (RAF Museum).

THE pugnacious little Grebe, though sadly overlooked nowadays, had, in the bright innocent years after the First World War, the distinction of being the first new fighter type ordered for the Royal Air Force. The young service was still in its post war depression, following the run-down of all the services at the end of the war; men, machines and morale had dwindled to such a position that the air defence of the realm relied on a few Sopwith Snipes, excellent aircraft though they were.

The British Aircraft industry was in a very poor shape after the incredible cut back in production from full wartime operation, to what was only a trickle of completed assemblies from parts already manufactured. The Gloucestershire Aircraft Company Limited was no exception, formed in the spring of 1917 from an amalgamation of the Aircraft Manufacturing Company and the aircraft manufacturing business carried out by H H Martyn. By 1918 this combination was able to build 45 aircraft per week.

In 1919 the Government made a settlement with the G.A.C. over the Nieuport Nighthawk contracts and a considerable number of spares for these aircraft became the property of the company. This was a speculative step which shortly paid off. Despite the need for the Company to take on all sorts of engineering work the directors wanted to remain involved with the aircraft industry. To this end the G.A.C. acquired the rights to the Nieuport Nighthawk fighter in November 1920, because the Nieuport company fortunes were at a low ebb. The decision to close the Nieuport factory gave Gloucestershire Aircraft the opportunity to contract H.P. Folland, the chief designer of Nieuport, to oversee production of the Nighthawk at Sunningend.

Folland had started his design career at the Farnborough Balloon Factory in 1912, but following the disbandment of the technical staff at Farnborough, he moved to the Nieuport Company. His work on the design of the SE5a needs no comment, but he now concentrated on the Nighthawk fighter, which was intended to meet the RAF Type I specification of 1918.

Following the successful sale of fifty Nighthawks to the Japanese in 1921, the board of directors of G.A.C. pressed for a re-design of the Nighthawk for high speed flight.

Subsequently a series of quite remarkable aircraft was developed; a strange mixture of components called the Barmel won the Aerial Derby in 1922 and 1923 and established Glosters' reputation of being in the forefront of high speed flight.

A serious programme was put in hand to investigate biplane efficiency, and an appropriate development was the High Lift Biplane, a combination of different aerofoil sections which gave the wings almost monoplane efficiency, linked with a low aspect ratio for great manoeuvrability. An aircraft conforming to this Folland biplane layout and fitted with a 350hp Jaguar III engine was demonstrated at Hendon. This was the "Grouse" which impressed the Air Ministry greatly. This single seat aircraft was sold to Sweden and in 1923 the Company received a contract for three prototypes embodying the H.L.B combination. Work began on the

first Gloster Grebe aircraft to Contract No. 402023/23 for what was officially called the Nighthawk.

The engine selected for the aircraft was the 350hp Armstrong Siddeley Jaguar III and this was to be supported by the thick, high-lift HLB 1 and the thinner, medium lift HLB 2 sections of the upper and lower mainplanes respectively. The first aircraft was allotted the serial number J6969, and was given the name of Grebe.

The construction of the Grebe was very much in keeping with aircraft practice of the first war, relying almost entirely upon wood, jointed with steel sockets and sleeves. There were four main bulkheads in the fuselage:- the firewall of aluminium and asbestos, the engine mounting bulkhead made of three thicknesses of 3 ply, with an aluminium duct held at the front by brass screws, and the instrument board bulkhead, with all the appropriate holes already drilled. A fourth, seat bearer bulkhead, completed the nose section.

Armament consisted of two Vickers .303 machine guns although dummy guns were fitted with partial fairings to J6969 when it went for trials at Martlesham Heath in 1923.

A Very pistol was provided in a leather holster attached to a wooden box containing cartridges mounted on the starboard side of the cockpit, which was also wired for lighting, heating for a flying suit, W/T, to ignite the holt flares for night landings and of course the guns and ignition.

Provision was made for oxygen to be carried, the apparatus being installed on the starboard side of the fuselage. Instruments and control gear were inside the cockpit between Nos. 4 and 5 struts whilst the liquid oxygen vaporiser was on the bottom of the fuselage behind the pilot.

The instruments were sparse but included Air Speed Indicator, Altimeter Mk VA, tachometer, oil pressure gauge, oil temperature gauge, compass, an inclinometer for lateral altitude and the vital fire extinguisher.

INTO SERVICE

Finished in gleaming fresh silver paint with cowlings highly polished and with a new type number 14 painted below the cockpit, the first Grebe, J6969, taxied out across the grass at Hendon in event No. 5 of the most prestigous air show of 1923, the RAF Pageant.

This was the first public appearance of the type, but it was perhaps not until G-EBHA, flown by Larry Carter, won £100 for the fastest circuit in the Kings Cup Air Race of 1923, that people realised they were seeing the fastest fighter yet put into service.

The race was held between Hendon and Glasgow, flown over the two days of July 13-14; the outward journey was staged in three legs, Hendon-Birmingham, Birmingham-Newcastle, Newcastle-Glasgow, which the Grebe covered in 32 minutes and 19 seconds. This time put G-EBHA in second place, but sadly on the return journey shortly after take off from Glasgow a landing wire broke, causing retirement from the race at Manchester.

G-EBHA was, in fact, the company demonstrator and this aircraft, flown by Flt. Lt. Bird, flew the 700 miles between Rotterdam and Gothenburg, easily outpacing its rivals to win a special prize from the Swedish Government.

Grebe J6969 was sent to Martlesham Heath and to the Aircraft Experimental Establishment for extensive trials, which resulted in test and service pilots agreeing that the type was far in advance of any contemporary fighter designs. It had at best a 20 mph airspeed increase over the Sopwith Snipe and with a potential increase in engine power its rate of climb and general manoeuvrability was excellent. On the strength of the service appraisal an Air Ministry contract was issued for a total of 133 aircraft. Four were prototypes, their service serials being J6969-J6971.

The aircraft industry had to be kept alive, so Gloster were required to subcontract the sub assemblies. A.V. Roe built upper mainplanes, De Havilland the ailerons and small components, while Hawker built the lower mainplanes.

The first production aircraft had the larger 400hp Jaguar IV engine, which, like the III had fourteen cylinders and was a two row radial driving a 9ft 6in diameter wooden fixed pitch propeller made by Watts. Work began on the first batch of eleven aircraft known as the Grebe Mk II, which were allocated serial nos J7283 to J7294.

In October 1923 Duxford airfield found itself the host to 111 Squadron which, commanded by Squadron Leader T.F. Hazell DSO MC DFC, had recently reformed with Sopwith Snipes, and was now to have the distinction of receiving the first Grebe aircraft.

During 1924 the Grebe evolved with the introduction of parallel ailerons, which made a very distinctive and attractive wing shape, a characteristic which would be continued with the Gamecock. Work also continued with 22 Squadron at Martlesham Heath where flutter, a very undesirable characteristic, was investigated, along with tests for terminal velocity dives. The Grebe was the first fighter aeroplane to survive this test, reaching 240 mph before pullout; the bracing wires were a little stretched, otherwise there were no ill effects.

The Martlesham pilots were to know the type for many years and did a great many experiments with it. A Vickers .51m machine gun was fitted in April 1925 and a similar calibre Browning gun was also put through tests.

The pilot's view from the Grebe was not good and after many tests it was decided that a thinner centre setion was the best in terms of rate of climb, maximum speed and pilot visibility.

G-EBHA was still proving useful; it was fitted with a Gamecock tail, a Jupiter engine and a revolutionary variable pitch Hele-Shaw Beecham propeller. Glosters claimed that the Grebe thus fitted could climb, fly level, loop repeatedly and dive for several thousand feet without any noticeable variation in engine rpm. With a supercharged Jaguar IV a Grebe achieved 165 mph in level flight, could climb to 20,000 feet in 16 minutes and had an absolute ceiling of 27,000 feet.

A very odd adventure overtook F/O Rogers and F/O Machenzie-Richards, both pilots at the Royal Aircraft Establishment at Famborough when they were asked to fly J7400 and J7385 from a position slung below the airship R33 whilst the airship was in flight.

The engines were started by means of a Bristol gas starter in the body of the R33 connected to the Grebes by detachable, flexible hosing. Both aircraft were successfully launched and landed at Pulham, but nothing came of the experiment in this country.

A very intelligent move in the latter part of 1924 was to convert J7519 into a two seat trainer which allowed pilots to learn from a very early stage the type of aeroplane they would eventually fly on a Squadron. A series of acceptance tests were carried out and 20 similar aircraft, (J7519-J7538) were constructed in 1925, which was the year when the type would come to prominence. In October 1924 No. 25 Squadron at Hawkinge received their Grebes to replace Snipes, in December, 19 Squadron received theirs at Duxford, 29 Squadron, also at Duxford, received theirs in the New Year, whilst 32 Squadron under Sqn Ldr H P Lale based at Kenley received theirs in November 1924.

The famous record breaking pilot C.W. Scott was one of the Snipe pilots of 32 Squadron detailed to collect a squadron aircraft direct from the factory field at Hucclecote where Gloster aircraft were assembled. The time of year was not opportune as he records:-

"Our old Snipes of 1925 were being replaced with machines of a more modern type – Gloster Grebes. These machines, compared with our old ones, had a better and more commanding performance. They had a top speed of at least thirty miles an hour more.

"There was a batch of six Grebes to be collected from Cheltenham, and six of us went down to fly them back to our unit. Each of us having tested our own machine and accepted it, we were then to fly back, led by our Commanding Officer, in formation to Kenley. It was a very cold January afternoon, and having received instructions from the CO to follow him home, we took off together. We ran into thick weather, however, and all by myself lost the CO's machine in the fog.

"When flying in formation behind a leader one has little time to navigate oneself, as one's eyes are kept permanently on the leading machine, but when it was getting dark as well as foggy I drew away a little from his machine to make certain of our whereabouts. Almost at that moment we passed over an aerodrome and the CO, waving me away, prepared to land.

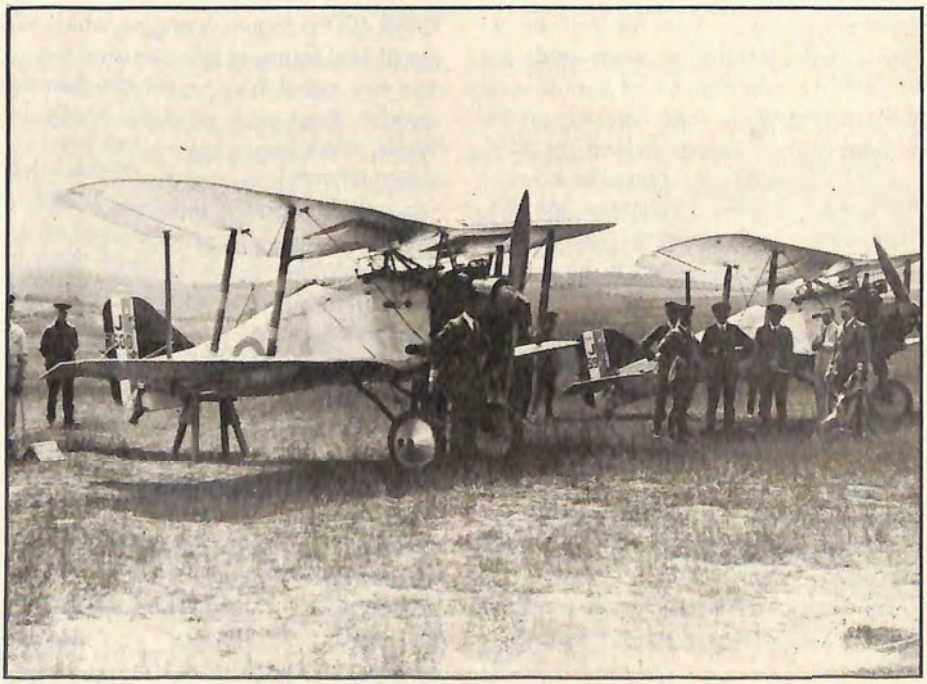
"Owing to the fog and failing light, I deemed it advisable to let him land first, rather than in formation. Imagine my surprise, therefore, when I saw the CO attempt to land in a field outside this aerodrome on which there were bill-posts. It was obvious that he had not seen the aerodrome himself. His landing was marked with a sudden determination, for he made his goal between two particularly solid posts, and, ripping the wings completely off his machine, dug his nose into the ground and turned over. I landed on the aerodrome, to discover it was Stag Lane Aerodrome. It was the first time I had landed on that aerodrome, which was to be one of great importance to me. The CO was unhurt and we had to stay there the night."

At Hawkinge, 25 Squadron began to work up an interception routine using radio signals from the ground to vector his squadron against an enemy. This new interceptor fighter technique was appropriately begun here just 25 miles from the French coast. The great day dawned when in the 1925 Hendon Pageant the honour of performing squadron drill to the instruction of HM King George V, went to 25 Squadron commanded by Sqn Ldr A H Peck DSO MC.

The procedure up to this time was for the leader's aircraft to have radio and instructions received by him were transmitted to the rest of the flight by hand signals or by special movements of the

Ready for the trials, J.7400 is hung securely below R35 at Pulham on October 21, 1926. (Flight)

One of the few air to air photographs of a Grebe II (J. 7585), probably from the RAF Training Base, Leuchars. (RAF Museum)



A fine study of the two Central Flying School Grebes at Upavon prior to their appearance at the 1925 Hendon Air Pageant. These aircraft, which had red painted fin and upper mainplaines, were flown by F/Lt H A Hammersley and F/O J N Boothman. (RAF Museum)

leader's aeroplane. The latter must have led to some misunderstandings in view of the sensitive nature of the aeroplane and the limited visibility from the cockpit.

During the show a Gloster Gamecock was also demonstrated and cast a shadow on the bright career of the Grebe. No further squadrons were equipped with the Grebe. In 1926, Nos 19, 29, 32 and 156 Squadrons all combined with a Siskin squadron and Gamecock squadron to open the RAF Pageant on July 3.

An incident which proved fatal for one pilot of 25 Squadron was to have a considerable effect on the 'elan' of fighter squadrons. In December 1926, after ground firing practice a Grebe was destroyed and the pilot fatally injured.

Flying Officer Purvis was flying one of three Grebes diving towards a series of circles cut in the turf near the centre of the aerodrome. Something was not right for Purvis lost control of his aeroplane which dived into a small valley, it burst into flames on impact. Purvis was the nephew of the Secretary of State for Scotland Sir John Gilmour who asked that this and other incidents be considered. At the time Sir Samuel Hoare, the Air Minister remarked that they had not yet discovered a remedy against flying accidents!

Although efforts were made to try and keep the incidents as few as possible, there were many accidents to Grebes including prop swinging but most of the accident report cards are missing so the bias of incidents is no longer known. Sadly the movement cards are also lost and it is impossible to trace many of the aircraft as they progressed through their service career.

Despite dire threats many were not to be suppressed as C W Scott relates:

"Although we were getting new machines in the Squadron, we still had a few of our old Snipes. It was very interesting to discover the difference between the fighting qualities of these and the new Grebes. Owing to the gyroscopic action of the rotary engine in the Snipe we all found that the Snipe could readily out-manoeuvre the Grebe, but the Grebe, owing to its higher speed, could attack and retreat at will.

"Round about this period each squadron in a fighting area had to have one flight as a "Battle Flight" each week. This flight was on duty for the whole week and would start off on Monday mornings by putting 250 rounds through each of its front guns at the butts. They might be called on at a moment's notice. We had to do three flights of at least one hour's endurance, at 20,000 feet, each week.

"How glad we were that we had Grebes and not Snipes, for the Grebe would get up 20,000 in about half the time that the old Snipe would take and would still be a nice machine to fly at that height, where the Snipe had had such a poor performance. But it was desperately cold at that altitude and the electrically heated clothing that we had in those days was far from being efficient, for the glove on one hand would be warm, while that on the other would be absolutely frozen. Sometimes the complete equipment would pack up and at the end of an hour one was cold enough to be at the point of frostbite. Neither had we any oxygen, but this was issued to us later.

"I was in "A" flight all the time I was in No 32 Squadron, and was then the senior flying officer in the Flight. A new Grebe was being erected for me in the flight hangar and was almost ready for testing when I was suddenly posted to "C" Flight.

Feverish preparation for the 1923 King's Cup in which GEBHA, the company's demonstrator, flown by Larry Carter, took the £100 prize for the fastest circuit. (Flight)

" 'Blues' Broadway was jubilant because my machine then moved to him, and the very evening of the day of my posting to "C" Flight he took the machine up on its first test flight. This test flight of his was more in the nature of an engine test and lasted only five minutes, but on landing he told me it was going to be a fine aeroplane.

"The next morning he took it up and put it through its final paces. I remember that morning very well. There was a thin cloud layer at about 800 feet, through which one could just see the blue sky above. Broadway took off and climbed through this thin layer of clouds into the blue sky above, but out of sight of us. By the note of his engine we could tell he was performing aerobatics. This went on for some minutes, until suddenly one heard a sound like the crescendo of a siren and Broadway's machine came hurtling towards the ground. God knows what speed he must have hit it, as there was not a particle of the machine two feet above the ground, and the engine, when dug out, was eight feet four inches under the level of the grass field in which he crashed.

"At this time we were being equipped with parachutes, and Broadway tried to get out of his machine, but it was too late.

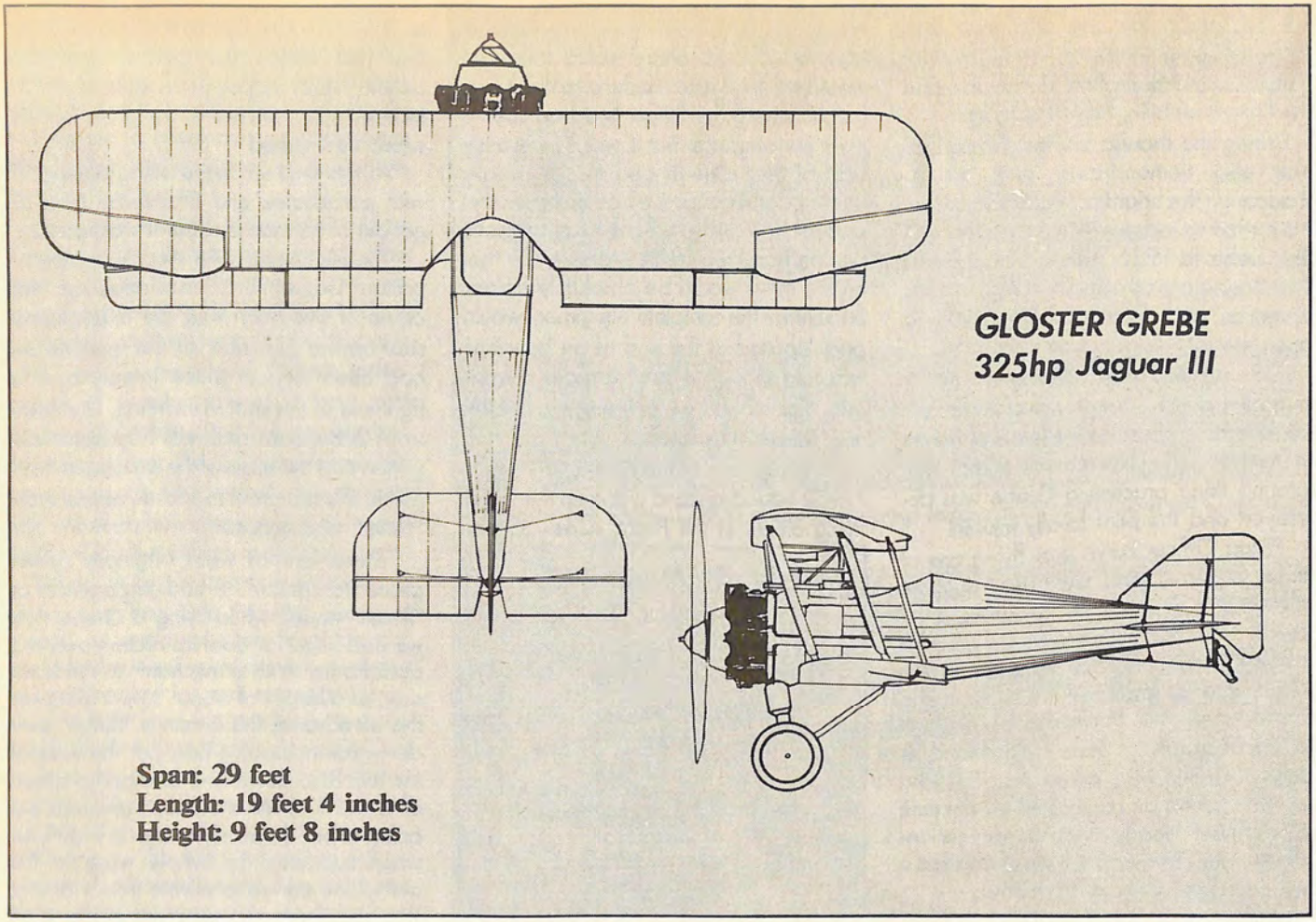
"The Air Ministry, Air Accidents Investigation Department, discovered as the cause of this crash that the inter-aileron strut on the port side, at the top aileron, had been held in place merely by the tightness of the strut in its fitting. The three small 2 BA bolts and nuts had been forgotten and the strain of the aerobatics had pulled the strut from its socket, and aileron "flutter" had occurred.

"These Grebes were originally rather prone to "flutter". I had experience of "flutter" myself while flying a Grebe that we had fitted for dual instruction over the aerodrome. With a mechanic in the back seat, at a height of about 3,000 feet over the aerodrome, this uncanny "flutter" suddenly commenced. I had put the nose of the machine down and attained a speed of about 170 miles an hour, and was just going to pull the machine over a wide loop when suddenly the whole wing of the aeroplane started to vibrate tremendously. The actual arc of movement at the wing tips, I am sure, could not have been less than eighteen inches, and it was one of the most peculiar moments of my life.

"In this particular machine we had no parachutes, and I had visions of the machine falling to pieces in mid-air. I throttled my engine back and with the wings still flapping, began to glide as slowly as possible towards the ground. I was actually able to land the machine on the aerodrome, but the mechanic in the back seat must have been even more alarmed than myself, for practically as soon as the wheels touched the ground he was out of the machine and running away from it.

"When the machine came to rest I discovered that all my landing and flying wires and aileron control wires were so loose that I could have tied knots in them. All our Grebes were modified very soon after this.

"For some unknown reason, one day I started to dive to the aerodrome surface, and at a very high speed tried to touch first one wheel and then the other, flying a few inches above the ground. I was successful on the first few occasions, and then obviously what had to happen did happen. I hit one wheel so hard that my whole undercarriage crumpled up, and, to my amazement, I saw my starboard wheel appear through the top of my bottom main plane. To add to my consternation, I



saw the fire tender and the ambulance rush out towards the centre of the aerodrome to a spot where they thought I might crash.

"The impact of that last bounce had sent me well up into the air again, and, although I was flying, I had no undercarriage on which to make a successful landing. I came down and crashed as near the ambulance as possible. It was impossible, of course, to land correctly, and I turned my machine over at a fairly high speed on the aerodrome, and after crawling out found myself under arrest."

By 1927 only 19 and 29 Squadron appeared with Grebes to entertain the public in an air battle. Number 25 Squadron kept their Grebes until 1929, 29 Squadron lost theirs in March 1928, 32 Squadron were issued with Gamecocks in April 1928 and 56 Squadron received Siskin IIIa aircraft as early as September 1927.

In 1929 one of the two seat Grebes, J7520, achieved public acclaim when it won the King's Cup. The aeroplane carried the number 39 on its rudder and was flown by Flt Lt R D R Atcherley and Flt Lt G H Starforth, neither a stranger to the notion of speed. The Grebe's average speed over the 1,160 miles was 150.3mph which was a record for the King's Cup. This average was more remarkable because of a taxi-ing accident at Blackpool. Spares were rushed from Cheltenham during the night and by race time the rudder and tailplane were repaired.

Ousted from squadron service, the aircraft continued to serve the Aircraft Experimental Establishment at Martlesham Heath. In the RAF Pageant for 1929 Flt Lt Bradbury and Flt Lt Guest flew an exhibition of individual aerobatics using smoke generators supplied by Major Savage. The smoke was coloured and it is likely that the aeroplanes were painted in accordance with the smoke as were the Grebe for the following two years for in 1930 and 1931 22 Squadron supplied three Grebes fitted with smoke generators for the great display. The pilots were Flt Lt Fleming, Flt Lt Wincott and Roy Addams for both years. Grebes left the service in a bright trail of coloured smoke.

In 1926 Sir Henry Wigram gave £2,500 to the New Zealand Government to purchase a fighter aircraft. The Air Ministry recommended a Gloster Grebe and in 1928 the first arrived in New Zealand (NZ501). This aeroplane was originally J7381.

Finally NZ502, another single seat machine, ex J7394 and NZ503, ex J7400 a two seater, arrived in September 1928 at Wigram. All three aircraft flew regularly despite many major accidents until 1932, when NZ503 crashed after an elevator control rod end broke. The remaining single seat Grebes were renumbered as A-5 and A-6 when the Royal New Zealand Air Force was formed.

The last Grebes in existence entertained the public on June 4, 1938 at an air display at Rongatai. By November 1938 both machines were withdrawn from service; A-6 (ex-NZ502) was sent to Hobsonville Engineering School. Perhaps the pieces still survive.

There are, sadly, no complete Grebes left and only a few examples of the Jaguar engine remain.

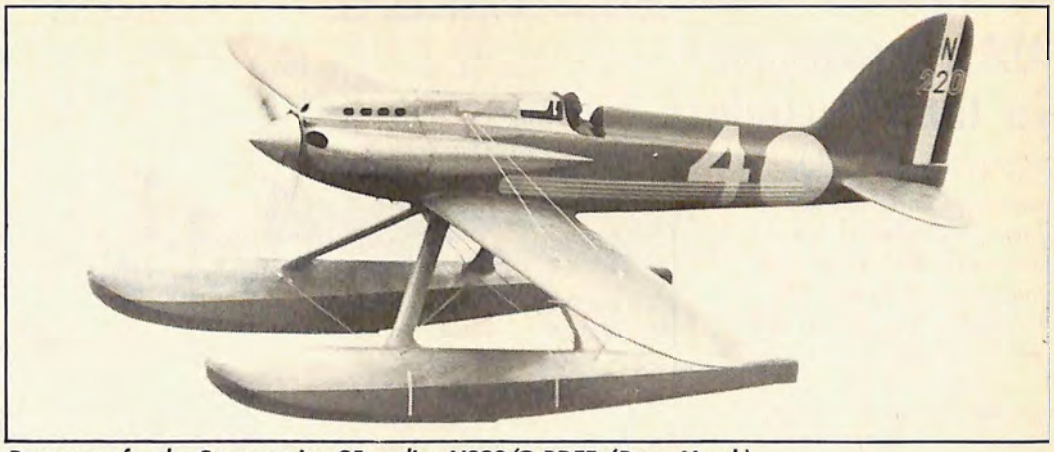
GREBE PRODUCTION

J6969 – J6971	ORDERED AS NIGHTHAWK (THICK/WINGED)
J7283 – J7294	FIRST GREBES MKII. SUPPLIED TO 25 SQUADRON.
J7357 – J7402	(J7381, 7394 & 7400 SUPPLIED TO RNZAF).
J7406 – J7417	
J7519 – J7538	GREBE III 2 SEAT TRAINERS.
J7568 – J7603	(J7570 WAS A BRISTOL F2b)
J7784 – J7786	LAST BATCH ORDERED IN 1924.

Schneider celebrations

ON September 13, 1931, Flt Lt J N Boothman won the Schneider Trophy outright for Great Britain flying Supermarine S6B S1595. This achievement is being marked 50 years later by events up and down the country. The aircraft and trophy can be seen in the Science Museum, S1595 having been presented to the Museum in 1932. And at Thorpe Park, Chertsey, Surrey, Leisure Sport recently unveiled a Schneider Trophy exhibition.

Supermarine S5 replica N220/G-BDFF will have a busy year with commemorative appearances at Thorpe Park Air Days on July 25, August 22 and September 26; International Air Tattoo '81 at Greenham Common on June 27-28; and at the 50th Anniversary event at Calshot on September 13. It is hoped that the S5 and a Spitfire will 'race' over the original Schneider course and a ground exhibition will include the Curtiss R3C-2 replica BAPC-140 and original Macchi MC.72.



Busy year for the Supermarine S5 replica N220/G-BDFF. (Peter March).

Aircraft industry in action

THE Shuttleworth Trust at Old Warden continues to be a hive of activity – especially with the new flying season only a few weeks away.

Outside help is always welcome at Old Warden and the aircraft industry is keen to help when it can. Three projects involving the help of individuals within the industry are currently underway. Jean Batten's famous Percival Gull Six G-ADPR, in which she flew to Brazil, Australia and New Zealand in the mid-1930s, is being restored by a team from Hunting Engineering at nearby Ampthill. Hunting took over Percival and now deals with munitions and systems.

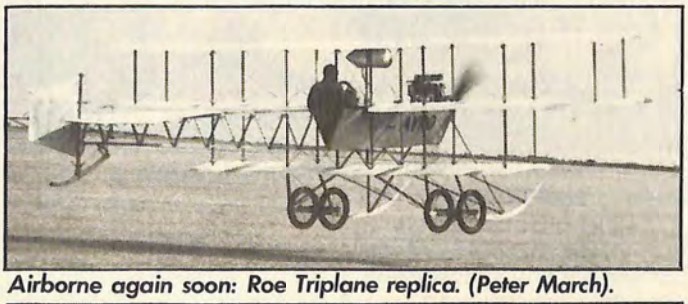
Members of Hawker Athletic and Social Club Aircraft Preservation Group, based at BAe Kingston, are hard at work on the Trust's Chipmunk T.10 WB588/G-AOTD. This aircraft has not yet flown with the Trust and will make a welcome addition to the growing number of de Havilland types there.

Sharing the same roof as Jaguars and Tornados is the 3hp Wren built by English Electric in the mid-1920s. The roof is that of the huge plant at Warton where British Aerospace are currently producing machines of considerably more potency.

The Trust's Wren (BAPC.11) is a composite airframe that was put together at Warton in 1957. It has been flown at Old Warden – when the weather has been kind – ever since. However, the time had come for another refurbish to the airframe and ABC pylon-mounted engine.

Another restoration nearing fruition is that of 1937 vintage Hawker Afghan Hind BAPC-78. Obtained from Afghanistan in 1967, it has been painstakingly rebuilt to flying condition and should be airborne during this summer.

The Roe Triplane Type IV replica BAPC-1, built in 1964 by the Hampshire Aeroplane Club, should also be back in the air again this year after being grounded for some time.



Airborne again soon: Roe Triplane replica. (Peter March).

Almost complete: Old Warden's Afghan Hind. (Peter March).

Trident IE on the way

THE Science Museum 'out-station' at Wroughton is preparing for another new inmate. This will be an ex-British Airways Trident IE, tipped to be G-AVYE.

The Trident will join a growing collection of airliners. First was Dakota E1-AYO which flew in from Shannon on October 25, 1978, followed by Dan Air Comet-4 G-APYD on November 5, 1979.

Also due is the amazing 'Newbury Manflier', a two-pilot man powered aircraft designed by Rear Admiral Nick Goodhart to attempt a cross-Channel flight. Of some 139ft wingspan, the 'Manflier' has two booms 70ft apart, each one carrying a pilot. Despite this vast size, the empty weight is only 160lbs.

US types in the air

EXPERT vintage aircraft restorer, Cliff Lovell, has brought another clutch of interesting American types into the country and got them back into the air in pristine condition.

Stinson 108 Voyager 3 G-BHMR, previously F-BABO, F-DABO and N6352M, made its public debut at the Compton Abbas New Year's Day Fly-in and remains based at Mr Lovell's strip at Walkeridge Farm, Hannington, near Newbury.

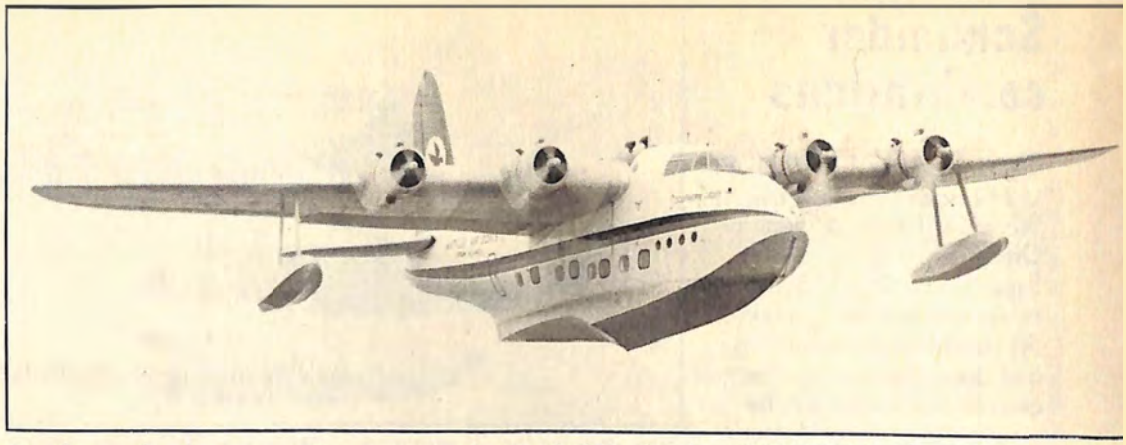
Taylorcraft BC12D G-BIGK, previously N96002, is the first example to come onto the UK civil register and is now based at Sandown, IOW, certification having been completed towards the end of last year.

A third type, Piper PA16 Clipper 108 G-BIAP, previously F-BBGM and F-OAGS, is a welcome addition to the small number of Piper tail-draggers in this country. It is based at Henstridge, Somerset.

Pennine's Hadrian

PENNINE Aviation Museum, at Bacup, has what is thought to be the largest Hadrian assault glider in the UK. It was found during the summer of 1979 in a garden in Ormskirk and, like many of its type, was probably bought from Burtonwood or Warton with a view to turning it into a garden shed.

The cockpit section moved to Bacup in 1979, the remainder following in September 1980. PAM has virtually all the fuselage and tail 'feathers' but no mainplanes. Restoration will be a long job, but the cockpit should produce a useful travelling exhibit very soon.



Good news for the preservation movement is arrival of Sandringham IV N158C Southern Cross at Calshot. (Peter March).

Flying boats rescued

ARRIVAL of Sandringham IV N158C at Calshot on February 2, in the hands of Captain Ron Gillies, was the culmination of two years' hard work on the part of flying boat enthusiast Mike Coghlan and colleagues from all parts of the UK.

The ex-Antilles Air Boats Southern Cross VP-LVE was no stranger to the Solent, having made two summer visits flown by the late Captain Charles Blair in 1975 and 1977.

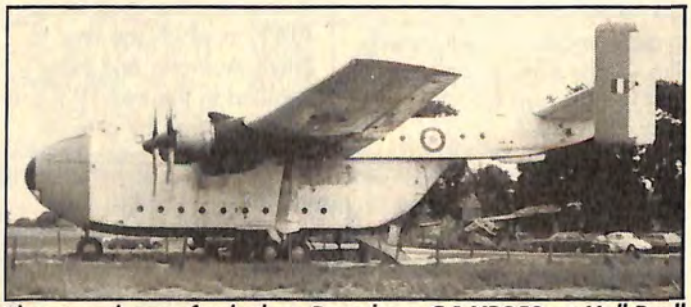
Built as a Sunderland MR V JM715 in 1943, it was used by the MR Pool at Wig Bay. With low operational hours it was purchased by Shorts in April 1947 and converted to a Sandringham IV. Purchased by TEAL in 1948 it went to New Zealand as ZK-AMH. Later it moved across to Australia where Ansett flew it as VH-BRC.

Brought out of retirement when purchased by Antilles Air Boats, the aircraft was operated in the Virgin Islands until the tragic death of Captain Blair in 1978. With sister ship N158J 'Excalibur', the two flying boats resided at Isla Grange, San Juan, awaiting their fate, which seemed likely to be the breaker's yard.

It is hoped that work can be put in hand to bring the Sandringham up to CAA certification standard, which is quite a major undertaking. Three possible homes have been suggested for Southern Cross – Rochester (where she was built), Calshot or RNAS Lee-on-Solent.

Excalibur has been purchased by Edward Hulton who plans to bring the aircraft across to the Mediterranean coast of France and operate it for pleasure flights.

Cloud over Beverley



Threatened: one of only three Beverley s, C.1.XB259, at Hull Paull airfield. (Paul Jackson).

IMMINENT closure of Hull Paull airfield has cast a dark cloud over the continued existence of Beverley C.1 XB259. Only two other Beverley s exist, XH124 at the RAF Museum, Hendon, and XB261 at the Historic Aircraft Museum, Southend.

The giant Beverley is owned by North Country Breweries who bought it from the now defunct Court Line at Luton. Court Line had originally hoped to use the cavernous aircraft to fly RB.211 engines about for their TriStars, but the plan fell through.

The brewery wanted to turn XB259 into a bar and disco for use by Hull Aero Club and, with some difficulty, the Beverley flew in on March 30, 1977. No work was carried out and the machine is nothing more than a unique landmark destined for scrap – unless a fairy godmother turns up.

New trio at Yeovilton

LATEST aircraft to go on show at Yeovilton Museum are Harvard 3 EX976, Humber-Bleriot BAPC-9 and Gannet COD4 XA466.

The Harvard was brought in from Portugal as 1657 on September 7, 1979, and subsequently used to provide parts for EZ407 (ex-Portuguese 1656) in its restoration to flying condition. At the end of 1980 1657 was moved to Culdrose for painting in wartime Royal Navy colours. It returned to Yeovilton in January but carried incorrect serial FX976 and a faulty roundel. Before going on public show it will be fully assembled and the painting errors corrected.

Humber-Bleriot BAPC-9 was built as a flying replica for the movie "Those Magnificent Men in their Flying Machines." It is owned by the Midland Air Museum and loaned to the Fleet Air Arm Museum. It had been stored at Wroughton before room could be found in the new Mountbatten Hall, where it takes its place alongside the Short S-27 replica.

Gannet COD4 XA466, coded 777/LM from its final days with 849 Squadron, was flown to Yeovilton on December 12, 1978, and stored until earlier this year. It has now replaced Gannet T5 XG883 which was parked outside the museum in February.

Unfortunately, one expected winter resident, John Fairey's Flycatcher replica S1287, did not make it to the museum. It was badly damaged in an accident at Stockbridge in October, shortly before it was due to fly to Yeovilton.

The original construction team has been brought back into action and it is hoped to have the Flycatcher back in the air later this year.

The wheels up landing of Spitfire T VIII G-AIDN. (Peter March).

Spitfire rebuilds

REBUILDING of RAF Battle of Britain Flight's Spitfire Vb AB910 at Abingdon and Kemble is now well advanced. This aircraft was badly damaged at a display in Switzerland by a Harvard and when first returned to the UK there was some doubt whether it could be restored to flying condition. However, with a great deal of skill and ingenuity, the task is being accomplished.

Use has been made in the rebuild of parts from Spitfire Vb BL614 (really AB871), from St Athan, and long-term resident Spitfire IX MK732.

Another accident victim, Spitfire T VIII G-AIDN, is beginning to look a lot healthier at Coventry. It suffered damage in a wheels-up landing at Baginton on February 6, 1978 shortly after it had been sold by long-time owner and air-show flier John Fairey. Both of these aircraft will hopefully be back on the air display scene before the year is out.

Flying within a year – Messenger RH378. (Peter March).

Messenger progressing

COTSWOLD Aircraft Restoration Group, based at RAF Innsworth, Glos. has recently announced that its first major project, the restoration of 1947 Miles Messenger RH378 to flying condition, is progressing well. It is hoped that it will be back in the air within 12 months.

After C of A expiry in March 1977 the Mesenger languished for nearly three years, dismantled in a hangar at Staverton, until owner Mike Collins contacted the newly-formed Cotswold Group to see if they would be interested in getting it airworthy again.

RH378 was manufactured at Newtownards, Northern Ireland, and first registered as G-AJOE on April 28, 1947. It was first painted in RAF colours in 1975 by Jim Buckingham at Bristol and operated alongside RG333/G-AIEK from Staverton at air displays for a couple of years.

Whirlwind phase-out

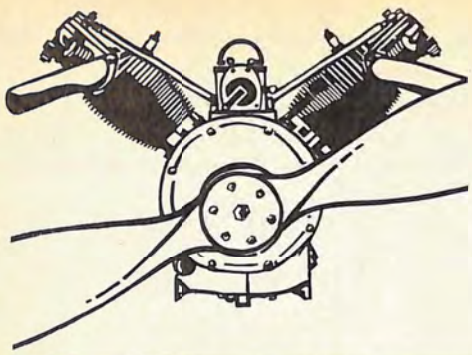
MUCH of the news at present appears to be associated with the comings and goings of helicopters. Apart from movements around museums, the Royal Air Force is currently phasing out the venerable Whirlwind HAR.10.

In December, RAF Shawbury retired the Whirlwind fleet of No. 2 Flying Training School and some have ben earmarked for museums. Helicopters always hold a fascination for the public and are a popular display item. From a museum's point of view they are readily portable and, because of their high manganese content, rarely hold a high scrap value.

Norfolk and Suffolk Aviation Museum have been allocated XR485 and this will become the second rotorcraft at Flixton. The first was a Bensen Gyroglider, BAPC 147, acquired in 1978. XJ726 has been secured by the newly-formed Nene Valley Aviation Society which has premises at Sywell. Apart from the Whirlwind, they are currently working on the restoration of Luton Minor BAPC 97 on behalf of the North East Aircraft Museum.

Skeeter AOP.12 XN351, on display at the Torbay Aircraft Museum since 1971, has moved for the 1981 season to the Wales Aircraft Museum at Cardiff (Rhoose) Airport. The WAM collection has been growing steadily at its expanding site and XN351 joins a Whirlwind HAR.10 (XJ409), a Whirlwind HAS.7 (XG592) and a Dragonfly HR.3 (WA718) as well as some twenty fixed wing exhibits.

Left: Whirlwind HAR3 XG577 now at East Midlands Airport. (Peter March).



DAIMLER-BENZ 601: A MOTOR DEVELOPED TO EXHAUSTION

ENGINES BY LJK SETRIGHT

When it sprang fully competent from the brow of some Teutonic Minerva in the 1930s, the DB600 Series of aero engines seemed a high speed phenomenon in every applicable sense. It was right from the start, one of those designs so beautifully and thoughtfully worked out as to need very little development.

Such development as it first enjoyed was essentially special-purpose work, so that by the end of 1939 the DB601 was by a long way the fastest engine ever to have flown; and by the end of 1940 it had shown itself no less phenomenal in its rugged dependability for every kind of battle conditions.

Things had moved fast up to that time, but for people accustomed to Blitzkrieg technology things must thereafter seem to have taken a gloomy turn towards protraction, for the next generation of high-power aero engines was planned to go into quantity production as late as 1948.

That left plenty of time for the virtues of the DB601 to be extrapolated or exhausted, and Daimler-Benz engineering in the war years was mainly devoted to doing just that. Virtually all subsequent production engines were essentially similar to the DB601, varying only in size and very occasionally in the number of cylinders.

Their variety was none the less formidable as the company pursued their ideals of having an engine for every requirement, superficial though the differences might be. There were, for example, 62 different versions of the DB603 which was the next significant engine to follow the 601. The most accomplished of these versions found their way into the Focke Wulf FW190, an aircraft whose high performance made it a thorn in the flesh of the allies for some considerable time.

The first versions of this fighter, which many authoritative people considered the finest of the genre ever to have been produced, had BMW 801 radial engines; later ones looked as though they were radial-powered too, but in fact they concealed in their elongated noses an in-line inverted V12 DB603 with an annular radiator around its nose to achieve excellent aerodynamics and a nice line in deception.

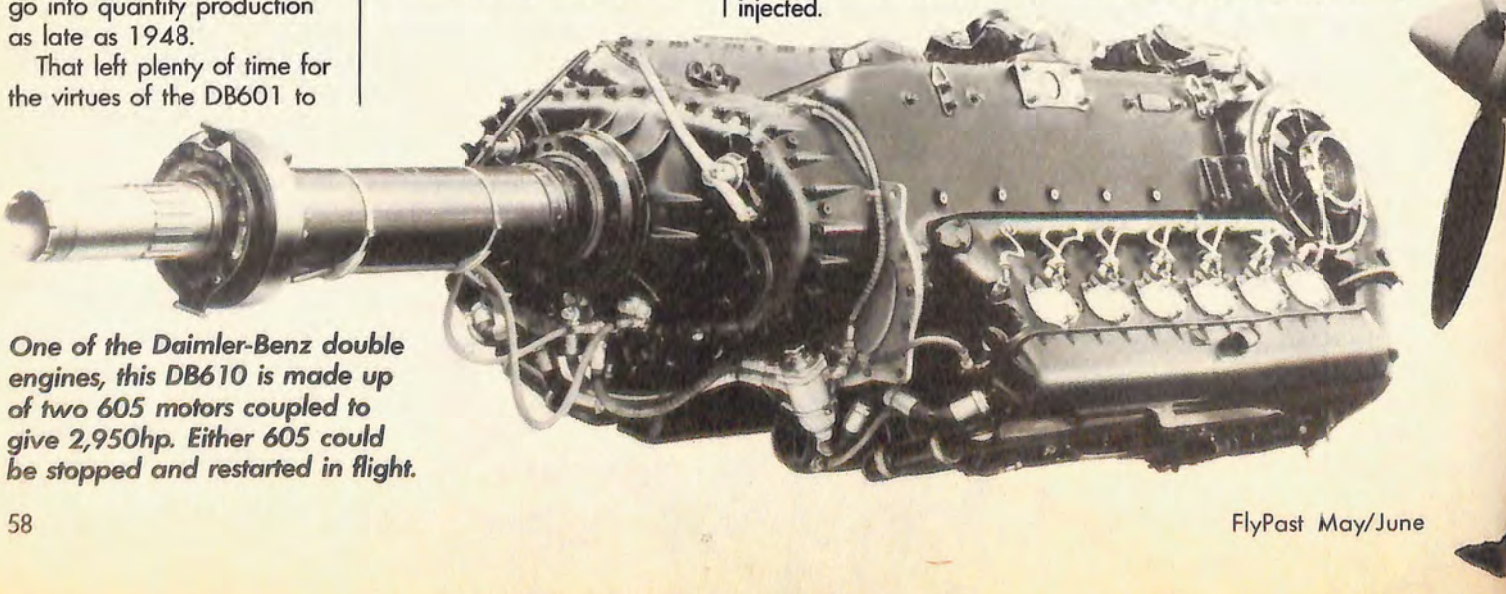
Late 190s with the higher-powered variants of the DB603 could reach 450mph at 23,000ft, while some less highly rated versions of the engine nevertheless produced a tremendous performance in combat emergency conditions by making use of nitrous oxide injection.

This was a considerable advance on the water-methanol injection widely used by all the powers. The injection of those fluids had evaporative internal cooling as its principle virtue, but temporary power boost at high altitudes could be much more substantial if oxygen-rich supplementary fuels were injected.

The Germans originally pursued this line of thought by experimenting with liquid oxygen kept under pressure in suitable tanks and injected into the eye of the supercharger as and when desired. This gave results that were not always predictable or even desirable, and later in the war they developed nitrous oxide injection instead.

The British had done likewise, the idea first being proposed in England by Sir Ralph Merton; the German system, designated GM1, produced similar results to ours. It was used above the rated altitude of the engine, when nitrous oxide (retained under presure in liquid form) could be injected into the supercharger, furnishing additional oxygen for the engine to burn as well as acting as an anti-detonant.

The system was mainly used in conjunction with the DB603E engine which powered the Focke Wulf Ta 152B fighter – a late version of the GW190 incorporating



One of the Daimler-Benz double engines, this DB610 is made up of two 605 motors coupled to give 2,950hp. Either 605 could be stopped and restarted in flight.

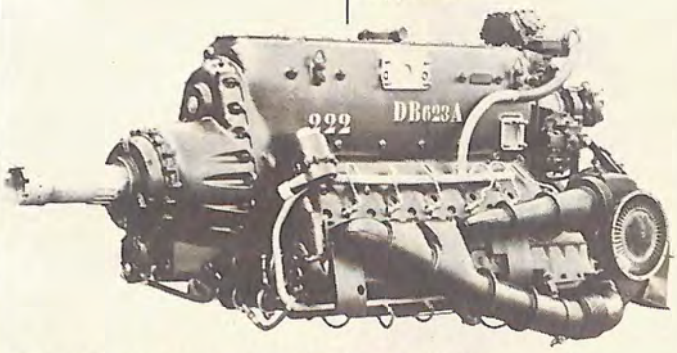
a designation identifying its designer, the brilliant Kurt Tank. With an injection of 13.2 lb of nitrous oxide per minute, the engine gave another 350hp at 32,800ft.

Another Daimler-Benz speciality to make its first appearance in the 603 lists was the twin engine, a device that was to become very popular as the war progressed and new heavy aircraft created a demand for particularly high power outputs. Instead of spending a couple of years and a small fortune developing some new big banger, they simply joined two existing ones together like Siamese twins, coupling them into a common gearcase from which sprouted a single drive shaft. For a start they joined two DB603 engines together, making an 89-litre engine that developed 3,500hp at a rated altitude of 45,000ft.

The DB604 showed that they were capable of trying things another way. This engine was first built in 1939 in fact, and production was stopped in September 1942, but it was very interesting as an example of a type that many other manufacturers had tried and failed to make to work – Rolls-Royce included.

It had 24 cylinders, each of a size rather smaller than was usual in Daimler-Benz practice, and they were arranged in an X formation about a single crankshaft. This ran at quite high revolutions to give respectable power, and the engine was notably light at 0.68lb per horsepower. It was also blessed with a very good fuel consumption, and the lessons it taught were remembered with evident fondness by Daimler-Benz when they embarked on their design studies for the next generation of really powerful engines.

Before this came about there were to be several more variations on the classic inverted V12 theme. The DB605, for example, was smaller than the 603, but was built in greater quantities than any of the others. Some statistics are interesting in this connection: from the introduction of the DB600 back in 1934, Daimler-Benz built fewer service engines than might have been supposed:



When the DB603 was turbocharged it became the 2,000hp DB623.

Above: To the left of this Heinkel He118, on which the DB600A engine is laid bare, stands a Junkers Ju52 which served as a flying test bed for the DB600.

DB600	2,281
DB601	19,322
DB602	12
DB603	8,758
DB605	42,405
DB606	820
DB610	1,070
DB613	26
HZ-Anlagen	120
Miscellaneous	82

This makes a total of 74,896 engines, including nearly 2,000 double engines. For an organisation supposedly gearing itself up for full-scale war production since 1934, that is not many – especially when compared with the 150,000 Merlins built by or for Rolls-Royce outside the USA.

A further comparison is in retrospect perhaps more amusing than instructive. The 605, being by German standards a relatively small affair, they found it possible to substitute it for the original Merlin in a Spitfire 5 that they captured. Test pilots averred that the Spitfire thus powered was a greatly improved aircraft, handling better as well as having more superior performance. No doubt this was just what the employers wanted to hear, and the same presumably applied to the British verdict that the Me109 became a far better aeroplane when a Merlin was fitted to a captured specimen.

Of all the other engines in the DB list, the most significant was probably the DB609. This and the 604 represented the first steps taken along the road to a new generation of engines of really high power. It was in 1943 that a directive was issued to the effect that the

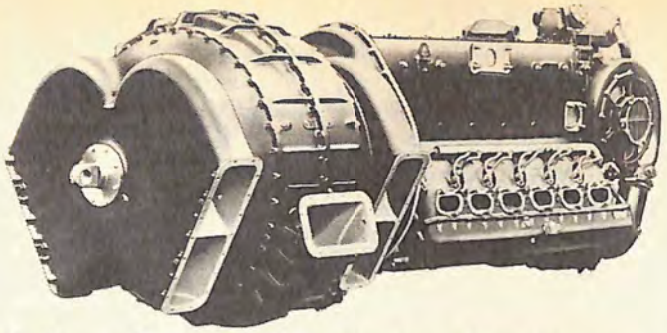
Below: Germany's first air speed record fell to this Heinkel He100 V8, powered by a sprint version of the V12 DB601 engine.

engine manufacturers should begin to evolve a class of engines which would start at about 4,000hp and extend, with coupling if necessary, up to 10,000. These figures imply an extraordinary confidence in their ability to design airscrews capable of absorbing such power outputs – but there was plenty of time to do so, in view of the schedule proposed by the directive. Construction of the DB609 was planned to begin on April 1, 1944, the first prototype being run on the bench on January 1, 1945, pilot production to begin on April 1, 1947 and quantity production on July 1, 1948.

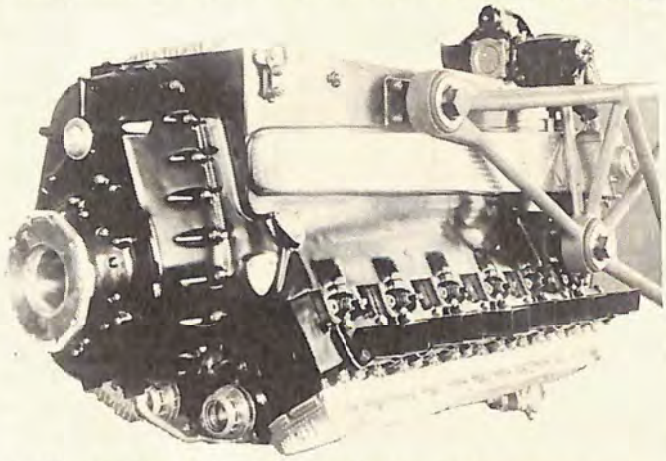
Daimler-Benz had obviously had wind of this directive in advance of its promulgation, for they actually built some prototypes of the 609 in 1942 and 1943. These gave a decent performance, as much as 3,400hp at rated altitudes up to 39,000ft; more remarkable was the high-altitude version, the DB629, which in 1942 was rated at 3,000hp for 49,000ft or 2,650 for no less than 56,000.

Flying 10 or 11 miles high was very much a German speciality: the Luftwaffe was extremely keen on very-high-altitude operation, especially for reconnaissance aircraft, and all sorts of ingenious measures were taken to provide the necessary engine performance despite the rarefied atmosphere up there.

The HZ-Anlagen system was one such, being used in a high-altitude Henschel HS130 E-O and in the Dornier 217 PV1. The idea was to have two engines in the customary wing nacelles to drive the airscrews, each of them a DB603 producing 1,750hp at 44,000ft. Buried in the fuselage was a third engine, a DB605T, the sole duty of which was to drive a supercharger which fed the tractive engines through large intercoolers. There was an alternative layout involving a DB603 providing the boost for a pair of DB614 engines.



The heart of the HZ-Anlagen system, a DB605T engine driving massive superchargers to serve a brace of DB603s.



This F4 engine, built at the beginning of the 1930s, was the first inverted V12 upon which Daimler-Benz based their 600 series.

Even more sophisticated arrangements were devised to use a trio of DB627 engines (which were the same size as the 603) with 2-stage supercharging, either with both stages mechanically driven, or else following the American pattern of having the first stage as an exhaust turbocharger and the second stage as a positive-drive blower.

Daimler-Benz were very keen on their DB627, a 2,000hp engine which they used as a yardstick for comparing the performances of competing engines when they set about designing their new generation of mightier motors in 1943. It and the DB609 were thought to be the twin pinnacles of their achievement so far – but even 3,400 in the DB609 was a long way short of 4,000 especially when 4,000 was being advanced as the bottom limit of the new class.

Daimler-Benz were not the only people engaged in design studies. The Deutsche Versuchsanstalt fur Luftfahrt or DVL, the German equivalent of the Royal Aircraft Establishment, had their own ideas, proposing an H engine of 32 cylinders totalling 66.5 litres, running up to 3,500rpm to produce 3,750hp. Daimler-Benz put up four designs, one of which (the DB613, which was one of their doubles) was clearly inadequate in its 3,500hp from 89 litres. The DBX24 had the same number of cylinders of the same capacity, but by running them all on a common crankshaft and at a somewhat higher speed it was expected to generate 4,200hp at 3,000rpm, thus demonstrating the value of their earlier experience with the DB604.

More complex still was a DB630, in which no fewer than six banks of six cylinders were focussed on a common crankshaft to wring 4,000hp out of 88.2 litres, but the efficiency of this engine was almost as depressing as that of the DB613. Finally came the DBH24, a vertical H twin-crankshaft 24-cylinder engine of 89 litres developing 4,000hp at 2,850rpm; and if Daimler-Benz were capable of taking the hint, this should have been the preferred design, resembling as it did the 'official' proposition from the DVL.

Daimler-Benz even built a smaller engine in order to gain experience, an H16 of only 33.2 litres, yet developing 2,000hp – half the size of the DVL, and more than half as powerful.

Then BMW came along and made them all look silly. They simply took two of their 14-cylinder radials, joined them on a common axis, and produced the 803, an engine that developed 3,950hp without any increase in frontal area compared with the basic engine. It was not even a design study, it was an engine which was built and which worked.

The one thing that didn't work was that time schedule: the allies presumably were working to a different one, and as things turned out most of these ideas for the future of German aviation never got any further than the archives where I found them.

Instructions were issued for all work on the new class of engines to be suspended forthwith in the summer of 1944. The reasons were basically two: in the first place the war going the wrong way for Germany and in the second, gas turbines were showing such extraordinary promise that any demand for high-powered piston engines seemed sure to fade.

The Germans were naturally not the only ones to recognise these two trends; if they appear to be have done so earlier than anybody else, they were in a better position to do so than anybody else.

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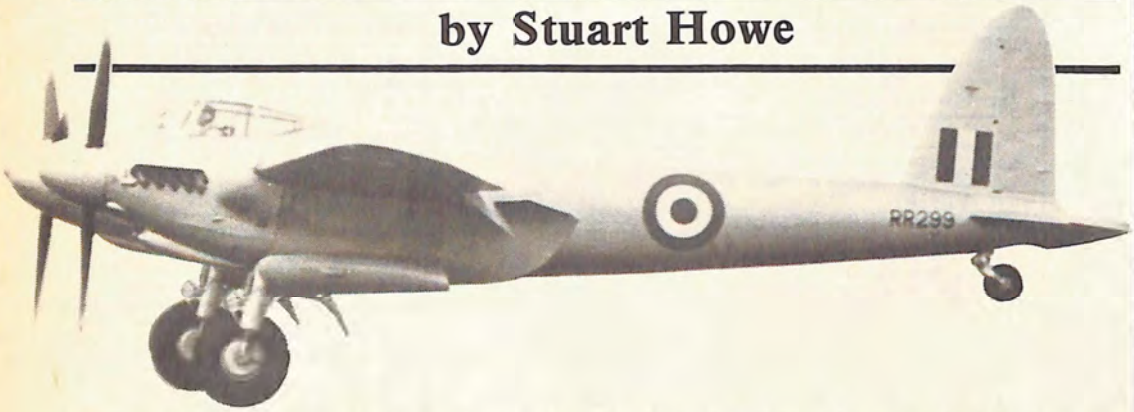
Last Of The Mosquitos

by Stuart Howe



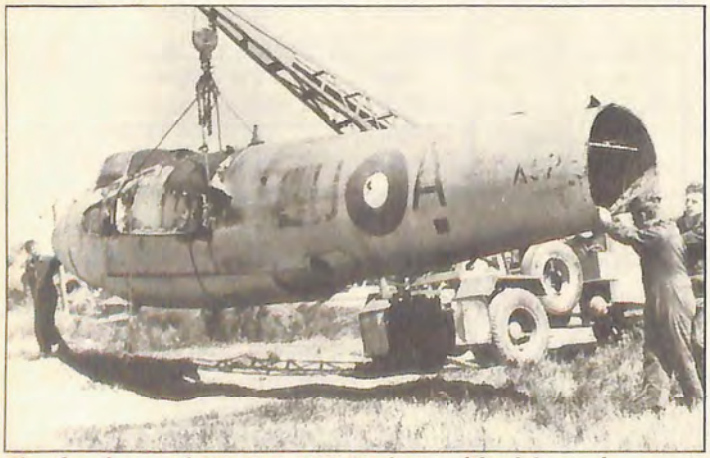
REVILED at design stage, the de Havilland Mosquito developed into one of the most versatile and deadly aircraft of World War II. It could fly high and fast and deliver a bomb load with great accuracy. Furthermore, its wooden construction allowed it to be built in furniture factories dotted all round the country and field repairs were relatively easy.

Despite the ravages of time, quite a large number of Mosquitos survive and new discoveries are being made each year. The following is a world-wide catalogue of those that are known to be intact or nearly so.

Australia

Mildura, Victoria

At Mildura Airport, the Warbirds Aviation Museum has ***PR XVI, NS631.*** Hatfield-built in late 1944 it was shipped to Australia and allocated serial A52-600. The aircraft joined 87 Squadron, coded SU:A, at Coomallie Creek on March 1, 1945, and completed 20 missions over enemy territory.



The fuselage of PR XVI NS631 being lifted from the spot where it had rested for 12 years. It is now at Mildura Airport Museum in Victoria.

On July 21, 1947, it was issued to the Air Ground Radio School at Ballararat, Victoria, and finally disposed of in 1954 to lay outside for 12 years until bought by curator Pearce Dunn. The wings and tail had been sawn off, but these were recovered. Only the fin and tailplane have so far been restored.

Sydney, New South Wales

At Lidcombe, the First Year Apprentices of Hawker de Havilland Australia Pty Ltd are restoring ***PR41 A52-319*** for the Australian War Memorial. This Mosquito started life as an FB40 and was allocated to the RAAF as A52-210. But during construction, PR41 modifications were carried out and a first flight on January 29, 1948, was followed by storage.

The aircraft was bought by Capt James Wood, of Perth, in 1953 and put on the civil register as VH-WAD. His idea was to enter the 1953 London-Christchurch Air Race, but unable to find a sponsor, he withdrew. The machine was stored in a hangar for eight years before being put outside at the mercy of vandals who removed some 234 items.

Legal problems stopped her from making a safe home in America and she spent ten years in a Melbourne shipping agent's yard, suffering further extensive damage, including a broken back. The Australian War Memorial paid 21,000 dollars for the remains at auction in January 1979 and restoration work has commenced. When completed, it will go on display in a new building at Mitchell, Canberra.

Narellan, New South Wales

Here at the Camden Museum of Aviation, ex-DHA employee G H Thomas stores the remains of ***FB.VI HR621.*** Coventry-built in 1944, HR621 was shipped to Australia to join 618 Squadron early in 1945 and was possibly equipped for 'HighBall' operations. Sold for scrap to a farmer, the aircraft sat in the open for the next 25 years until purchased by Thomas. Many parts are needed, including a good fuselage, and at the time of writing restoration had not commenced.

Belgium

Brussels

The Musee de L'Armee are proud of their unique ***NF30.*** Built at Leavesden in 1945, it was sold to Belgium in October 1951 and allocated the serial ***MB24.*** It flew with the 10th Belgian Wing, coded ND-N, until retirement in 1956 and subsequent transfer to the museum in 1957. A small team led by Pierre Hofmans is at the moment refurbishing MB24, which is virtually complete except for exhaust stacks and radar equipment.

Canada

Calgary, Alberta

At the airport, the Centennial Planetarium stores ***B.35 RS700/CF-HMS.*** Built by Airspeed early in 1946 it was passed around a number of

M.U.s until returning to the manufacturers for conversion to PR standard in February 1951. It joined 58 Squadron until April 30, 1954, when it was put up for disposal and sold to survey company Spartan Air Services Ltd., of Ottawa. After modifications it worked until 1964, was then sold privately and in 1972 donated to the Planetarium.

RS700 is still in store and in good condition. The intentions are to get it back into the air again, but this is not expected until 1990!

Edmonton, Alberta

At Chipman, another ex-Spartan ***B.35 VP189/CF-HMQ*** is being restored to static condition and was a late production machine built by Airspeed in 1947. After retirement in 1966 it was acquired by 418 (Reserve) Squadron RCAF in 1969 and displayed at the gate of the Nameo base. Here it was badly vandalised, and suffered a broken back before being put under cover. Restoration was started by Bill Harvey with the aim of eventual exhibition at the city's museum.

Kapuskaping, Ontario

With Don Campbell and colleagues of 647 Squadron Canadian Air Cadets lies ***B.35 VR796/CF-HML***. Airspeed-built in 1947, it was sold to Spartan in December 1954 and fitted with dual controls for pilot conversion. Campbell's aim is to make VR796 airworthy and for several years now it has been undergoing a thorough rebuild. The fuselage was completely stripped out, all worn components replaced, and finally given a new fabric with 14 coats of dope. The wing had fared better but needed a new skin and leading edges.

Mission, British Columbia

With Mike Meeker is ***B.35 TA717***, which was a long-term resident behind the Holiday Inn Hotel in Mexico City. Built at Hatfield early in 1945 it went into storage until sold in May 1956 to Cloux Clam Imports in the USA and, registered XB-TOX, undertook the first aerial reconnaisance work in Mexico.

The aircraft's full history is not yet known, but it ended up behind the Holiday Inn Hotel, somehow becoming involved in a divorce case which stopped the Confederate Air Force and other customers from buying it. Meeker finally secured the aircraft for 6,000 dollars in August 1979. By then large parts of the fuselage had rotted through and it literally fell apart during dismantling. Mike is determined to restore TA717 with the help of Anglo-American Cedar Products, of Mission, and estimates it will take five years.

Richmond, British Columbia

Canadian-built ***FB26 KA 114*** was discovered by Ed Zelesky in 1976 on a prairie farm in Alberta and acquired for his Canadian Museum of Flight and Transportation in Richmond. The aircraft was completed in Downsview in early 1945 and served with 7 OTU at Digby before being struck off strength on April 13, 1948. One report claimed that it had force landed on the farm, but in any case it is in poor condition. In 1979 Meeker and Zalesky joined forces to rebuild their Mossies.

Rockcliffe, Ontario

The National Aeronautical Collection has an immaculate Canadian-built ***B.20 KB336***. Taken on charge by the RCAF on June 12, 1944, it was soon put into store and in 1946 relegated to an instructional airframe before being allocated to the Collection. All KB336 required was a tail wheel and tyre – and these were finally delivered to the doorstep by a man who said he'd bought them from a surplus sale but never used them!

New Zealand

Ardmore, Auckland

The Museum of Transport and Technology's ***T.43 NZ 2305*** is undergoing a major rebuild led by Peter Dingwell. Initially she was laid down as an FB.40 at Bankstown, serial A52-19, but was modified as a T.43 with the new serial A52-1053. Taken on charge by the RAAF on August 6, 1946, it was put into store until sold to New Zealand and operated by 75 Squadron. In 1955 NZ 2305 was sold to a Marton farmer who, 12 years later, donated the now dilapidated Mosquito to MOTAT.

When dismantled the fuselage fell apart, but after some hard work by Dingwell and his team it has been restored to excellent condition. The wings had been cut outboard of the engines and although the centre section is in a reasonable state, the ends of the spars have rotted and may have to be replaced. Other parts still required include a number of cockpit fittings, one Merlin engine and props.

Christchurch

At one of their stores, Ferrymead Aviation Society has the remains of two ***FB.VIs*** including wings, nacelles, undercarriage, cowlings and drop tanks from ***HR339/NZ2382*** and the fuselage of ***TE758/NZ2328***. The aim is to complete one Mosquito.

HR339 was Standard Motors-built and joined the RAF in July 1944, serving with 487 and 16 Squadrons before emigrating to New Zealand late in 1947. TE758 went straight into store in August 1945 until flown to New Zealand where it served with 75 Squadron before disposal to an Oamaru farmer in 1956. All of the parts are in fair condition but, due to lack of space, very little work has been undertaken apart from re-storing the tail surfaces and undercarriage.

Also in the Christchurch area is another ***FB.VI*** awaiting restoration, this time in the hands of Ted Packer and his son Gray. The fuselage is that of ***TE863/NZ2355*** and was delivered into storage from Standard Motors in October 1945. It went to New Zealand in July 1947 and after little service was sold as scrap in the mid 1950s. Packer also has wing parts from ***RF597/NZ2383*** which served with the Banff Wing in 235 Squadron.

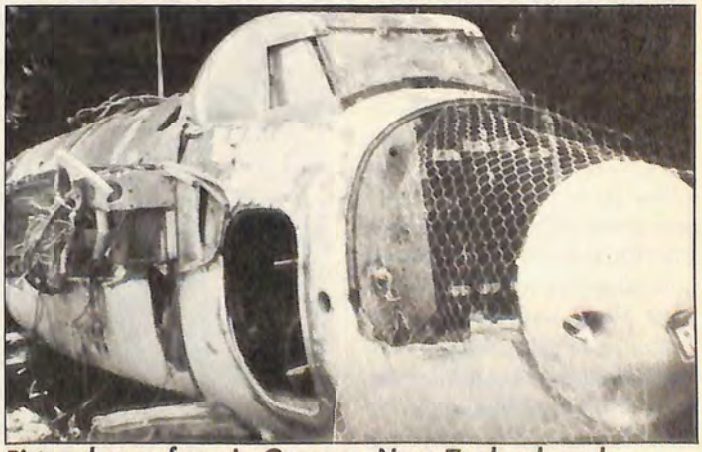
Nelson

With enthusiast John Smith is ***FB.VI TE910/NZ2336*** which is complete and in good condition. Standard Motors-built in 1945, it was sold to New Zealand, arriving in April 1947, served with 75 Squadron until June 1955 and was then sold to Smith. It seems that the fuselage was cut behind the wing's trailing edge, presumably to facilitate transport.

South Africa

Johannesburg

The South African National Museum of Military History at Saxonwald displays the unique



Pictured on a farm in Oamaru, New Zealand, and looking as if it is part of a chicken run, this FB.VI TE758 is now being restored by Ferrymead Aviation Society.

PR.IX LR480. Hatfield-built in 1943, it was flown to the Middle East, issued to 60 Squadron SAAF at Foggia, in Italy, and saw operational service over the Balkans and Australia. After an abortive attempt to break the Cairo to Pretoria speed record in December 1944 it was damaged in a forced landing, repaired and donated to the museum. It is well preserved and displayed on stilts.

Great Britain

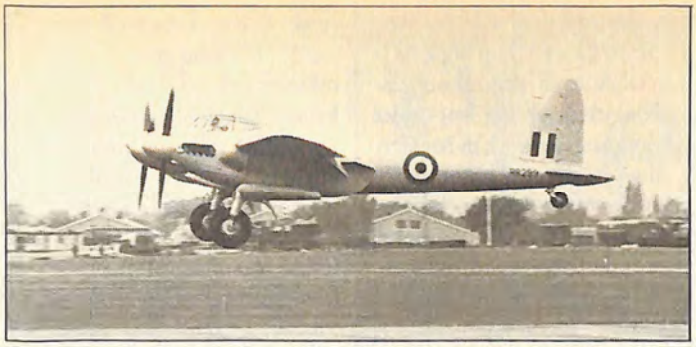
Auchterarder, Perthshire

At Strathallan airfield is kept one of the three airworthy Mosquitos, ***B.35 RS712.*** Built at Christchurch by Airspeed in 1946, it travelled to several M.U.s before being converted to a target tug at Brooklands Aviation, Sywell, in November 1951, and delivered to 1 Civilian Anti-Aircraft Co-operation Unit at Hornchurch in December 1953. Then followed a period in Germany and with 3 CAACU at Exeter where it served until sold to Mirisch in 1963 to star in the film '633 Squadron.'

Afterwards it was bought by Group Capt H A Mahaddie. In 1968 it was refurbished for the film 'Mosquito Squadron' and later bought by Sir William Roberts for his collection at Strathallan. The collection is due to be sold, so it looks as if RS712 will once again be on the move.

Blackbushe, Hampshire

At Doug Arnold's fledgling Warbirds Museum is airworthy ***B.35 RS709.*** Built at Christchurch early in 1946, it was stored until May 1952 and delivered to Brooklands for TT conversion. After a period with 236 OCU it was again stored until allocated to 3 CAACU in June 1956 and remained at Exeter up to July 1963. Then it was purchased by Mirisch for '633 Squadron', passing on to Peter Thomas, of the Skyfame Aircraft Museum, at Staverton. In 1971 it was sold to America, but due to engine problems did not fly again for several years. In 1979 it was bought by Arnold and flown back to England on November 28 to join his collection. A complete overhaul has been undertaken.



One of only three airworthy Mosquitos, TIII RR299, which is owned by British Aerospace and flies regularly at air displays.

Chester, Cheshire

Britain's third airworthy Mosquito is ***T.III RR299,*** kept in superb condition by Harold Robins and helpers at the British Aerospace factory at Chester. Originating from Leavesden in early 1945, it was delivered to 51 OTU before being flown to the Middle East, possibly with 114 Squadron. After a year she returned home, toured a few M.U.s, joined the Home Command Examining Unit at White Waltham and in April 1959 went to 3 CAACU.

Since a transfer to de Havilland in July 1963 it has flown regularly at air displays and also starred in 'Mosquito Squadron'. British Airways test pilots Ron Clear and Chris Capper are the usual custodians.

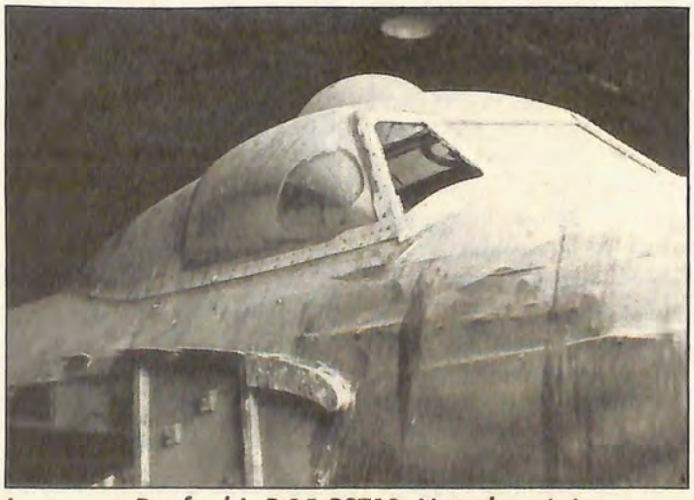
Cosford, Shropshire

Resident here is ***B.35 TA639*** which left Hatfield early in 1945 and became another Brooklands Conversion during 1952. Passing through Aldergrove, 3 CAACU and the Central Flying School at Little Rissington, TA639 settled with the RAF Museum, first at Henlow and then Cosford. A minor refurbish has recently been completed.

Duxford, Cambridgeshire

This famous airfield houses ***B.35 TA719*** which was built at Hatfield in 1945 and stored right up to a Brooklands TT conversion in August 1953. After a spell with Exeter-based 3CAACU it became another '633 Squadron' leading lady and was subsequently acquired by Peter Thomas for his Skyfame Aircraft Museum at Staverton.

A landing accident in July 1964 smashed the port wing and left a large hole in the nose. Some equipment was stolen from the stricken aircraft but repairs were undertaken, including the fitting of a dummy wing. Re-painted in the markings of Air Vice Marshall Bob Bateson, TA719 was selected for crash sequences in 'Mosquito Squadron' but again became the target for souvenir hunters. The machine is now in store until restoration can begin.



In store at Duxford is B.35 RS719. Note the missing quarter light and broken outer skin of the perspex side panel – both items now extremely difficult to find or make.

London, South Lambeth

At the Imperial War Museum is displayed ***T.111 TV959,*** a 1945 Leavesden product. After serving with a number of units, including 13 OTU, 266 Squadron, 54 OTU and 228 OCU, the aircraft went to 204 Advance Flying School in July 1951. It was damaged at the school and went on to Home Command Examing Unit and 3 CAACU. For display purposes in the IWM, the starboard wing has been removed inboard of the engine.

London, Hendon

One of the RAF Museum's three 'Mossies' is displayed here in the form of ***T.111 TW117.*** Built at Leavesden early in 1946, it was delivered from 15 MU to 2 Armament Practice Station at Acklington in July 1947 goirg on to Linton-on-Ouse, 204 Advance Flying School, 58 Squadron and 3 CAACU. After taking part in '633 Squadron' it was placed in the RAF Museum collection at Henlow and then Hendon.

London Colney, Hertfordshire

The Mosquito Aircraft Museum at Salisbury Hall has no fewer than three Mosquitos and part of a fourth. But pride of place goes to the prototype ***W4050.*** Designed and constructed at Salisbury Hall during 1940, W4050 made her first flight at Hatfield on November 25, piloted by Geoffrey de Havilland jnr.

Post-war, W4050 appeared at the 1946 SBAC show at Radlett and was finally struck off on June 21, 1947. It was

The author's pet project, FB.VI TA122, arriving at Salisbury Hall after being donated by the Royal Netherlands Air Force Museum.

dismantled and stored for a while, finally coming back to Salisbury Hall at the Instigation of Walter J Goldsmith who had taken over ownership of the house. When officially installed in a personal hangar on May 15, 1959, Britain secured its first aircraft museum. Painted in the all-yellow scheme that it originally wore in 1940, W4050 must rank as the most historic aircraft in Britain today.

Built at Hatfield early in 1945, ***TA634*** was delivered into store and got the TT treatment in 1952. Between then and 1963 it travelled to 4CAACU at Llandow, the Armament Practice Station at Sylt, Germany, and 3 CAACU. Liverpool Corporation bought the aircraft for display at Speke Airport, but plans were shelved and TA634 next saw the light of day flying for 'Mosquito Squadron'. Afterwards it was donated to the Mosquito Aircraft Museum, dedicated as a memorial to Group Capt P C Pickard who led the raid on Amiens jail. Replacement of brittle fabric is proceeding.

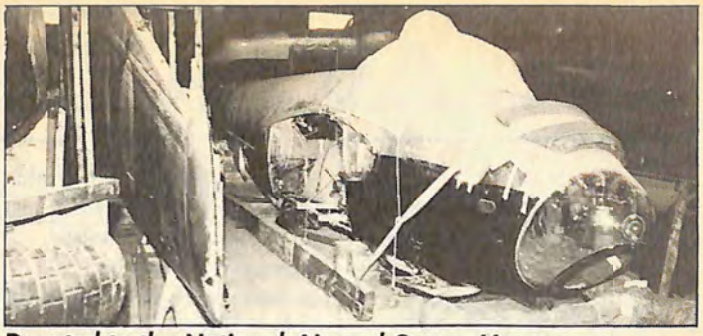
The museum's third Mossie is the writer's own project, ***TA122*** being the only ***FB.VI*** extant in Europe despite being the most widely produced of all versions. After leaving Hatfield early in 1945, this machine joined the famous 605 Squadron intruder unit at Coxyde, Belgium. When they re-formed as 4 Squadron, TA 122 moved with them to Gilze-Rijen and then Gutersloh, West Germany.

Retired in 1950, the wings were sawn off and the fuselage donated to Delft Technical College, Holland, as an instructional airframe. It finally arrived at Salisbury Hall early in 1978 and the intention is to produce a complete aeroplane again.

Also at Salisbury Hall is the nose section of ***B.35 TJ118,*** an ex-target tug which was relegated to a spares airframe after an accident. The nose was severed to shoot the cockpit sequences in '633 Squadron'. Almost ten years later, nose and fuselage were rescued from MGM's Elstree Studios by Eddy Reynolds. Members of 220 Squadron Air Training Corps are restoring the nose, while David Elvidge shelters the fuselage at his home near Oxford.

Swinderby, Yorkshire

In store here for the RAF Museum is ***B.35 TJ138*** of Hatfield 1945 vintage. The aircraft was issued to 98 Squadron at Celle in 1950 but soon returned to the UK and was given a TT conversion in 1953. It became an instructional airframe for 71 MU at Bicester in 1959, later joining the RAF collection at Colerne, Finningley and Swinderby.



Donated to the National Air and Space Museum at Washington in 1962, this B.35 TH998 has remained in store ever since.

York, Yorkshire

On the outskirts of York, Tony Agar is doing a back garden rebuild on ***NF.II HJ711,*** which is in fact made up of parts of several Mosquitos. It all began in 1969 with a few small items from wrecks, but in 1972 he picked up HJ711's nose and rudder at auction for £7. Since then Tony has travelled many hundreds of miles, scavenging bits of wings from Chorley, Lancs, and St Davids, South Wales; a pair of Merlins from a Midlands scrapyard; and the fuselage of ***B.35 RS715*** from Elstree. Still required are the extremities of nose and tail cones, plus nacelles and some cowlings.

United States of America

Silver Hill, Maryland

The National Air and Space Museum's store and restoration facility near Washington houses ***B.35 TH998***. Built at Hatfield in 1945, it was stored until converted to TT standard in 1952, joined 3 CAACU and declared surplus in 1962. Donated to the NASM, TH998 is dismantled but in good condition.

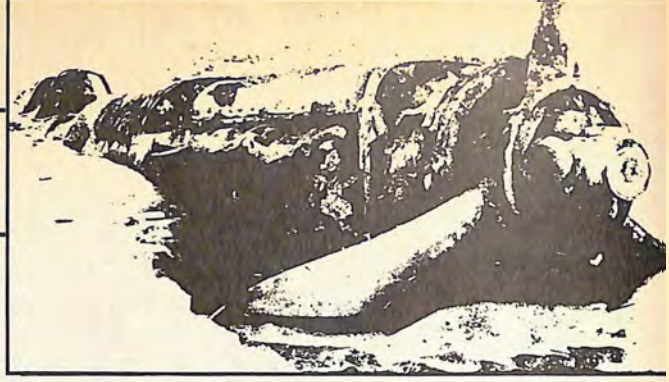
Unusual parking problem! Tony Agar's almost complete fuselage on short stay outside his home. Restoration was carried out in his back garden.

Placentia, California

This sad looking heap is FB.VI PZ474 lying derelict at Whiteman Park, California. It was bought by James Merizan in 1973 and is thought to be under restoration.

In poor condition here is ***FB.VI PZ474,*** owned by James Merizan. After leaving Hatfield in 1945 the aircraft went to 80 OTU in May and 132 OTU in June. It was sold to New Zealand in 1948 and stored until put on the American civil register as N9909F. New owners, Insurance Finance Corporation, kept her at Whiteman Park airfield, California. After cancellation from the register in 1970, the machine became derelict and had its fuselage sawn in two. Merizan acquired what was left in 1973 and was considering the use of plastics in restoration.

● ***Stuart Howe would appreciate any information leading to Mosquito remains. He can be contacted c/o Mosquito Aircraft Museum, Salisbury Hall, London Colney, nr St Albans, Herts.***



In search of extra reading

AS INFORMATION Officer to the BAAC I receive numerous enquiries about specific crashes and requests for details of further reading on the subject.

Over the past few years a number of crash logs have been released, almost all listing aircraft by types, for example, Hampden, Halifax, Mosquito, Defiant and Whitley. Additionally, much information can be gleaned from publications such as the Air-Britain RAF Serial Registers and from their quarterly historic military journal Aeromilitaria.

Aircraft losses on both sides during the Battle of Britain are recorded in great detail in the mammoth title The Battle of Britain – Then and Now which is the definitive work on the subject and, even at £25, is well recommended.

Several of the archaeological groups operating in this country produce their own journals, but not all are generally available. Those that are include the Wartime Aircraft Recovery Group's Warfile, and Wreck Review from the Wirrall-based Warplane Wreck Investigation Group. The BAAC journal Aviation Archaeologist is also available by subscription.

Details of the various journals mentioned here are contained in a BAAC leaflet available from Peter Moran, 'Ryecroft', 154 Hardhorn Road, Poulton-Le-Fylde, Lancashire, FY6 8ES. Please enclose a stamped and addressed envelope.

AS RELICS of the First World War form a very small proportion of the items recovered by aviation archaeologists it is nice to be able to report on significant finds from this period.

An interesting item, netted in the Humber by the fishing boat Courageous II is a French-made 9 cylinder 130hp Clerget rotary engine now being restored by Humberside Aircraft Preservation Society prior to going on display at the Humberside Aviation Museum in Elsham Country Park, Brigg.

Just a few months earlier a badly-corroded Lewis gun was trawled up in the same area and HAPS members suspect the two finds are connected. During the closing months of the First War, Avro 504Ks, powered by the French engines and armed with Lewis guns, were based at nearby Kirton Lindsay airfield.

The Avros of 33 Squadron were tasked with the high-level interception of German airships and some may have been lost in the Humber.

Clerget netted

Above: HAPS members with their Clerget rotary engine – from left to right, Mike Peart, Robin Fletcher, Pete Aird and Ken Morris. (Chris Bridges).

Below: another HAPS project was recovery of this Lockheed Hudson oleo leg and wing section from sands on the edge of Donna Nook bombing range, Lincolnshire. (Chris Bridges/Robin Fletcher

Sands of

IN DECEMBER 1980 reports started reaching Britain of a Spitfire which had begun to emerge from the sands on a French beach. A photograph in the aircraft preservation journal Control Column showed the aircraft, described as a "Spitfire II", to be remarkably intact with wings, engine and propeller in place.

To find out the story behind this new discovery, Andy Saunders, of the Sussex based Wealden Aviation Archaeological Group, travelled to France in mid-January only to find the Spitfire had already been removed the previous weekend.

The wreck had been found ½km east of Calais Hoverport and had been recovered by members of the Hoverport staff. Unfortunately, the airframe, already weakened by corrosion and the weight of sand it held, had been further damaged

Legends of the hills live on

FEW, if any, aircraft relics of the First War period remain on the British hills. But certainly the legends live on to be revived at intervals by the media and often in dramatic form.

The most often quoted tale is about a Sopwith Camel reputedly found in the mountains of Scotland in 1941 during a search for a missing Anson. This story seems to have arisen following an account in an early edition of the Aeroplane Spotter and it has been variously interpreted ever since.

While there is doubtless a basis to some of these stories, most serious archaeologists regard them with extreme scepticism. In any case, after more than sixty years exposure the frail wood and fabric structure would now certainly have disintegrated, leaving just a few rusting metal parts which would be difficult to locate.

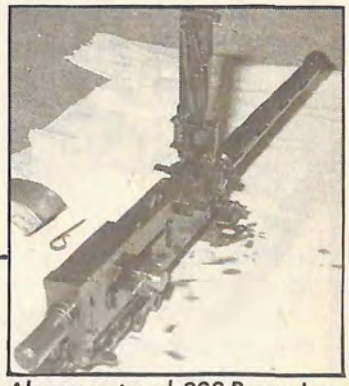
One of the earliest known hill wrecks., incidentally, is that the ANEC IV Missel Thrush G-EBPI which crashed on July 20, 1928, on the Newcastle to Glasgow leg of the King's Cup Air Race. Just a few pieces of this aircraft remain on the summit of Broad Law, near Peebles.

Examples of aircraft lost in the 1930s are more numerous. In the Cumbrian Lake District, for example, the engine and other remnants of a Vickers Vildebeest, K4607 lost by 42 Squadron on June 4, 1937, can still be seen high on Crinkle Crags at the head of the Langdale Valley.

Coincidentally, a Hawker Hind, K6614, crashed at Thomthwaite Crag, above Hartsop, on the following day. The Hind was en route from West Freugh to Hucknall to rejoin 98 Squadron when it struck the steep mist-shrouded fellside and burst into flames, killing both crew members.

When the crash site was last inspected a very smashed Kestrel engine was found along with parts of the metal framework. Stainless steel fittings were in almost perfect condition.

Aircraft wrecks on the high ground of Cumbria include a wide cross-section of types, from biplanes such as the Hawker Hector, Dominie and DH86B to more modern hardware such as a Douglas Skyraider. As usual the most prolific type is the Anson and probably the most unusual a Beech C-45 of the USAAF which flew into Black Combe on March 12, 1947.



Above: restored .303 Browning from the wing of Spitfire P9374. (Andy Saunders).

Below: The wreck of Spitfire I P9374 as it emerged from a beach near Calais. (Andy Saunders).

France release a Spitfire

during a rather brutal recovery operation.

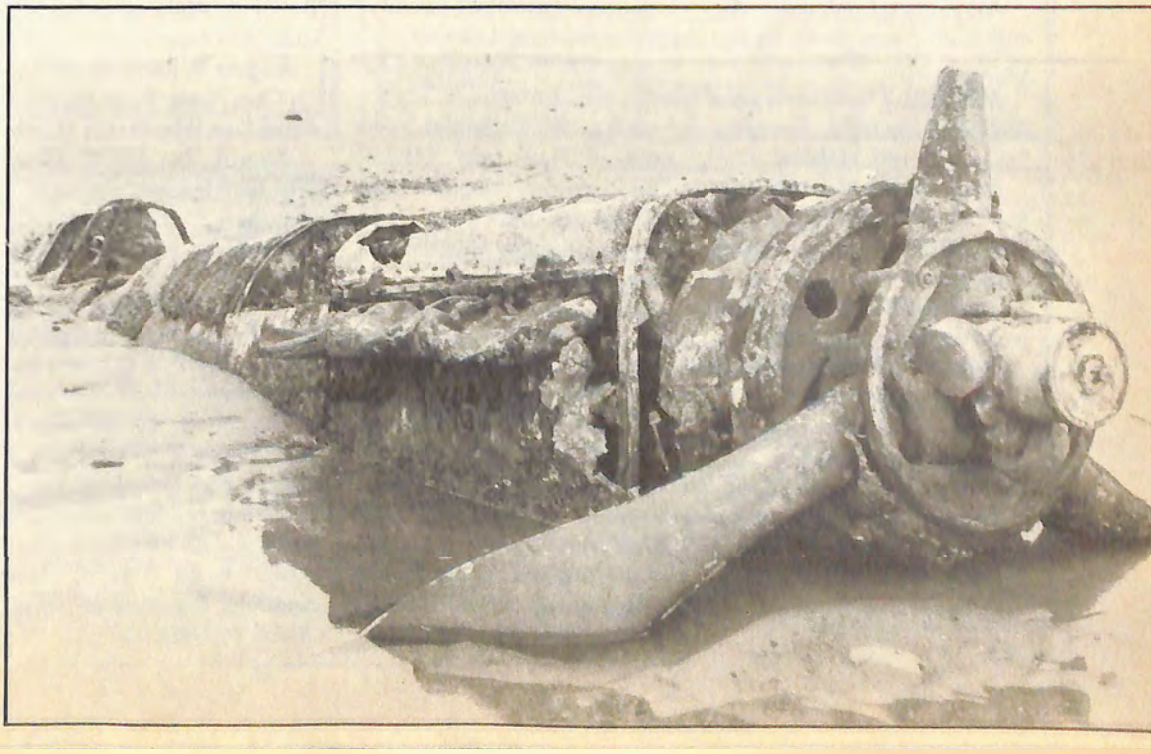
Later, vandals and souvenir hunters had taken their toll. Nevertheless large sections were saved including the engine, wings and cockpit which was still found to contain instruments, the control column, rudder pedals, armour, etc.

Bulk of the Spitfire has now been removed to a Paris museum while the armoured windscreen and its frame have been brought home to England.

The French enthusiasts who recovered the wreck had no idea as to its identity, but soon after arriving at Calais Andy Saunders had found the serial number, P9374, stencilled on a number of components. From this Andy was able to establish that the aircraft, a Spitfire I, was from 92 Squadron, lost on May 24, 1940, while being flown by Flying Officer Peter Cazenove.

P9374 had received several hits in the cooling system which had necessitated a forced landing on the beach. Cazenove had then walked into Calais where he joined up with the army, only to be taken prisoner when the town fell to the Germans next day. Later Cazenove was involved in preparations for the 'Great Escape'.

An ironic twist to the whole story is that Peter Cazenove died on December 7, 1980, unaware that his old aeroplane was just reappearing from the sands which engulfed it 40 years ago.



DATES

April 20: Bank Holiday Flying Display, Shuttleworth Collection, Old Warden, Biggleswade, Beds.

April 26: Popular Flying Association, Fly-in, Henstridge Airfield, Somerset.

May 3: Imperial War Museum, Duxford, nr. Royston, Cambs. Local Flying Day.

May 3: Vintage Aircraft Club, Gemini Patrol formation practice and tea patrol, Finmere, Bucks.

May 9-10: Flower Fly-in, Fenland Airfield, Holbeach St John, Spalding, Lincs.

May 10: Recreational Flying Club, British Aircraft Fly-in, Popham Airfield, nr Winchester, Hants.

May 23/24: Air Fete '81, RAF Mildenhall, Suffolk.

May 23/24: Eglinton Flying Club, Fly-in and Rally, Londonderry, N. Ireland.

May 23-25: Vintage Aircraft Club, Spring Rally, Boston, Lincs.

May 28-31: Experimental Aircraft Association, European Fly-in, Lelystad, Holland.

May 31: Shuttleworth Trust, Military Aircraft Flying Day, Old Warden, Biggleswade, Beds.

June 5-14: Paris Air Show, Le Bourget Airport, Paris.

June 5-7: Gamston Air Fair, Gamston, nr Lincoln.

June 6: Shuttleworth Collection, Flying Evening, Old Warden, Biggleswade, Beds.

June 6: Scottish International Air Show, Prestwick Airport, Ayrshire.

June 7: Vintage Aircraft Club, Vintage Car Day, Finmere, Bucks.

June 14: Imperial War Museum, Vintage Flying Day, Duxford Airfield, nr Royston, Herts.

June 14: SSAFA Flying Day, RAF, Church Fenton, Tadcaster, Yorks.

June 14: Vintage Aircraft Club, Midsummer Picnic, Shotteswell, nr Banbury, Oxon.

June 27/28: International Air Tattoo, RAF Greenham Common, nr Newbury, Berks.

June 26-28: Kinair '81. 9th International Air Rally and Race Londonderry.

June 28: Shuttleworth Collection, The Sporting Flying Scene, Old Warden, Biggleswade, Beds.

July 4: Shuttleworth Collection, Flying Evening, Old Warden, Biggleswade, Beds.

July 3-5: Popular Flying Association, Annual Rally, Leicester East aerodrome, Leicester.

July 10-12: International Air Rally, Isle of Man.

July 12: Air Britain, International Fly-in and Display, Old Warden, Biggleswade.

July 12: Stawberry Fly-in, Fenland Airfield, Holbeach St John, Spalding, Lincs.

July 12: Recreational Flying Club, Biplane Fly-in, Popham Airfield, nr Winchester.

July 17: Society of Amateur Aircraft Constructors, Homebuilders Fly-in, Abbeyshrule, Co Longford.

July 18: USAF Open Day, RAF Upper Heyford, Oxon.

July 18: Air Display, HMS Daedalus, RNAS Lee-on-Solent, Hants.

July 25: Thorpe Park Air Day, nr Egham, Surrey.

July 26: Shuttleworth Collection, Military Air Pageant, Old Warden, Biggleswade, Beds.

July 29: Cornwall Flying Club, Air Day, Bodmin Airfield, Cornwall.

July 29: Royal Naval Air Station Culdrose, Air Day, Culdrose, nr Helston, Cornwall.

August 1: Royal Naval Air Station Yeovilton, International Air Day, Yeovilton, Somerset.

August 1-8: Experimental Aircraft Association, Oshkosh '81 Fly-in, Wittman Field, Oshkosh, Wisconsin.

August 9: Recreational Flying Club, Auster Fly-in, Popham, Airfield, nr Winchester, Hants.

August 16: USAF Open Day, RAF Fairford, Glos.

August 21-23: Scottish International Air Rally, Turnhouse, Edinburgh.

August 22: Thorpe Park Air Day, Thorpe Park, nr Egham, Surrey.

August 29-31: Vintage Aircraft Club, Summer Camp, Finmere, Bucks.

August 30: Shuttleworth Collection, Bank Holiday Flying Display, Old Warden, Biggleswade, Beds.

September 6: Imperial War Museum, 1981 Flying Display, Duxford Airfield, nr Royston, Herts.

September 13: Science Museum, Wroughton.

September 13: Tiger Moth 50th Anniversary Air Display, Old Warden, Biggleswade, Beds.

September 13: Schneider Trophy 50th Anniversary, Calshot.

September 26: Thorpe Park Air Day, Thorpe Park, nr Egham, Surrey.

September 27: Shuttleworth Collection, Shuttleworth Pageant, Old Warden, Biggleswade, Beds.

October 4: Vintage Aircraft Club, Spot Landing Competition, Shotteswell nr Banbury, Oxon.

October 8-11: Confederate Air Force, Air Show '81, Harlingen, Texas.

October 11: Recreational Flying Club, Vintage Aircraft Fly-in, Popham Airfield, nr Winchester, Hants.

October 11: Imperial War Museum, Local Flying Day, Duxford Airfield, nr Royston, Herts.

October 25: Shuttleworth Collection, End-of-Season Flying Display, Old Warden, Biggleswade, Beds.

This list of air shows and associated events for 1981 was compiled in early April from information available at that time. Intending visitors are advised to check locally before setting out to visit air displays, as date changes may occur.

Organisers are invited to send details of future events to FlyPast, Key Publishing Ltd, 1 Wothorpe Rd, Stamford, Lincs, PE9 2JR. Our next issue will be published on June 15 and details for that issue will be required by May 25.