

Royal Air Force



YEARBOOK 1993

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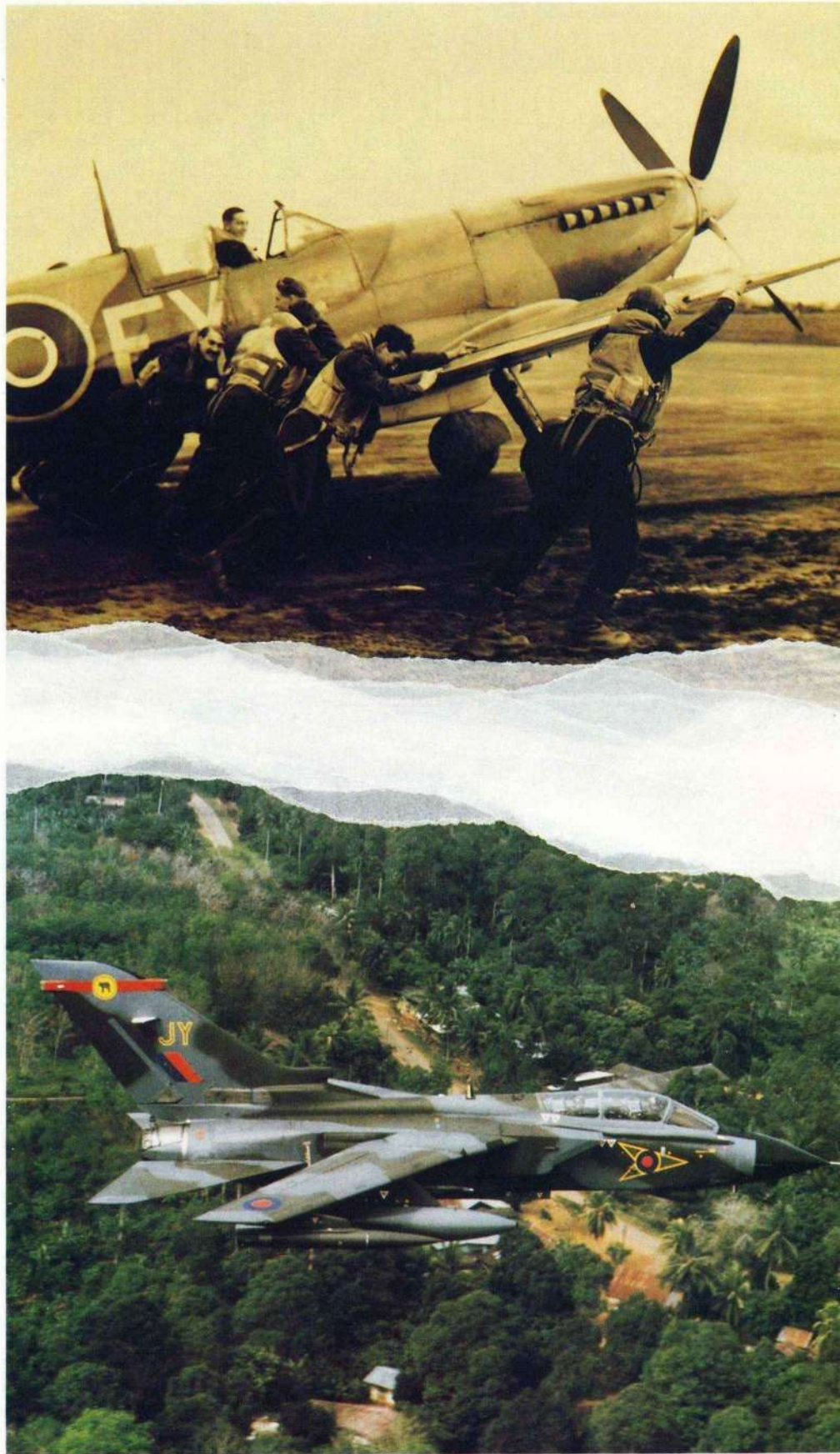
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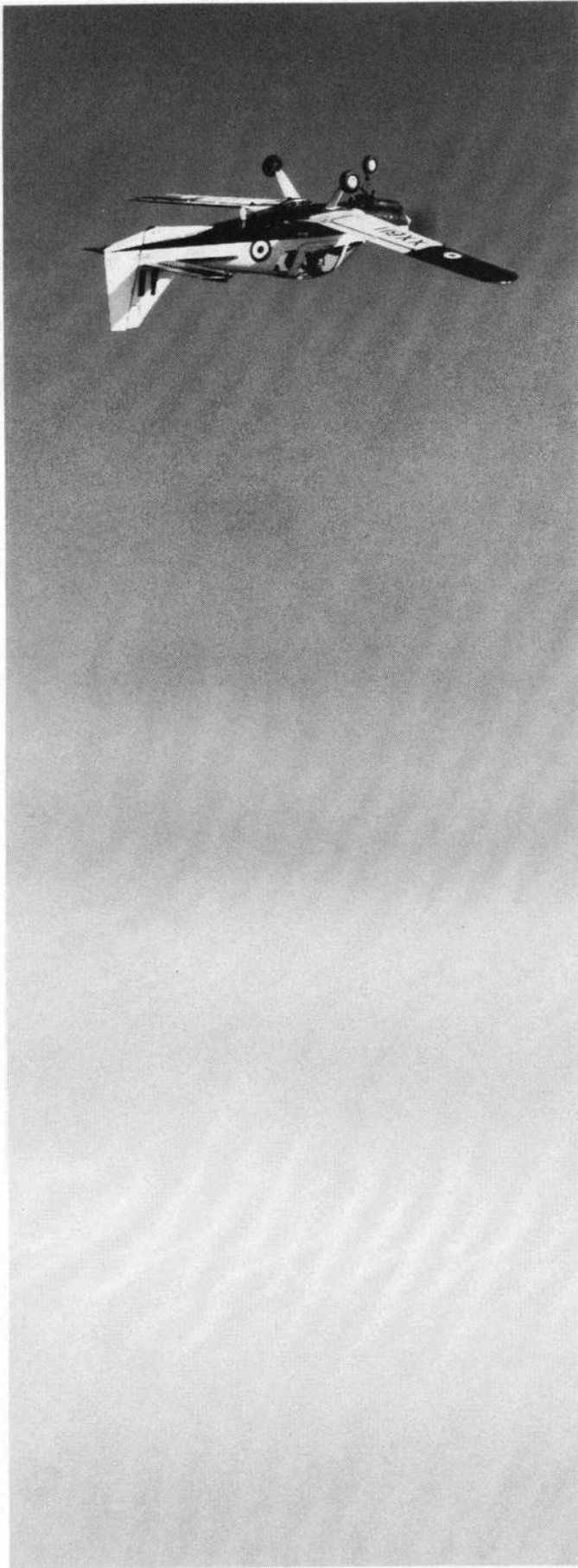
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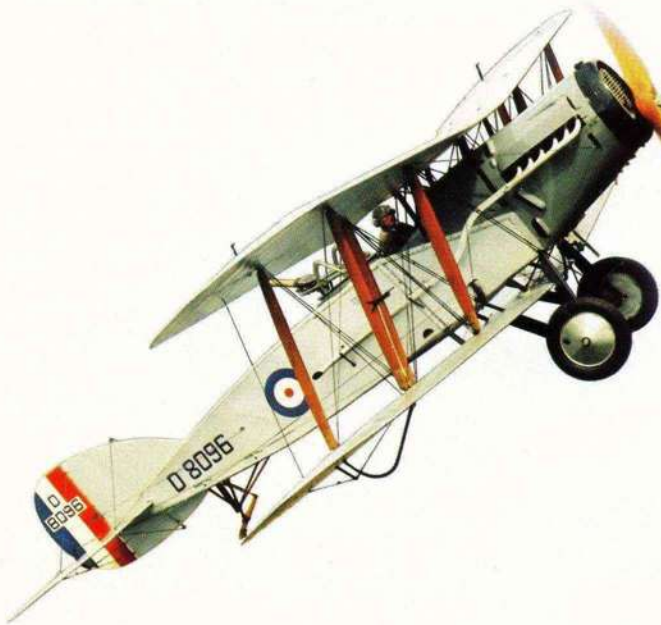
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Royal Air Force



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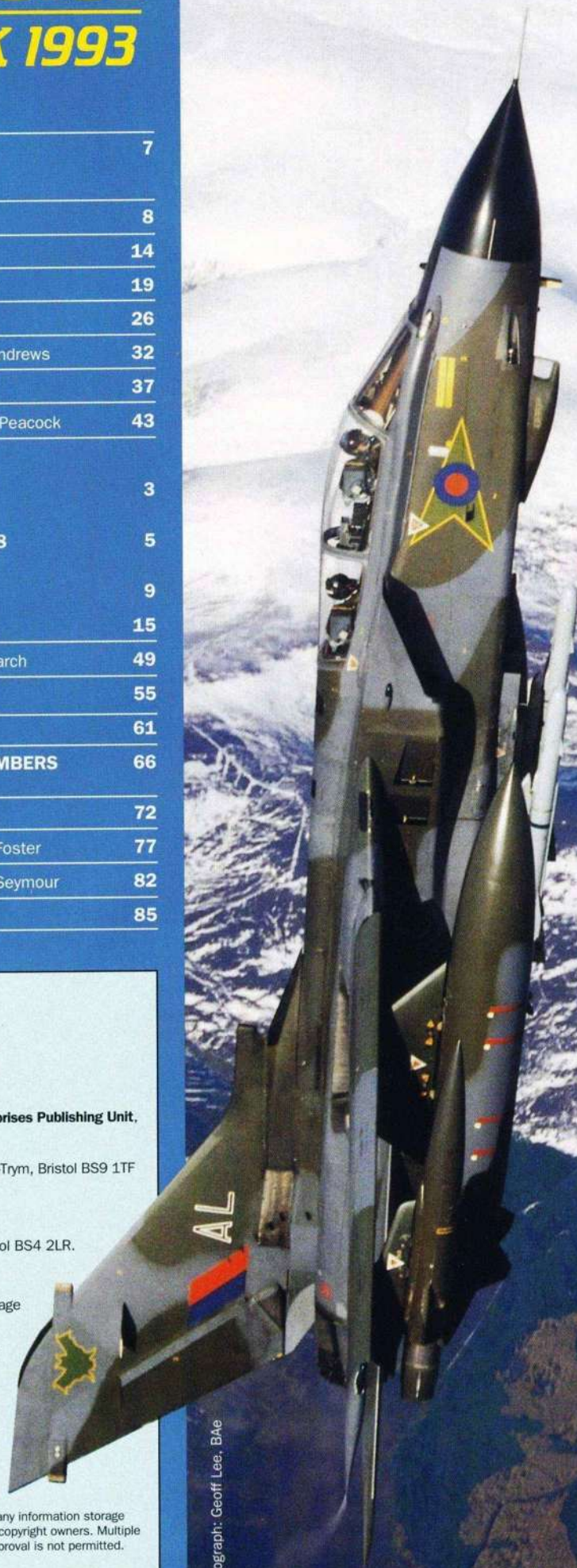
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SHORTS

Introduction

Air Chief Marshal Sir Michael Graydon

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Chief of the Air Staff



In this our 75th Anniversary Year, the Royal Air Force can look back with pride on its relatively short, but nonetheless eventful and highly successful history. From the early days of pioneering aviation through two World Wars, many regional conflicts and most recently the Gulf War the Royal Air Force has shown itself capable of adapting to the requirements of the time. The Service has not been without its opponents, indeed, in the early days many questioned its very existence; but, in the light of recent events, and the wider appreciation of the importance of air power, I do not believe any responsible person would challenge the need for well equipped air forces as a vital component of national security.

1992 has been a particularly busy year for the Royal Air Force with many units moving or being disbanded. These changes have been necessary as the Service adapts to reflect the changes in British defence policy. In addition, throughout the year men and women of the Royal Air Force have been deployed world wide on a variety of challenging and at times hazardous operations. Many of you will be familiar with the work of our C-130 Hercules aircraft, but their support during the year on humanitarian relief operations, especially in Yugoslavia and Somalia, deserves particular mention. Similarly, our Tornado GR1 and Jaguar aircraft, supported by VC10 and Victor Tankers, have continued their UN air policing duties over Northern and Southern Iraq, while further afield we continue to base aircraft in Hong Kong, the Falkland Islands and Belize. All these operations rely on considerable support behind the scenes not only from our air transport forces, but also from the many planning and operations staffs here in the United Kingdom. Neither should we forget the daily responsibilities of our Air Sea Rescue helicopters whose crews each year rescue over 1000 people, often in the most atrocious and hazardous flying conditions.

This then is something of the modern Royal Air Force. A Service which is increasingly being used not only in concert with our sister Services, but also for crisis management in its own right. It is a Service which is well equipped with new aircraft like the Tucano, the Harrier GR7 and the Boeing E3D and one which can look forward to the arrival of EFA at the turn of the century.

But equipment is just part of the story. It is our men and women and their families which have enabled the Royal Air Force to perform with such distinction over its first 75 years. Their loyalty, courage and professionalism have sustained the Service through its turbulent history and make it the effective and efficient organisation it is today. For all these people the Royal Air Force Benevolent Fund has stood by, as it does today, to help those in need in times of personal or family crisis. The Fund is an integral part of the Royal Air Force family; a family with which our servicemen and women and indeed the Nation can be justifiably proud in this the Royal Air Force's 75th year.

Michael Graydon

SHADES OF Green

Paul Jackson visits No 1 Squadron to see the night-attack Harrier GR7.

"We have to get away from the Harrier being seen as an aircraft which flies 20-minute sorties out of a wood." Coming from a senior Harrier pilot, these words sound strange to the ears of those old enough to remember the Hawker-Siddeley Harrier GR1 joining No 1 Squadron at Wittering in 1969. Wasn't that exactly what the world's first operational STO/VL (short take-off and vertical landing) combat aircraft was *designed* to do? Indeed it was, but along with transformation of the strategic situation in Europe following the Warsaw Pact's self-destruct, fundamental changes have been taking place in the Harrier force.

It was only in the 1989 *RAF Yearbook* that a welcome to RAF service was extended to the Harrier GR5 – an aircraft completely re-engineered in the USA as the McDonnell Douglas AV-8B and also built here by British Aerospace. With larger wing and re-designed, higher-placed cockpit, the second-generation Harrier possesses modern avionics and provides its pilot with an ergonomically-ordered working environment in which traditional dials and multiplicity of switches are replaced by multi-function TV displays and hands-on-throttle-and-stick buttons for all critical functions. In simple terms, the GR5 could carry nearly twice its predecessor's weapon load (or the same ordnance twice as far), deliver it with double the accuracy and defend itself with an expanded suite of self-protection equipment. As one enthusiastic convert put it, in terms of avionics the GR5 was "virtually an F/A-18 Hornet, lacking only the radar".

Of 96 single-seat Harrier IIs delivered to the RAF between 1987 and 1992, the last 34 were built to GR7 standard and the remainder are in the process of conversion from GR5 or GR5A. First to receive the new GR7 variant, the Strike Attack Operational Evaluation Unit (SAOEU) at Boscombe Down accepted ZG473 on 17 August 1990, this aircraft also becoming the initial equipment of No 4 Squadron, operating GR3s in Germany, on 12 September 1990. Partner unit, No 3 Squadron began re-equipping from GR5s on 30 November that year. Resident at Laarbruch since December 1992, Nos 3 and 4 Squadrons have had great difficulty with the low level flying restrictions in Germany but by regularly flying to the UK and on overseas detachments they have managed to realise the Harrier's low-level day potential.

The aircraft recognition expert will point to the small bulge ahead of the Harrier GR7's cockpit as its principal difference from the GR5. Re-designating an aircraft for the sake of a wart might seem an unnecessary exercise, but seldom has such a small change heralded a major expansion in capability. What a GR5 can do in all but the worse daytime weather, the

GR7 can also do on every night that it is not raining or foggy – doubling yet again the Harrier's effectiveness. The equivalent AV-8B Night Attack Harrier II entered service with the US Marine Corps in September 1989; now it is the RAF's turn to venture into the Stygian domain of the owl.

Outfitting the aircraft to fly at night is easier than training pilots to use the Harrier's new-found versatility. The over-nose bulge contains an off-the-shelf GEC Sensors FLIR (Forward-Looking Infra Red) sensor feeding an image in shades of green to the Smiths Industries wide-angle head-up display (HUD) and/or one of the two multi-function screens set in the instrument panel. (A colour moving map navigation display is presented on the other – usually the left.)

As the FLIR is almost at the same height as the pilot's eyes, there is virtually no parallax error when its green image appears in the HUD, superimposed upon what – if anything – can be seen of the real world. Additionally, of course, the HUD performs its original purpose of displaying flight, navigation and weapon-aiming data, focused at infinity, so that the pilot rarely

NVGs are attached to the helmet on a swivel mount which allows them to be raised when not required. Transforming starlight into a passable imitation of day, NVGs provide the extra vision required when looking into a turn or when searching for a target. Cockpit lighting is filtered so that its glow does not blanket the sensitive NVGs, but reference to the inside of the cockpit is normally made by glancing underneath the goggles which, unlike binoculars, are an inch or more from the eye. Moonlight flying would be undertaken with the FLIR picture viewed by naked eye on the head-down screen and flight data in the HUD, readable through NVGs. On darker nights, FLIR is projected in the HUD, where it is best seen by the unaided eye from above or below the NVGs.

As would be expected, it was the SAOEU which flew the RAF's initial Harrier GR7 sortie with NVGs, on 11 December 1990. With background work complete, Flt Lts Paul Gunnell and Steve Hawkins of the same unit, undertook the first representative attack mission when they flew 300 miles to drop live 1,000 lb bombs on Garvie Island range, north-west



needs to look down into the cockpit.

A button on the throttle moves the display between HUD and lower screen and also changes its polarity from hot-black to hot-white (rather like viewing a photograph and then looking at its negative). As some aspects of a heat picture show better under one polarity than another, the display is switched back and forth every few seconds to provide maximum awareness. Infra Red is unaffected by darkness – except that warming or cooling of objects at dawn and dusk can play tricks with the heat output of different materials – and only water in the air limits its effectiveness. The GR7 does not fly in fog . . . but neither does much else.

Complementing FLIR, with its narrow cone of forward vision, are pilot's night vision goggles. The GEC-Ferranti Nightbird

Scotland, on 19 February 1992. One of the pair had its GEC-Ferranti FIN1075 inertial navigation system modified to 1075G standard with an automatic facility from the satellite global-positioning system. Now a highly accurate piece of kit, the 1075G had been incorporated in six of No 1 Squadron's aircraft by late-1992, its presence betrayed by a small, flat, white antenna ('like a jam-jar lid') on the Harrier's spine. No more of this special trial fit have been funded, but the potential for the whole Harrier force is obvious.

Plans to field the Harrier GR7 first centred on a detached flight (detached by a couple of hundred yards) of No 1 Squadron to be established at Wittering with six aircraft and eight pilots under ex-SAOEU night attack specialist Sqn Ldr



Top: Harrier GR7s of No 4 Squadron, based at Laarbruch, Germany. RAF Germany

Above: A No 1 Sqn GR7 on a 'fine weather, daylight' training flight. Phil Boyden, BAe

Above middle: Helmet-mounted Night Bird night vision goggles provide pilots with a 40 deg field of view, turning starlight into 'day'. Sqn Ldr Mike Harwood is 'Officer Commanding Night' at No 1 Squadron. Paul Jackson

Above right: Green imagery from the FLIR combines well with illuminated aspects of the real world in this view of a Harrier T4 and the Gaydon hangar at Wittering. Paul Jackson

Right: The Harrier GR7's instrument panel is dominated by two multi-purpose screens for infra red imagery (right) and the moving map display (left), plus a central control panel and the wide-angle HUD. Paul Jackson





Top: A GR7 from No 20(R) Squadron, Harrier OCU. PRM Above: With its distinctive tail marking, this Harrier GR7 of No 4 Squadron displayed at Farnborough '92. PRM

Mike Harwood. Instead, it was decided to convert the whole of No 1 Squadron as the first RAF night Harrier squadron – and do so without standing it down from NATO or reducing the day capability. The unit's GR5s were therefore exchanged for GR7s, the first sortie with the new equipment being made by Sqn Ldr Mark Green in

ZD434 on 2 June 1992. By November, No 1 was up to strength with 12 GR7s and retaining its own original Harrier T4 two-seat trainer, passing a further milestone on the 19th of that month when Flt Lt Lance Nicol in ZD437 made the first sortie using FIN1075G. All the dozen GR7s came from the batch of 19 mid-production machines built as Mk 5As and stored until BAe had capacity to upgrade them to full night standard.

A BL755 cluster bomb is winched onto a Harrier GR7 during an exercise. Paul Jackson



Flying with night vision equipment is not as simple as operating in green daylight – the differences being so profound that it is fully expected that a few good 'daytime' pilots will have difficulty in accustoming themselves. Conversion of No 1 Squadron's 18 pilots has therefore proceeded with care under the guidance of Sqn Ldr Harwood, who has the currently unique official title of 'OC Night'. Progress has been slowed by peacetime constraints on night flying which limit operations after 23.00hr.

Some 50 hours of flying in a total of six basic categories are required to give each man a grounding in all forms of night operation. These areas are:

1. Take off and landing (including all ten variations of landing technique possible in the Harrier).
 2. Formation flying, navigation and bombing, all from medium level.
 3. Weapons range familiarisation.
 4. Low-level attack missions of increasing complexity, developing into 1.5 hour missions, including 1 hour low-altitude phase, in differing light conditions and attacking three targets using:
 - a. Lay-down technique;
 - b. Dive-bombing;
 - c. Rockets.
 5. Refuelling from tanker aircraft with and without NVGs incorporating this into a typical full mission scenario.
 6. Combat readiness check mission, incorporating elements of the above, plus a 'bounce' by simulated enemy aircraft.
- (Reference 4b, it should be noted that the nose-mounted TV camera for the very accurate Angle Rate Bombing System [ARBS] is daylight-operable only, so recourse must be made at night to either the barometric altimeter or, below 5,000 ft, the radar altimeter).

For the first few sorties, flying with night vision systems is totally entralling. Pilots soon realise that scenery which is much of a muchness in daytime can appear different at night. For example, Wales and the Lake District return dissimilar images, as do the Saudi Arabian desert and Nevada desert, the latter being more scrubland than sand dunes. Whereas in the UK – as astronomers bemoan – the ambient lighting from habitation is particularly bright, Arizona and Norway (both excellent training areas) are so dark that NVGs pick up almost nothing, forcing total reliance on the FLIR.

Further complicating training, Wittering has only a Harrier GR5 simulator. The RAF can use the Marine Corps' night attack simulator, but the function of some switches on the AV-8B are different, asw is all the mission avionics software, so pilots look forward to having their own GR7 simulator. It has long been a tradition within RAF Germany that simulators are not at the same base as the aircraft they represent. Although this is to be corrected by having both the real and notional Harriers at Laarbruch, the GR7 simulator there will be operational for a while yet.

There was once a plan to modify some Harrier T4s to T6s with the addition of night



vision avionics. However, this has been shelved for the good reason that the T4 flies so differently from the Harrier II that its night training value would be extremely limited. Instead, 13 Harrier T10s were ordered in February 1990, having full operational kit (FLIR, NVGs and eight underwing weapons pylons, compared to the TAV-8B's two) apart from deletion of ARBS. Meanwhile, the training value of each GR7 sortie will be enhanced by the facility to replay the mission on a cockpit video recorder. In late-1992, ZD469 was at BAe for a trial installation of the equipment.

Remembering the positive 'g' routinely pulled by combat aircraft, it will be appreciated that NVGs attached to the flying helmet are fatiguing to wear, whilst ejection with goggles would almost certainly break the neck. Therefore, the Martin-Baker Mk 12 zero-zero seats of No 1 Squadron's aircraft have been modified so that pulling the ejection handle activates a gas motor which unclips NVGs from the helmet. What happens to them then depends on the attitude of the aircraft at the time, but pilots are resigned to the fact that some related injuries will ensue unless they have time to throw their NVGs on the floor before using the 'bang-seat'. The US Marines have no NVG jettison facility as yet and thus are unable to use NVGs for take off and landing – a serious shortcoming.

At Wittering, night operations taken on an air of incongruity, as airfield lights are turned off when missions are launched and recovered, and, during this early stage on again for safe movement of personnel and vehicles in between. There remains the not insignificant question of maintaining night currency during the summer. The 1992-93 night season ends with a deployment to the USMC AV-8B base at Yuma, Arizona, in April. No more sorties will be flown until September, when any loss of skill on re-start will be carefully monitored. In the summer of 1994, it is planned to give pilots one night flight per month between May and August to assess the value of this technique. After that, the two Germany-based squadrons may begin training for low-level night operations.

Accuracy and versatility in ordnance delivery is matched in the GR7 by a broad spectrum of armament and sensor possibilities. First, however, the aircraft must negotiate the target's defences. In

the realm of self-protection, affairs have progressed since 1982, when Harrier GR3 pilots stuffed bundles of chaff in their airbrakes for attacks on the Falkland Islands. GR7s have two AIM-9L Sidewinder air-to-air missiles; AN/ALE-40 flare dispensers under the rear fuselage; a MATRA Phimat chaff pod on the port outer pylon – soon to be augmented or supplanted by the Bofors BOL installed in the rear of Sidewinder launch rails; Marconi Zeus automatic electronic jamming suite; and, in final stages of service clearance, the tailcone-mounted active-radar Plessey MAWS (Missile Approach Warning System). The value of Zeus was demonstrated recently when, a mere four hours after Harrier GR7 met a contemporary European fighter for the first time, it had been programmed to jam effectively that aircraft's fire-control radar.

A new departure for 1993 is the introduction of a reconnaissance capability. After plans were abandoned in the mid-1980s to install an internal, miniaturised version of the Tornado GR1A's Infra Red reconnaissance equipment (Hence the Harrier GR5's slightly different chin contours), the question was allowed to lapse. It was revived in 1990 when the SAOEU began trials of a Vinten VICON 18 Srs 403 pod on the centreline attachment. This has a Vinten 4000 IR linescan camera and the same firm's Type 753 panoramic camera, but for long-range oblique photography the GR7 can be fitted with a multi-sensor VICON 57 pod containing a Type 690 camera with interchangeable 18-inch or 36-inch telephoto lenses, plus a fan of three cross-track cameras, a BAe Type 401 IR linescan and a Type 751 panoramic camera. Thirdly, the recce pod formerly carried by Harrier GR3s may also be attached.

Having been optimised for the US Marines, the Harrier's weapons computer contains 80 different stores configurations. More may be added, and though stories have appeared in the aviation press of impending addition of ALARM, *Sea Eagle* and the new stand-off anti-armour weapon to be ordered for ASR1238, financial constraints make these only a very long-term possibility. Inherited from the first-generation Harrier have been the established RAF weapons of BL755 and Improved BL755 cluster bombs, 1,030 lb free-fall and 1,120 lb

retarded bombs, 400 lb MATRA Type 155 pods for eighteen 68mm rockets and Paveway II laser-guided 1,210 lb bombs. Protracted development continues of the Royal Ordnance ADEN 25mm cannon intended (with 100 rounds each) for the two under-fuselage pods. Earlier this year the armoury was expanded with addition of Bristol Aerospace CRV-7 high-velocity rocket pods (nineteen 70mm missiles each) from Canada and the American-designed CBU-87 cluster-bomb – two weapons which were added to RAF Jaguars for the 1991 Gulf War.

The fact that CRV-7 and CBU-87 are optimised for release from medium altitude is a clue to the future *modus operandi* of the Harrier GR7. Traditional close air support (CAS) – low-level attacks a short distance ahead of our own troops, as classically demonstrated by Harrier GR3s at Goose Green in 1982 – is taking a back seat to battlefield air interdiction. BAI is longer-range and puts the accent on destroying support elements and reserves in the enemy's rear. As one Harrier pilot put it, "Why put an immense effort into shooting-up individual tanks in the front line when you can take out their entire fuel supply system farther back?" Armies still use night-time to bring up supplies and re-organise, whilst their helicopter support force often congregates in the same field until dawn. Such targets are easy meat for the Harrier GR7's all-seeing night sensors. However, the supreme value of aircraft in the close air support role is still recognised and the aircraft will continue to be used in its more traditional role.

As a result, cockpit re-briefings in woodland dispersals could become a thing of the past as pilots fly just one, longer-duration sortie per night. The Gulf War demonstrated that even heavily-bombed airfields have enough undamaged concrete to support a STO/VL aircraft, so, in future, the Harrier is more likely to operate from established air bases – much to the relief of pilots and supply truck drivers, both of whom often have difficulty in locating Harrier sites in the field. Also this year, No 1 Squadron plans to renew its commitment (lost with passing of the GR3) to operations from aircraft carriers. All that is needed is a minor modification to the inertial navigation system to allow it to be aligned on a moving deck. The assignment to NATO's flanks also remains in place, so the 'whitewash' brushes will be wielded at regular intervals as the squadron prepares for routine deployments to Norway.

New roles; new weapons; and new (viewed in green through NVGs) horizons. The second-generation Harrier is becoming even more valuable to Nos 1 and 2 Groups of Strike Command. Now that the UK is playing an increasing part in international policing operations sanctioned by the UN, it is likely to be only a matter of time before the Harrier GR7 is put to the ultimate test.

Far left: A No 3 Squadron Harrier GR7 is marshalled into its hide on a German dispersal site during the GR7's first field exercise – Hill Foil – held between 1 and 12 June 1992. Field deployments will become less common in future. Left: A GR7 of No 3 Squadron taxiing to its roadway take-off strip. Paul Jackson



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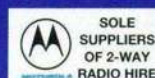
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Breaching the DAMS

John D R Rawlings looks back at No 617 Squadron's raid on the Ruhr dams 50 years ago.

Inset below: The Mohne dam pictured before the raid, showing the defences surrounding it. Bottom: Lancaster ED825/G whilst undergoing trials at A&AEE Boscombe Down. It was hastily flown to Scampton to become AJ-T and took part in the Dams raid. P H T Green Collection



Strangely enough it was, in all probability, the Spanish Civil War in the mid-1930s that was the genesis of the Dams Raid as it was that war which started the Royal Air Force's Air Staff thinking more deeply about the use of the bomber. Trenchard's Independent Air Force in 1918, with its Handley Pages, had just begun to show what strategic bombing could do but by 1919 the 'War to end all Wars' had ended. The RAF turned its offensive attention to bombing tribesmen in Iraq and the North-West Frontier and this was, to all practical purposes, the extent of its bombing expertise. It did keep the odd squadron of night bombers, successively Vimys, Virginias and Heyfords, together with other less important types, as an insurance but the development of strategic bombing was very much put on the back burner.

By 1937 all this changed and, with a new war already on the horizon the Air Staff had formed Bomber Command and was busily working out plans for its use.

These plans were already leaping ahead of the Luftwaffe's, although the latter was further advanced in actual hardware. It was this more mature approach to the use of the bomber that enabled Bomber Command to set up the offensive against Germany in the early 1940s. In working up plans for just such an offensive ways were looked at for identifying the best targets and especially those that would bring in their train the immobilisation of other targets as a result. High on this list came the destruction of the main dams which provided water for the Ruhr, for not only would this hamper the lives of thousands by disrupting drinking water but it would reduce the ability of all those industries and installations that drew electricity from the hydro-electric power stations.

The problem was that the RAF possessed no weapons that could breach the dams and had little hope of being able to deliver any weapons with sufficient accuracy, so the project was shelved. The





mini-R100. He interested Ben Lockspeiser, at the Ministry of Aircraft Production, and towards the end of 1940 the Road Research Laboratory (RRL) was asked to prepare a model of the Mohne Dam (1/50th scale) against which simulated charges could be used to see what results could be obtained. The next step was to build a 1/10th scale model at RRL at Harmondsworth and to acquire a disused dam in Wales which could be tested against by actual weapons. Much time, energy, committees and personalities came into the process, much of which was discouraging. Wallis became convinced that the only solution was to build this large bomb and a six-engined bomber to drop it from stratospheric heights. During 1941 the AAD Committee (Aerial Attack on Dams) was formed within the MAP and this Committee looked at any ideas that came up. One, current at the time, was the use of a torpedo attack or, better still, the new Toraplane which was a winged torpedo designed to glide. This idea collapsed with the ineffectiveness of this new weapon. Wallis's big bomb and big bomber idea was also crushed, this time by the Air Staff, who could not contemplate diverting resources as they were trying to build up a viable bomber force against Germany.

With all of these disappointments Barnes Wallis then looked at other methods of delivery of a charge of sufficient capability to destroy the dams. Further investigation revealed that charges placed near the base of the dams could do more damage than at first thought. A device had to be produced which could run across the water of the dam, hit the parapet and then sink to a pre-determined depth, before exploding hydrostatically. So Wallis turned his attention to spheres which would roll along the surface of the water, or bounce along. At the same time the second experiment at the disused dam in Wales (at Nant-y-Gro) was set up, the first having failed to breach the wall. This second attempt, with the charge placed where Wallis suggested, was a spectacular success, blowing the wall out completely. Concurrently one of Vickers' Wellingtons was dropping a series of spherical bouncing bombs on the Chesil Beach ranges in Dorset – most of which broke up on impact with the water. Eventually he redesigned the bombs into a cylindrical shape and at the same time perfected the idea of spinning the bomb across the water. Legend has it that his backspinning ideas came from a cricket discussion with one George Edwards, later to climb the ladder at Vickers and BAC. By now Wallis proposed two types of weapon, a small one *Highball* to be used by the Mosquito and a bigger one for the dams, *Upkeep*, for Lancaster use.

Much opposition was received all down the line from many in the 'corridors of power' but Wallis' persistence produced paper after paper for the various committees and then backing it with successful film of drops with the cylindrical weapons at Chesil Beach. Slowly the 'powers that be' were becoming convinced that here could be a practical means of producing the mass dislocation of the Ruhr industries. The idea was finally put to



Above: Wing Commander Guy Gibson VC DSO* DFC* led the Dams attack, which resulted in serious disruption within the Ruhr industrial area. P H T Green Collection

Left: Following the final test dropping of mines at Reculver, Lancaster ED817 joined No 617 Sqn as 'AJ-C'. James D Oughton Collection

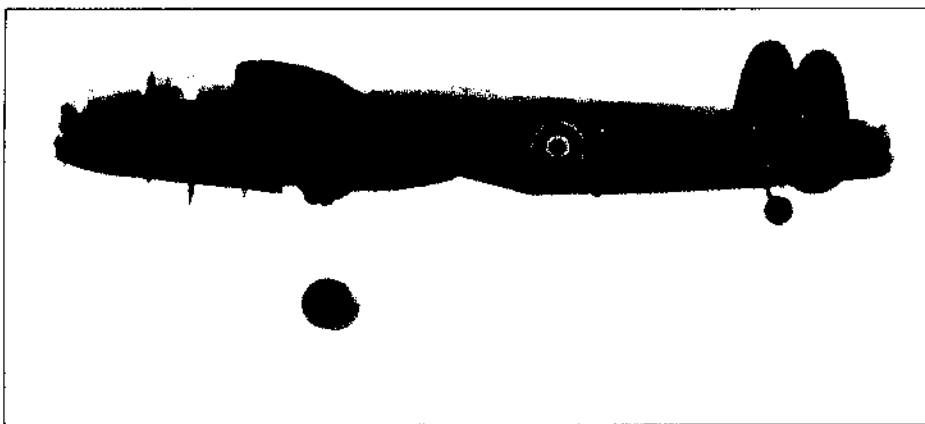
idea did not die completely and during 1938-9 exhaustive studies were made as to how the different types of dam could be breached from the air but without success. By 1940 there were more pressing problems, indeed the survival of Britain itself. All the ideas which had so far come up, and foundered on inadequate equipment, had postulated extreme accuracy in bombing as a *sine qua non* for such a raid. Another blow came with the first results of Bomber Command's efforts from the photo recce pictures after night raids which showed their very poor accuracy. Not only were aircraft dropping bombs off the targets but many bombers were not even reaching the right target – in 1941 only one tenth of the bombers on any raid in the Ruhr was getting within five miles of the target.

Attention then focused on the assistant chief designer of Vickers-Armstrongs, Barnes Neville Wallis who had designed the most successful British airship, the R100, and had used the same geodetic principle of construction for the Wellesley single-engined bomber and the Wellington, the best of the bombers with which the RAF entered WW2. Vickers-Armstrongs' Aviation Department had wisely set him up in an experimental design office near Weybridge and given him a fairly free hand. He was a man with an inventive turn of mind and a dogged persistence, qualities needed in abundance in the first three years of the War.

Barnes Wallis turned his mind to the problem of attacking strategic targets and the need to destroy the Ruhr dams. He collected as much material as he could on the construction of them and soon realised that none of the current range of bombs would be any use. So he set about designing a suitable bomb, his first design being a 22,400 lb effort, the shape of a

Bomber Command's AOC – with explosive results! His immediate reaction was "This is tripe of the wildest description". However, the rest of the Air Staff were not so opposed and slowly but surely Harris was talked round to letting the project move slowly forward. By 26 February 1943 it was decided that three Lancasters should be modified for trials, 150 *Upkeep* mines produced and 27 more Lancasters modified if the early trials proved successful. This was decided at the end of February. The dams had to be attacked before the end of May to obtain the greatest flooding effect so, in three months, aircraft had to be modified and tested, mines made, a squadron formed and delivery techniques evolved and practised.

But it all happened – by compromising on the quality of the mine casings enough could be produced quickly, and by taking the second Lancaster converted for the work and using it for intensive dropping trials at Reculver. The programme of dropping went through, first flying ED817/G from Manston on 13 April and eventually being joined by two further modified Lancasters. But where was the RAF squadron to fly the raid? At Metheringham the CO of No 106 Squadron, Wg Cdr Guy P Gibson DSO DFC had just completed his third tour of operations on 11 March, and was anticipating leave. He woke the next morning to find that his leave had been cancelled and he was wanted at 5 Group HQ. Five days later he was given charge of forming a new squadron for 'just one more operation'. The highest numbered squadron in the RAF to date was No 616; The next two numbers were allocated to squadrons to use Wallis's mines – No 617 was to be the Lancaster squadron for *Upkeep* and No 618 for the *Highball* Mosquito squadron. On 17 March 1943, Wg Cdr Gibson formed No 617 Squadron at



Lancaster III ED817/G, with cut-away bomb bay and no mid-upper turret, photographed on 12 May 1943 at Reculver during a test drop. The first fully armed weapon was successfully dropped the next day, only three days prior to the raid. James D Oughton Collection

Scampton for the express purpose of eliminating the important German dams. Crews were drawn from other 5 Group squadrons so it was something of an elite unit, hand-picked by Gibson. At first it had standard Lancasters to practice intensive low-flying by day and night, followed by flying across water at an exact height and speed. This was practised at various reservoirs in England as near in situation to the ones to be attacked in Germany. The problem of flying at the right height at night was solved by the ingenious placing of two lamps under the fuselage beaming forward and meeting on the surface of the water when the aircraft was at the right height. It was not until 1 May that the first full-size weapon was dropped at Reculver and ten days later the No 617 crews, now with their modified Lancasters, began dropping trials there. The first fully-armed *Upkeep* weapon was successfully dropped on 13 May – four days later history was made.

A comprehensive and detailed plan had been drawn up for the bombing of the principal dams supplying the Ruhr, taking into consideration the special arrangements the Luftwaffe had made for night-fighter defence of the dams. All that was needed was a suitable met forecast. This came for the night of 16/17 May. The operation had the codename *Chastise* and at 1615hr on 16 May No 617 Squadron knew that Operation *Chastise* was on. But there was a problem in that only 18 serviceable aircraft could be mustered. One of the Boscombe Down trials aircraft (ED825/G) was hastily ferried to Scampton and worked on by the ground crew to become 'AJ-T' with the Squadron.

At 2139hr the first three aircraft of the first wave accelerated down Scampton's runway and set out for Germany. They were Gibson in ED932/G 'AJ-G', Flt Lt J V Hopgood in ED925/G 'AJ-M' and Flt Lt H V Martin in ED909/G 'AJ-P' all heading for the Mohne Dam. It had been planned that the aircraft would operate in 'Vics' of three to the target and they tucked in low over the North Sea, to delay revealing their presence to enemy radar until the last minute. By now the second Vic had taken off, Sqn Ldr H M Young in ED887/G 'AJ-A', Flt Lt D J H Maltby in ED906/G 'AJ-J' and Flt Lt D J Shannon in ED929/G 'AJ-L'. A minute before 2200hr the third Vic of the first wave took off – Sqn Ldr H E Maudslay in ED937/G 'AJ-Z', Flt Lt W Astell in

ED864/G 'AJ-B' and Plt Off L G Knight in ED912/G 'AJ-N'. By and large the nine aircraft found, in the bright moonlight, that the low-level navigation required was easier than expected, although in places one or other of the aircraft would move out of formation. This brought about the loss of Astell's aircraft and crew who missed a turning point on the Rhine and were shot down north of Dorsten. By then the first three aircraft were arriving at the Mohne Dam. Gibson flew a dummy run over the dam, not using the intended route of attack, by which time the second Vic arrived. Gibson kept them orbiting and went in for the first attack. Despite the heavy flak coming up he dropped his weapon successfully. It hit the dam wall, sank and exploded with a huge spout of water which obscured the target. When it had cleared five minutes later Hopgood went in, his aircraft being hit on the dash across the water, dropped its weapon late and it bounced over the dam wall. The Lancaster flew on, burning furiously and crashed six km further on. Only two of the crew survived as POWs. However, the mine, having bounced over the wall, fell on the power house and blew that up.

Now Martin went in. Gibson went in ahead of him with forward guns firing to distract the flak towers. 'AJ-P' was also hit, but not disastrously, and the mine was successfully dropped. Again a huge spout of water, but the dam wall held. It was now Young's turn in 'AJ-A' – this time both Gibson and Martin joined in the attack from different directions, the attack was made successfully but the result was the same – the wall had withstood three explosions. Maltby then came in with 'AJ-J', with Gibson and Young making diversions. As he came across the lake he could see that, in fact the last attack had been successful as the dam wall was crumbling away. He dropped his mine to add to the melee. When the explosion and its waterspout had cleared away Gibson and the others flew around observing the effects and then set off for the Eder dam.

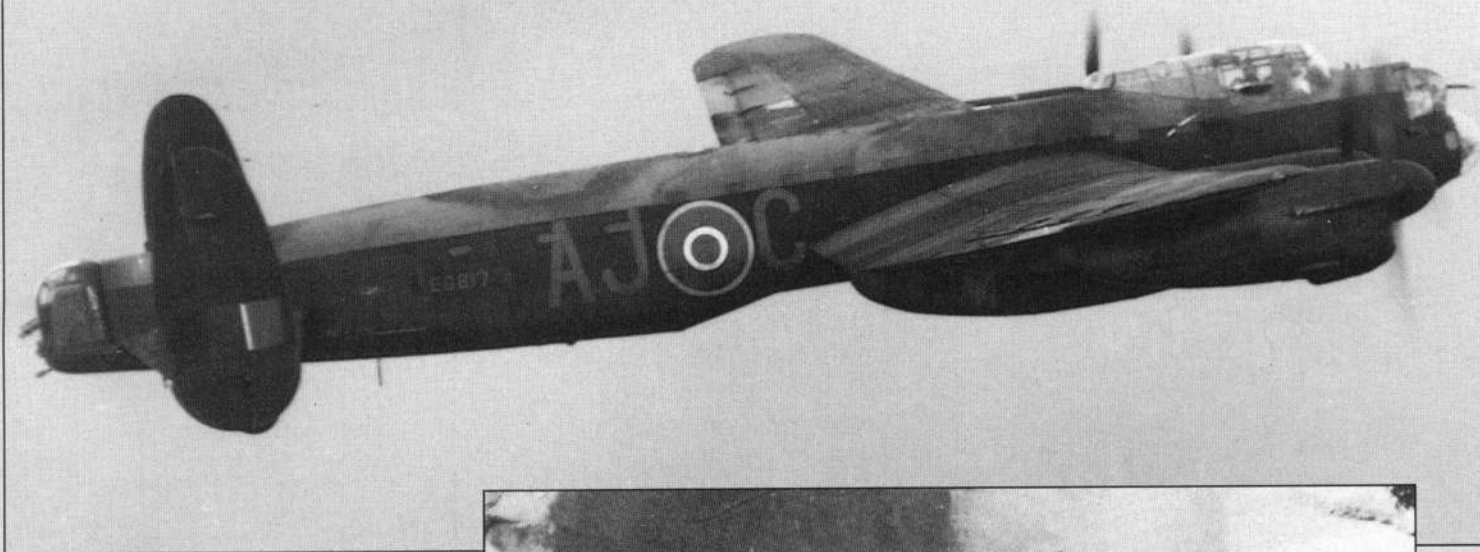
It had been arranged for brief radio reports to be sent back to 5 Group using two code words, *Goner* for a failure, *Nigger* for success (named after Gibson's dog). Wallis was at the HQ and became despairing after the first three *Goner*'s were received. When *Nigger* came over the radio he leaped in the air with joy, a rare

moment of ecstasy for him.

The Eder was a more difficult proposition, involving a diving approach and a 90deg turn over the reservoir. This caused problems – Shannon in 'AJ-L' made four abortive runs and Maudslay two before Shannon had three more attempts, on the last of which the weapon was dropped. The result was similar to the first few at Mohne. Maudslay then went in again, his mine overshot and hit the parapet hard, exploding while 'AJ-Z' was still close by. Although it is believed that Maudslay was still airborne shortly after in fact the aircraft and crew disappeared. There was only one weapon left; Knight in 'AJ-N' went in on a dummy run and then round again and dropped his mine perfectly. It breached the wall 30ft below the parapet collapsing it, sending a huge tidal wave down the valley. With all their mines dropped the survivors set out for home – all except Young and his crew returned, 'AJ-A' being shot down by flak near Ijmuiden.

However that was not all that No 617 Sqn was involved in that night. The other ten aircraft and crews were split into two waves. The second of these left Scampton earlier than the first in order to enter Germany at a more northerly point and flying singly to confuse the defences. Flt Lt R N G Barlow left first in ED927/G 'AJ-E' at 21.28hr, followed at one minute intervals by Flt Lt J L Munro in ED921/G 'AJ-W', Plt Off V W Byers in ED934/G 'AJ-K', Plt Off G Rice in ED936/G 'AJ-H' and finally Flt Lt J C McCarthy in ED825/G 'AJ-T'. This second wave was bound for the Sorpe dam and a series of disasters. The first aircraft, Barlow's, crashed near Haldern just before midnight – reports vary as to how it crashed but the upshot was that the aircraft was destroyed, the crew killed and the *Upkeep* weapon which did not explode came into German hands intact. Munro in 'AJ-W' encountered heavy fire over Vlieland and was so severely damaged that instruments, intercom and turrets were put out of action, so he returned to Scampton. Byers, in 'AJ-K', disappeared completely and it is almost certain that his aircraft was shot into the sea by flak at Texel. Rice, in 'AJ-H' was concentrating on flying low and navigating over Vlieland, his Gee having failed. Whilst doing so he hit the water but managed to pull up off the water but his *Upkeep* mine had been wrenched off the Lancaster so there was no point in proceeding. More flak on the way home damaged the hydraulics which meant landing problems. These were exacerbated when Munro, without radio, landed almost underneath him. So the attack on the Sorpe rested on McCarthy. He gained full marks for persistence, making no less than ten runs over the target before being sufficiently satisfied that the run was perfect. His persistence was rewarded and his mine breached the parapet, even though it did not sink and destroy the wall itself. He returned to Scampton safely, despite navigation difficulties.

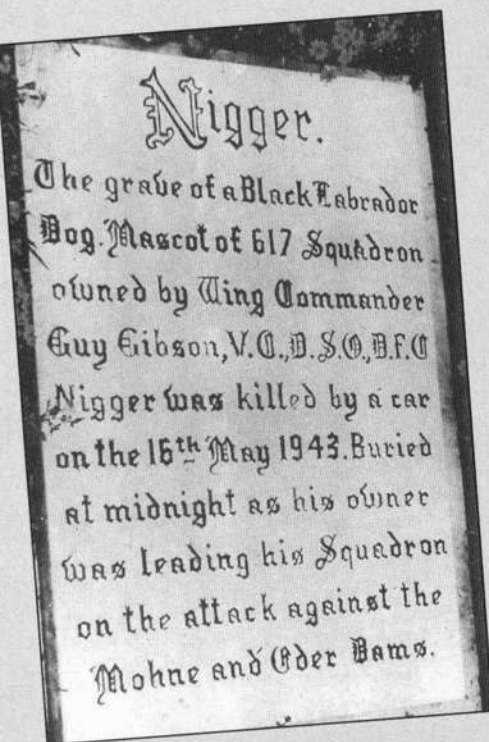
The third wave also comprised five aircraft – Plt Off W H T Ottley in ED910/G 'AJ-C', Plt Off L J Burpee in ED865/G 'AJ-S', Flt Sgt K W Brown in ED918/G 'AJ-F', Flt Sgt W C Townsend in ED886/G



Above: Further view of No 617 Sqn Lancaster III ED817. The aircraft was lost when it was hit by flak and exploded north-east of Ham. James D Oughton Collection

Right: Reconnaissance photograph of the breached Mohne dam taken on the morning after the raid.

Below: Gibson frequently took his black Labrador Nigger on operations. Nigger, the squadron mascot, did not go on the Dams raid but was killed in a road accident that same day. P H T Green Collection



'AJ-O' and Fit Sgt C T Anderson in ED924/G 'AJ-Y'. Their tasks were to attack the alternative dams and be prepared to go to the Mohne or Eder dams if required. Ottley, in 'AJ-C', was hit by flak and blown up over the Ruhr just after being detailed to go for the Lister dam. The rear gunner, alone, survived. Burpee in 'AJ-S' was lost in similar manner over Holland. Brown in 'AJ-F' managed to reach Germany successfully at very low level and was diverted to attack the Sorpe. He, too, found it a difficult target to attack and it was on his sixth run that he dropped the weapon, which had a similar effect to McCarthy's, extending the damage

considerably. Townsend in 'AJ-O' had nearly reached the Mohne dam when he was ordered to attack the Ennepe dam. This was extremely difficult to find and attack, not helped by patches of mist, but on his fourth run the mine was dropped – it fell short and exploded but did not breach the wall. He, too, ran into intensive flak on the way home. Anderson in 'AJ-Y', the last aircraft off at Scampton, ran into tremendous flak which put him off course and his rear turret out of action. By then dawn was approaching and he was nowhere near his target so he brought his mine back to Scampton.

This had been a raid like no other, the cost in aircraft and crews had been high, the flying expertise necessary had been testing. Had it achieved the results that all the planning and devising had suggested? In short, had it been worth it? In the Ruhr valley, as a result of the Mohne breach, eleven factories were totally destroyed,

over 100 others damaged, nearly 3,000 hectares of farming land rendered useless, 25 bridges totally destroyed and nearly as many damaged and electric and water stations destroyed. The Eder breach produced similar results. As well as the actual material damage, the halting of electricity and water supplies over a large area had a significant effect on the whole Ruhr. Probably the best summary of the Dams Raid and its effect is to be found in John Sweetman's book *Operation Chastise* where he states – "Because *Chastise* broke two major dams – causing widespread flooding interruption to industry, communications, gas, electricity and water supplies in varying degrees, re-deployment of troops and weapons and diversion of labour to repair its ravages – this operation could well be termed 'a major disaster' for the enemy". Guy Gibson and No 617 Squadron HAD done the job!

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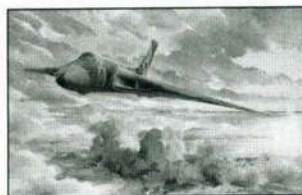
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DAMBUSTERS

THE JET AGE

Although relatively young in RAF terms, No 617 Squadron has an impressive history as a special and pioneering unit. The squadron has been at the forefront of Bomber Command's equipment programme since it entered the jet age with the venerable Canberra B2. No 617 received its examples of the RAF's first jet bomber in January 1952 as the RAF's second Canberra unit, operating them in Malaya in 1955 against the Communist guerrillas. No 617 Sqn became part of the V-force with the Avro Vulcan B1 in May 1958 and this type was used as part of the UK nuclear deterrent force – three years later the B2 arrived. Throughout the Vulcan's 24-year tenure the squadron was based at Scampton.

Today No 617 Sqn is equipped with Panavia Tornado GR1s as it celebrates the 50th anniversary of its formation on 21 March 1943. *Après moi le deluge* ('After me the flood') is a very fitting motto when

Peter R Foster

one bears in mind the squadron's achievements in the Dams raid and one that perhaps will become even more appropriate as the squadron approaches a period in its history when it takes on a new (for the Tornado) maritime role, replacing the Buccaneers of No 208 Sqn at RAF Lossiemouth in 1994.

The Tornado GR1 was introduced to No 617 Squadron in early 1983. The unit becoming the second RAF squadron to convert to the IDS version of this Vulcan replacement, reforming at RAF Marham, Suffolk under the command of Wing Commander Tony Harrison on 1 January 1983. With the Tornado, No 617 Sqn is tasked as part of the RAF's nuclear deterrent, as it has been throughout its jet career and the unit trained in the art of

delivery of the WE177 bomb, a single example of which can be carried on the centreline station. However, the bulk of No 617's commitment is as part of SACEUR's tactical force and much of its training is conducted in the delivery of more conventional ordnance.

In the tactical or close air support role No 617 Sqn's Tornado GR1s can carry up to eight 1,000 lb (454 kg) bombs on the shoulder racks beneath the fuselage leaving the wing stations free to carry a variety of defensive equipment. A more realistic load, however, is four 1,000 lb bombs fitted with retarding systems for low-level delivery. Equally, 'smart-bombs' such as CPU-123B Paveway laser-guided weapons can be carried, although the aircraft is limited to three of these, each weighing 1,210 lb (549 kg). RAF Tornado GR1 aircraft can also carry Hunting Improved BL755 cluster bombs for close

Below: Vulcan B2 XM595 carrying a Blue Steel stand off bomb taxis at its home base at Scampton. No 617 Sqn markings stand out on the tail of the white-painted delta.



Spanning the 50 years from its formation as a bomber squadron, a No 617 Sqn Tornado 'meets' the Battle of Britain Memorial Flight's Lancaster at RAF Scampton. Rolls-Royce



Below: A distinctively marked No 617 Squadron GR1 refuelling from a VC10 K3 of No 101 Sqn on a routine exercise that prepared the squadron well for its involvement in the Gulf. Peter R. March



they were restricted to 38.7kN (8,700 lb st) on the combat squadrons. The grumbles in respect of this engine have largely remained with the Tornado force, although following the 'Options for Change' policy which has seen the withdrawal of three Tornado squadrons from Germany, sufficient airframes fitted with the more effective Mk 103 version of the RB199 have allowed those units using Batch 2 and 3 aircraft to upgrade.

Early in its career with the Tornado the squadron was chosen to represent the Royal Air Force, along with Victor K2 tanker aircraft also based at Marham, in the USAF Strategic Air Command bombing competition *Giant Voice* at Ellsworth AFB, South Dakota in 1984. No 617 Sqn left RAF Marham on 29 August, taking six aircraft with support from three Victors. Two teams, each comprising two crews, entered the competition and when they returned home on 23 October they had achieved spectacular success. Although this was the first time that the Tornado had taken part in such a competition No 617 achieved first and second places (98.7 and 98.5%) in the Le May Trophy for high and

air support and the Hunting JP233 runway denial munition used in anti-airfield attacks. Two of the latter each weighing 5,148 lb (2334 kg) can be carried on the under fuselage shoulder rails. The JP233 pods contain 30 SG357 20kg runway cratering bomblets and 215 BB876 2.5kg area denial mines to disrupt repair parties and were used to great effect during the Gulf War in 1991.

The defensive stores carried externally on the wing stations can include AIM-9L Sidewinder air-to-air missiles on the inside edge of the inboard pylons. On the

outboard stations are the Philips BOZ-107 chaff and flare dispenser and Marconi *Sky Shadow* electronic jamming pods.

No 617 Sqn's Tornado GR1s were originally drawn from batch 2, the contract for which had been signed in May 1977 for a total of 110 airframes but later increased to 113, 55 of which were destined for the RAF. These aircraft were fitted with the Mk 101 version of the RB199 engine, officially dry rated at over 40.0kN (8,992 lb st), but the engines had consistently failed to achieve their serviceability targets, with the result that



Left and above: No 617 Sqn received Tomado GR1s ten years ago, when it reformed as the second RAF squadron to be equipped with the IDS variant. BAe & Peter R March



Main picture and top right: In August 1992, No 617 Squadron's Tornados were repainted once again in desert camouflage and prepared for operations in the Gulf. ZA458 proudly displays the historic code letters AJ-A. Peter R. Foster

low-level bombing by an individual crew; first and third places (90.45 and 83.1%) in the John C Meyer Memorial Trophy for the highest damage expectancy from team bombing at low level; and second place (96.05%) in the Mathis Trophy awarded for the best high and low-level teams.

Following its success in the *Giant Voice* competition No 617 Sqn returned to the United States for Exercise *Green Flag 86/3* held during the last two weeks of March 1986 along with crews from both Nos 20 and 31 Squadrons. This deployment, led by Wing Commander Peter Day, utilised only two of No 617's aircraft, these being ZA560/C and ZA607/J. The others were drawn from Nos 9 and 27 Squadrons. The exercise, although similar to the better-known *Red Flag* exercise, concentrates on the world of Electronic Counter Measures (ECM) with threats being provided by Soviet-style radars and SAMs as well as defending fighters principally drawn from the (then) Aggressor units stationed at Nellis AFB with the Northrop F-5E Tiger II in company with other F-16 and F-15 air defence squadrons.

No 617 also provided four aircraft to

accompany a pair of No 229 OCU Tornado F2 fighters to Oman in November 1985 as part of Exercise *Saif Sareea* or *Swift Sword*. The flight to the region lasted in excess of ten hours and covered 4,200 miles. The jets were supported by aerial refuelling assets from Nos 101 and 216 Squadrons – the crews were unaware that this trip set a trend for what was to come in the future.

For the next two years the squadron settled down to a routine of various training exercises which included five weeks at CFB Goose Bay undertaking extensive low-level flying training over a terrain less hostile to the noise of jet engines. On the horizon was the probability of a North American exercise such as the *Green Flag* described earlier or possibly *Red Flag* at the same location, or even *Maple Flag* at CFB Cold Lake, Alberta, Canada.

While on a normal Goose Bay training detachment in July 1990 two aircraft and crew, accompanied by a pair of Tornado GR1s from No 9 Sqn, undertook an eight-hour transit with the aid of inflight refuelling to the wastes of Alaska. Here they visited Eielson AFB near Fairbanks to assess the possibility of utilising the

significant range areas available in this part of the world. The RAF was keen to use facilities where high-value training might be achieved, particularly with the curtailment of low-flying opportunities in Germany earlier that year. Although the crews concerned carried out an assessment which was ultimately to lead to Exercise *Distant Frontier 92*, which is reviewed elsewhere in this Yearbook, events in the Middle East overtook earlier planning.

Operations *Granby* and *Desert Storm* have been well documented in the *RAF Yearbook* and *RAF Gulf Special*. No 617 Sqn was at the forefront of the RAF's contribution to the liberation of Kuwait. Following the 22 August 1990 announcement that Tornados would be deployed to the Gulf region, the squadron was in the vanguard in providing seven two-man crews which aircrew formed an integral part of the force of 48 pilots and navigators together with 12 aircraft. The Tornados were all Mk 103-engined examples from RAF Germany which required the crews to route to the Gulf via Germany. On 25 August the crews left Marham for RAF Wildenrath and thence to Muharraq,



Top: In desert 'sand' camouflage Tornado GR1s carrying TIALD pods were operated by No 617 Sqn crews from Tabuk in February 1991. Peter R March Above: The GR1s returned to their normal north European camouflage early in 1992, carrying the two letter tail code prefixed M. Daniel March

Bahrain. A month later four more crews and a further two aircraft were deployed to bolster the force in situ should the Iraqi forces threaten other Gulf states. No 617 Sqn groundcrew were, however, deployed to Tabuk in Saudi Arabia to set up the second RAF Tornado GR1 operating base.

Tabuk, in the north-western part of Saudi Arabia, was home to a squadron of Royal Saudi Air Force Northrop F-5Es and offered little in the way of an operating base for the RAF Tornados. Over the next weeks the ground party worked miracles in setting up an operable facility, allowing the Tornado aircraft to relocate on 9 October under the command of No 617's 'boss' Wing Commander Bob Iveson. The Tabuk unit became 'combat ready' by the end of October. Rotation with fresh personnel started at the beginning of December and virtually all the squadron's aircrew were back in the UK by Christmas.

However, with the United Nations deadline set for the Iraqi withdrawal from Kuwait on or by 15 January after which date force could be used, six Gulf-experienced crews returned to Bahrain on 5 January 1991. On the night of 17 January these crews took part in attacks on airfields at Al Jarrah and Shaibah using the effective JP233 runway denial weapon. Low-level sorties continued for six days after which time the bombing campaign switched to medium level with the Tornados carrying loads of 1,000 lb high explosive bombs or laser-guided bombs (LGBs).

On 23/24 January another two crews and aircraft deployed to Tabuk as attrition replacements. These included Wing Commander Bob Iveson who immediately became the only British pilot to fly offensive operations in both the Falklands and Gulf Wars. The two crews were joined by a further pair when it was decided to rush the Thermal Imaging and Laser Designating (TIALD) pod into operational use. TIALD was still under development with only two pods existing at the time of

the decision. However, Wg Cdr Iveson was tasked to conduct TIALD operations which commenced at the beginning of February and gave the Tornado force a designating system to undertake precision attacks which, along with JP233, were to be the hallmark of the Gulf Aerial War.

During this traumatic period in the squadron's history the No 617 Sqn crews flew a total of 154 missions from both Tabuk and Bahrain. Following the end of hostilities the crews began returning to Marham on 10 March with the final aircrew departing Bahrain on the 20th of the month.

After the completion of the Gulf War it was soon realised that life, due to the warming of east-west relations and the dissolution of the Warsaw Pact coalition, would not return to quite the same pattern. Following the Government's 'Options for Change' policy it was announced that the RAF's maritime Buccaneer jet force would be withdrawn in 1994 and that its place would be filled by two squadrons of *Sea Eagle* equipped Tornado GR1Bs. No 237 Operational Conversion Unit was disbanded in 1992, the limited Buccaneer training commitment still required being taken up by No 208 Sqn. This move was to be followed by the relocation of No 27 Sqn from RAF Marham to RAF Lossiemouth during 1993 to become No 12 (Designate) Sqn. No 12 (Buccaneer) Sqn would remain in situ until the Tornado work-up was complete when it would stand down. No 617 Sqn would move from RAF Marham to Lossiemouth in 1994.

Unlike No 27 Sqn, however, No 617's 'number plate' is to remain active. No 208 Sqn will be retained in the short term at Lossiemouth whilst No 617 Sqn completes its role conversion, after which it will finally retire the last Buccaneers. From that point in late 1994 onwards, No 617 Sqn will take on a primary tasking as part of the SACLANT force operating under No 18 Group. It is however intended to keep both maritime Tornado squadrons current in their present role as part of SACEUR's tactical reserve.

Before this takes place the continuing problems in the Persian Gulf region have necessitated coalition forces again deploying to Saudi Arabia. In an operation named *Southern Watch* and codenamed Operation *Jural* for the RAF portion, six Tornado GR1 and GR1A aircraft from RAF Marham deployed to Dhahran on the morning of 27 August 1992. The deployment was led by No 617 Sqn with No 2 Sqn providing half the crews, ground personnel and aircraft, and was required to be in place by 14.15hr GMT on 27 August for the promulgation of the 'no fly zone' in southern Iraq. The deadline was met by a non-stop flight by three TIALD-equipped Tornado GR1A aircraft from No 617 Sqn – ZD849/AJ-P, ZA462/AJ-M and ZA393/AJ-T – plus three reconnaissance Tornado GR1As from No 2 Sqn. The respective ground personnel and tanker assets had preceded this force two days earlier. Unlike the previous occasion the squadron deployed to the region this time they were in a position to take with them their own aircraft, having transitioned to the Mk 103 RB199 engined versions following the withdrawal of three Laarbruch-based squadrons under the 'Options for Change' policy.

The No 2/No 617 aircraft were once again painted in desert pink colour scheme, with squadron insignia position to the top of the fin. No 617 Sqn has also chosen to re-adopt the style and system of coding on its aircraft used during its WW2 operations with the Avro Lancaster. The original squadron markings adopted in 1982 comprised black nose bars outlined in red with a red lightning flash superimposed on top. The black fin tip also gained a red lightning flash drawn from the squadron's official badge which portrays a breached dam wall with three lightning flashes descending into the breach. Individual aircraft coding began with numerals commencing '01' but was changed soon afterwards to a single letter system, in turn replaced by two letters with the squadron prefix adding the letter 'M' to the single letter already in use. In 1992 the squadron adopted its wartime code letters 'AJ-' as a prefix, an appropriate link to the formation 50 years ago for its specialised role.

The Gulf detachment, on-going at the time of writing, was taken over by crews and aircraft from RAF Bruggen in December 1992. No 617 Sqn crews not involved in *Operation Jural* continued their training which was to culminate once more in participation in a *Red Flag* exercise during October 1992 with the aircrew returning from Dhahran to participate.

For 1993 the squadron faces a new challenge with the beginning of the workup for its maritime role. It begins this with a new commanding officer, Wing Commander John Dickenson, a former Jaguar pilot whose initial task will be to initiate the squadron into the 'art of Buccaneer operations'. No mean task but one that will aptly demonstrate the versatility of the Tornado GR1 and the professionalism of the crews. The workup will be based on lessons learnt by No 27 Sqn which undertakes conversion first at Lossiemouth. 50 years on from the famous Dams raids, for which it was formed, No 617 Squadron takes on a new 'over-water' role for the RAF with its specially modified Tornado GR1Bs.



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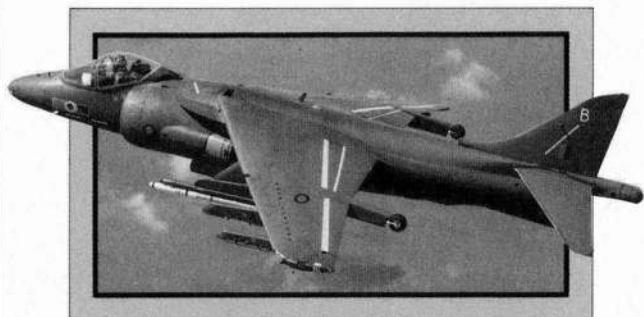
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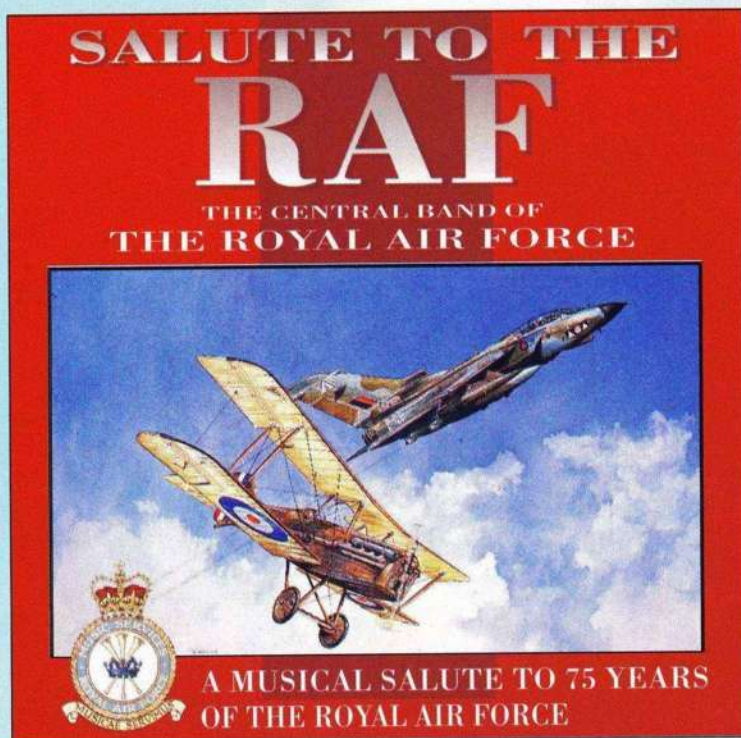
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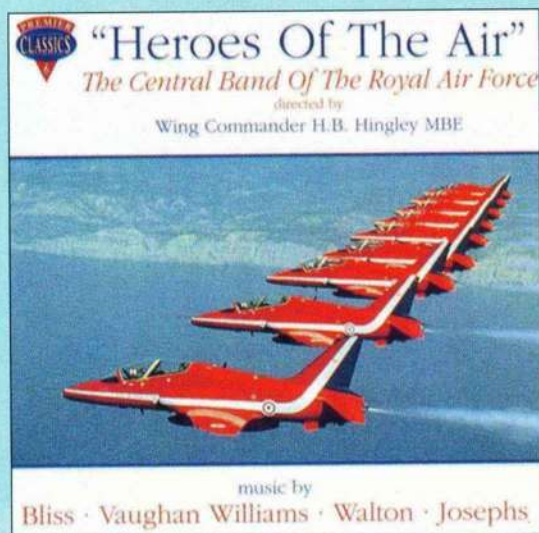


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MIRROR MIRROR...

Peter R. March visits Chivenor and Valley to look at the new advanced and tactical weapons pilot training course and asks if this produces...*the fairest of them all?*

There has been a major change in the overall structure of RAF fast jet pilot training courses in the past couple of years, culminating with the introduction of new combined advanced flying and tactical weapons training courses in the autumn of 1992. Until recently Basic Flying Training (BFT) was conducted at No 1 FTS RAF Linton-on-Ouse or No 3 FTS RAF College Cranwell on Jet Provost T3A/T5As or at No 7 FTS RAF Church Fenton on the new Tucano T1. In mid 1992 the latter base ceased its training role and its aircraft were re-allocated to Linton and Cranwell; the unit title was transferred to RAF Chivenor with effect from 1 April 1992. By mid-1993 all BFT pilot training will take place on Tucanos; the 40-years 'side-by-side' training line from the Percival Provost

adopted in 1953, through the Hunting Jet Provost T3/T4 (from 1959) and the BAC Jet Provost T5 introduced ten years later, will have come to an end.

After the BFT course the potential fast jet pilots went on to No 4 FTS at RAF Valley for 75 hours of Advanced Flying Training (AFT) on the Bae Hawk T1. This flying skills course comprised general handling, instrument flying, low-level navigation and formation flying. On successful completion they were awarded their pilots' wings before moving on to either No 1 Tactical Weapons Unit (TWU) at RAF Brawdy or No 2 TWU at RAF Chivenor. Here, in a 52 hours flying course, they were taught how to operate the Hawk T1A tactically as a weapons platform. Essentially this was a preparation

for the ensuing conversion to a front-line fast jet at the appropriate Operational Conversion Unit (No 226 Jaguar, No 228 Phantom, No 229 Tornado F3, No 233 Harrier, No 237 Buccaneer or the TTTE/TWCU for the Tornado GR1.

It was rumoured in mid-1991 and confirmed in January 1992 that the separate AFT and TWU pilot training courses were to be merged into single 100 hour 'Mirror Image Programmes' to be run concurrently at Valley and Chivenor. This meant that No 4 FTS at Valley would add tactics and weaponry to its advanced flying training task and No 2 TWU at Chivenor would introduce AFT ahead of tactical weapons training, being re-named No 7 Flying Training School and transferring from RAF Strike to Support Command on 1



Top: The newly completed 'Valley' building is seen behind this detached 4FTS Hawk at Chivenor in November 1992. Above: The first grey painted Hawk T1As arrived at Valley from Brawdy in May 1992; this aircraft (XX190) was allocated to 4FTS/3 Sqn which became No 74(R) Sqn, in whose colourful markings it now appears.

All photographs Peter R March unless otherwise credited



Above: In September 1992, Chivenor based Nos 63 and 151 Sqn, equipped with Hawks, became Nos 19(R) (light blue/white checks) and 92(R) (red/yellow checks) Sqn respectively. Geoff Lee, BAe

April 1992. There was no place for No 1 TWU at Brawdy in this new structure so it was closed down on 31 August 1992, with many of its weapons capable Hawk T1As and its instructors transferred to Valley to provide the tactical weapons element of the new advanced flying course. Some of the 4 FTS basic Hawk T1 pilot training aircraft were sent to Chivenor along with experienced QFIs to assist with the provision of the AFT element. In order to 'phase in' the new course both Valley and Chivenor first introduced 'sequential' courses containing the key parts of the forthcoming training schedule, in which some AFT graduates remained at 4 FTS for a separate 35 hours of tactics and weaponry and others went to 7 FTS for similar training, during the summer and autumn of 1992.

The first genuine all-through 100 hour 'mirror image' courses received their first students at the two training bases at the end of September 1992. By necessity there had to be a great deal of preparatory work at both stations before this could happen, in terms of facilities, buildings, equipment, flying operations and of course by the instructional staff. The introduction of the TW element at Valley probably called for the greater changes. In April 1992 the first of No 4 FTS's Qualified Flying Instructors (QFIs) went to Brawdy for Tactics Instructor Training. At the same time the first of the grey-painted Hawk T1As (essentially a new type) were delivered to Valley ready for the introduction of the 100hr syllabus in May. Facilities for film processing were in place by June and the first Tactical Instructors from Brawdy had been trained as Qualified Flying Instructors at Valley. Student tactics training commenced and preparations were put in hand at Chivenor for Weapons Detachments from Valley.

It was clear from the outset that air space, low-flying areas, ranges and runway availability etc were not equally accessible to both of the FTSS. Whereas Valley has a well-placed relief landing ground at nearby RAF Mona to take some circuit work, the North Wales airfield is too far away from the weapons range at Pembrey in South Wales for regular training operations without increasing transit flying. On the other hand Chivenor has no alternative airfield nearby but has ready access to Pembrey just a few minutes flying across the Bristol Channel. It was decided at an early point that No 4 FTS would have to detach students, instructors and aircraft

for their range work in the air to ground weapons phase of the new AFT/TW course, to Chivenor on a regular basis. With already overcrowded training buildings, discrete accommodation was therefore built at the head of the northern flight line. This was completed by the end of September 1992, ready for the first Valley students (on a Sequential Course) to use it in November.

More tactical flying from Chivenor inevitably puts pressure on an already busy airfield circuit – just the conditions you do not want for the students in the early stages of their conversion from the Tucano to the Hawk. With RAF St Mawgan, some 50 miles south, adopting a new role in 1992, which meant that its circuit would normally be somewhat quieter than when the Nimrod OCU was based there, it was decided that the ab initio Hawk pilots would detach to the Cornish airfield on a daily basis for the early part of the AFT element. Resolution of Valley's airspace problem for air-to-air firing and air defence exercises was also overcome by successfully negotiating with the Test & Evaluation Establishment at Aberporth to use the northern part of its Irish Sea danger area (EGD201), with radar control and fighter interception being provided by No 144 Signals Unit at Ty Croes. The first air-to-air firing exercise was flown from Valley in August 1992, using a flag-towing Hawk from Brawdy, and full air defence exercises the following month. The immediate problems had been overcome.

The inadequate accommodation at Chivenor for the wider training task necessitated a major development programme. Since re-opening in 1980 many of the old WW2 buildings, but certainly not all, have been replaced. Modern air traffic control, operations and headquarters facilities were already in use, but it was apparent that extensive on-going building work would be needed. Evidence of the importance attached to the station's



The old order – Hawk T1 of No 4FTS (nearest) for advanced flying training at Valley; Hawk T1A of No 1 TWU/79 Sqn RAF Brawdy (centre) and Hawk T1A of No 2 TWU/151 Sqn RAF Chivenor for tactical weapons training. BAe

No 19(R) Sqn's variously coloured Hawks on the flightline.



We hold at runway 28...



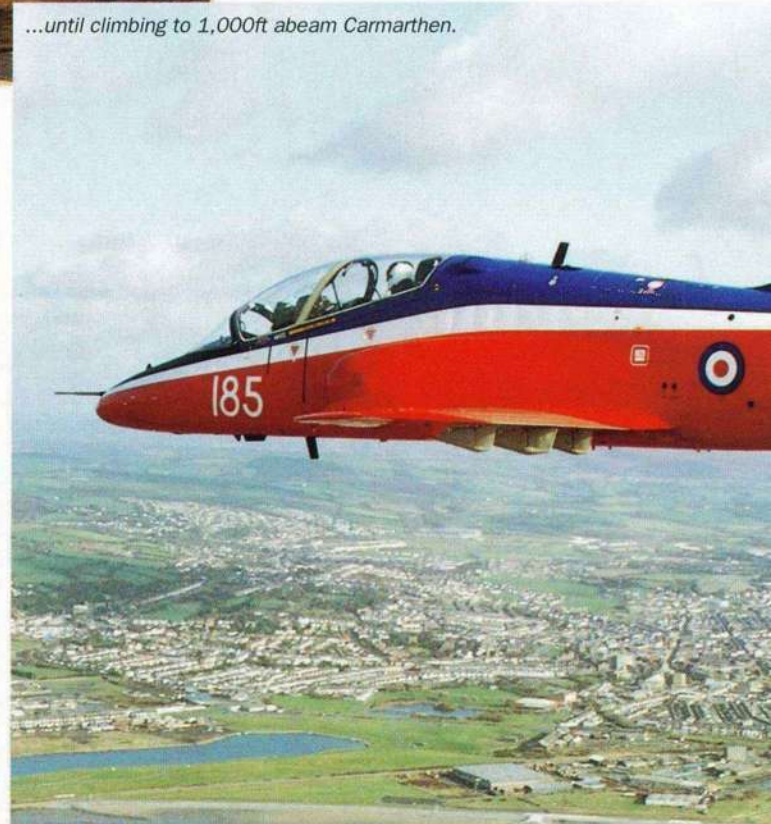
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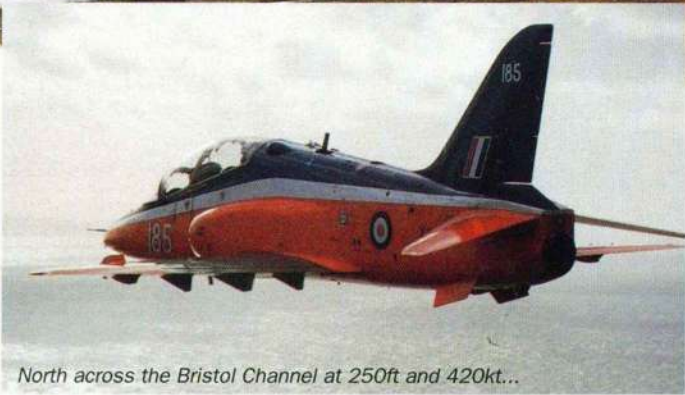
new role can be judged by the speed at which a £12 million programme has been implemented to up-grade engineering facilities, provide extensions to the ground school, new squadron buildings and the provision of extra Officer's Mess accommodation. Already in use by November 1992 was an additional Hawk T1A simulator moved in from Brawdy, with preparation for a third one under way.

Although not so extensive at Valley there were building needs here directly resulting from the introduction of the TW element. Facilities had to be provided for the processing of cine film, the station armoury had to be extended and a 'forward' (ie; near to the flight line) ammunition store constructed. Additional accommodation was also needed for the training squadrons, which was met by the provision of five portakabins, and storage for the banner towed 'flags'. With the introduction of a 'new' aircraft type – the Hawk T1A – engineering equipment, spares and appropriate extra 'bays' had to be made available, to cope with 48 Hawk T1/T1As allocated to the station.

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Organisational changes were also made as a consequence of the new course, adjustments to instructor training, a modified role for the Central Flying School (CFS) Hawk Squadron (also resident at Valley) and at Chivenor the 'mirror image' partner. As No 2 TWU in RAF Strike Command, Chivenor had operated two self contained squadrons (Nos 63 and 151 Sqns), each with its own instructors, accommodation, allotted aircraft and personnel, very much on the lines of a front line squadron. On transfer to Support Command on 1 April 1992 it was decided to maintain this arrangement (although the 'reserve' squadrons were changed on 23 September 1992 to Nos 19(R) and 92(R) respectively) and to adopt it at Valley. On 5 October 1992 No 74(R) Squadron took over from 3 Sqn of 4 FTS under the command of Sqn Ldr Richard Fallis; it had been planned that 2 Sqn would wait until mid-1994 to adopt the mantle of No 208 Sqn, but in November 1992 it was decided that in the interim its aircraft would operate as No 234(R) Sqn, that had been disbanded at Brawdy in August 1992.

The first four (including two WRAF) students for the first true 'mirror image' course arrived at Chivenor for Course CV01 at the end of September 1992; at the same time six student pilots started Course VY01 at Valley. Five weeks of ground school with eight 'flights' in the Hawk simulator, gave them the necessary background on the aircraft before the Initial Flying Phase commenced in November. The first six hours of conversion exercises (convex) introduced elementary handling, stalling and circuit work prior to their first Hawk solo flight. Once this important step was over they went on to practice emergencies, instrument flying and more extreme handling manoeuvres, all the while

continuing with training 'flights' in the simulator. After some 25 hours of convex the students had their first progress check, which cleared them to progress on to more applied flying.

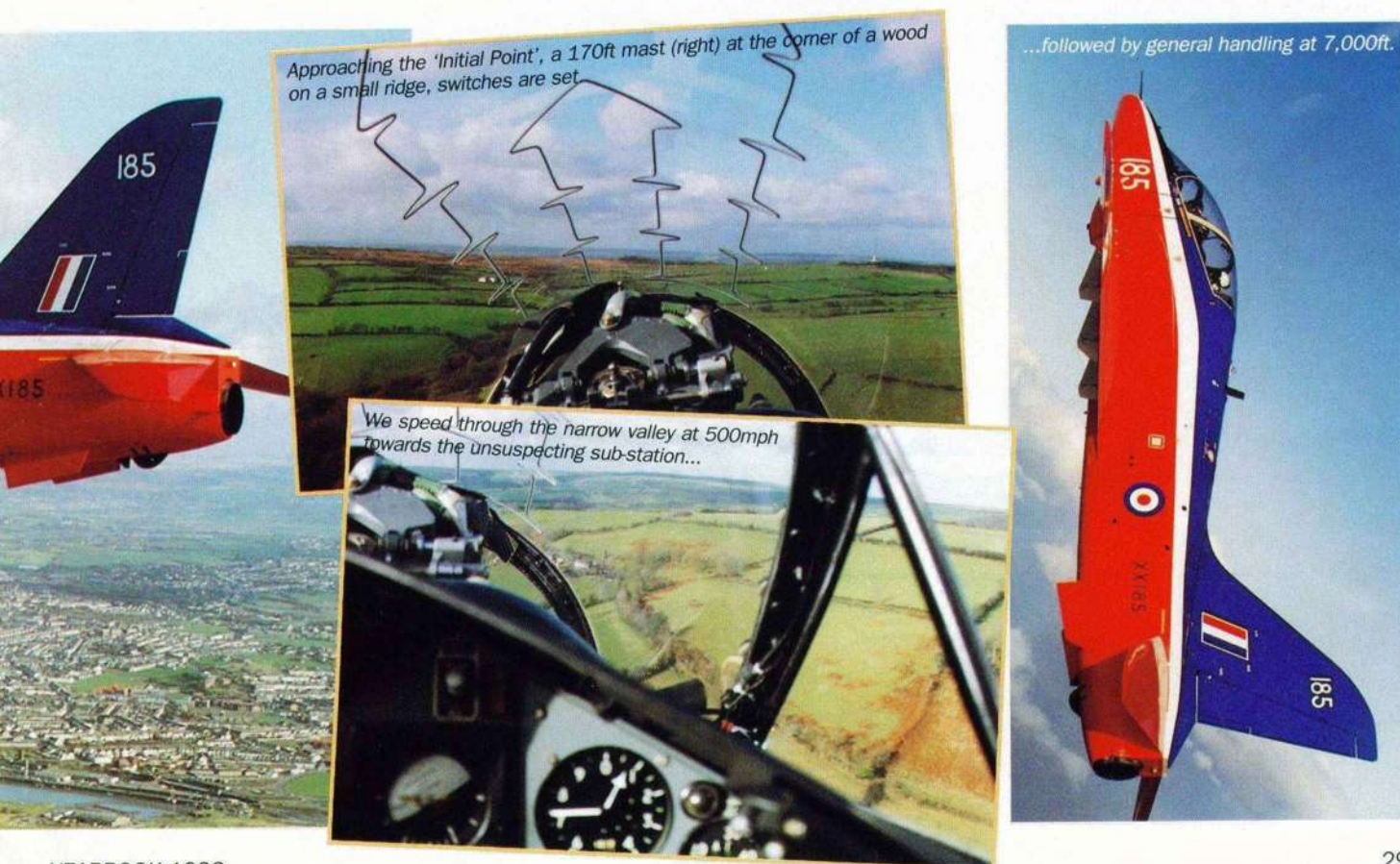
The extension of their flying skills on the Hawk introduced the students to low-level navigation and close formation flying followed by tactical formation flying at medium and low level, longer flights at various levels and night flying. This 45 hours dual and 20 hours solo flying, together with 24 hours in the simulator, brought them to the conclusion of the initial phase and directly on to apply their abilities to the Tactics & Weapons Phase, the old TWU course. For the first time these students on the new courses did not have to wait at this point for a space on a TWU course at Chivenor or Brawdy, make a physical change of base (and command), encounter new instructors and new fellow trainees and all the other disruptive things that inevitably occur. They had already learnt some of the applied flying skills not previously taught at Valley and now continued with the same squadron, instructors, ground staff and colleagues that they were already familiar with. This is one of the very positive factors in the new course, and one which allows it to be so dramatically shortened.

The TW phase introduces the student to weapons delivery, air combat manoeuvres, gunnery, dive bombing, strafing, air-to-air weaponry. Once this has been mastered the air defence phase commences with one versus one and two v one tactics using the AIM-9 Sidewinder air-to-air missile (or at least an acquisition sensor pod). The techniques of air interception coupled with air combat then follow in preparation for putting it all together for the final part of the course – Simulated Attack Profiles. In the words of a student "When you get onto

SAPs you really are working very hard. It's the culmination of the course – putting all the new found flying and tactical skills together and applying them to an operational exercise. It is very real – you get so involved that it is hard to believe when you look at the film in debrief that you did not actually destroy the target".

The SAP initially combines tactical formation flying, air-to-ground weaponry, low-level navigation, evasion and target attack, with air-to-air weaponry and air combat added in the latter stages. This is part of the key process of transforming the newly fledged student pilot fresh from the Basic Flying School to become a fighter pilot ready to tackle the rigours of an Operational Conversion Unit and ultimately join a front-line Tornado, Jaguar or Harrier squadron.

I took part in a typical SAP training mission as a 'mirror image student' with No 19(R) Sqn on a bright, showery winter's day at No 7 FTS Chivenor. With 'my instructor' Flt Lt Greig Thompson, a Tactics Instructor with 19 Sqn, and the crew of the second Hawk in one of the squadron's tiny classrooms, we briefed for SAP 2 – a pairs co-ordinated simulated attack on an electrical power sub-station north of Carmarthen. The Air Task Message (ATM) – the statement of the mission that we were to fly – including target information and timing, had been given to the student leader earlier and he had prepared the necessary maps, plotted and timed the route into the target and back to base, found the appropriate reconnaissance photographs, checked the weather in the target area, calculated fuel requirements and booked into the low-flying area and a period of time on target, to avoid conflict with any other training exercise. The critical departure time was identified to ensure a precise time on target (TOT) for the first of two attacks. It was planned to



do a dive attack 'as enemy defences were reported to be light'.

Some 25 minutes before take-off we walked out to the two lines of multi-coloured Hawks on 19's dispersal, south of the old control tower. We had a pair of ex Valley red, white and blue painted T1s, one of which had been up-graded to 'T1W', having the necessary modifications for the carriage of weapons. After completing pre-flight checks the formation pair, callsign *Kelly*, taxi out to runway 28. After waiting for a pair of practice emergency landings, which puts us a couple of minutes late for our initial TOT, stop watches are 'hacked' as we commence a close formation take-off. Moments later we are heading north past Baggy Point at 250ft and 420kt, remaining tight for some photography before breaking out into standard Hawk battle formation – 2000yd line abreast across the Bristol Channel.

On reaching the Gower coast we check with Swansea air traffic control for information on any light aircraft in the area and climb to 1000ft before passing abeam Carmarthen. Dropping back down to 250ft in the designated area

north of Llanelli we start our meandering, contour-hugging route towards the Initial Point (IP) for our target run. All turns are made so that we enter and leave in good battle formation. Approaching the pre-identified IP, which is the corner of a wood abeam a 170ft mast on a small ridge line, we replace the 1:500,000 scale map with a detailed 1:50,000 OS map, select bombing mode on the gunsight and dial in the calculated drift. At the IP Greig, who is leading the first attack, calls 'switches' and re-sets the stop-watch. We are now accurately following the line on the OS map as we speed through the narrow valley at 500mph towards the unsuspecting electrical power sub-station.

Suddenly we pitch up skywards – we have reached the pull-up point. At 2,000ft, the apex of our short climb we overbank to 120deg, turning port through 60deg and make a ten degree dive towards the target that has now been acquired in the sight. Our bomb safety flap is opened, starting the cine film, to prepare for a simulated bomb release. As soon as our 'weapons' are released

the flap is closed, simultaneously stopping the cine. We make a seat-pressing 5G recovery back to level flight at 250ft and a hard turn to port clearing the target. Meanwhile the second Hawk had remained in battle formation until mid-way down the run from the IP when he made a crossover manoeuvre to fall line astern to give a ten second spacing over the target. Once he called 'off target' we turned back onto track, with No 2 going straight ahead again in battle formation. Although I was convinced that we had eliminated the sub-station we make a repeat attack with the other Hawk taking the lead.

Returning south to Chivenor we climb to 7,000ft for a handling exercise culminating in a practice engine failure and emergency recovery back to base. A couple of quick 'touch and goes' in the very busy Chivenor circuit end a fascinating airborne insight into a typical training sortie for a student pilot nearing the conclusion of the tactical flying phase of the new programme. Once on the ground the exercise is still far from over. The all important debriefing is held back in the classroom, where both the instructors and their students analyse the 50 minutes flying, to identify the mistakes and underline the good points. This SAP-2 concentrated solely on the navigation, flying and weapons delivery. It will be followed by a similar mission but with the added distraction of a 'hostile aircraft' intercepting the pair of Hawks, introducing evasion and air-to-air combat.

On successful completion of SAP7, a



Left: Chivenor's Station Commander Gp Capt David Norriss (centre) with the first course (CV01), from left to right – Flt Lt Andy Quick, Fg Off Helen Dobbs, Fg Off Kate Cavaciuti and Plt Off Jim Haskins. Nige Marks

Below: Chivenor will have a £12 million up-grade programme for its facilities. Geoff Lee, BAe



very demanding integrated exercise at the end of 20 hours dual and 15 hours solo flying (plus 8 hours in the simulator) of the TW Phase, the student is at last awarded his or her 'wings' brevet and anxiously awaits news of his next destination - Jaguar, Tornado or Harrier OCU. There is one thing that is certain, the course they have just completed at Chivenor or Valley has laid a sure foundation for the student's front-line flying with the RAF, when he/she eventually gets there. This is due in no small way to the skill and determination of the instructing staff at both of the Flying Training Schools.

Adoption of the new course for student pilots has also brought about major changes in Hawk flying instructor training. With the combined need for Qualified Flying Instructors (QFIs) for the Initial Flying Phase and Tactics Instructors/ Qualified Weapons Instructors (QWIs) for the final Tactical Weapons third of the course, the training of instructors has had to be re-structured. The CFS Hawk Squadron at Valley which was solely responsible for training QFIs for No 4 FTS now shares the responsibility for Hawk instructor training with Nos 74 and 234 Sqns at Valley and Nos 19 and 92 Sqns, together with the Weapons Instruction Flight, at Chivenor. The previous 60 hour Hawk QFI course with the CFS Sqn has been reduced to 45 hours, sandwiched between a similar length initial MIPETT 'Mirror Image Pre-employment Tactics Training' course with the squadron that the new instructor is joining as a staff member, and a final 15 hours TI work up back with the squadron.



No 74(R) Sqn of 4 FTS leaves no doubt as to which squadron at Valley operates this all-black 'Top Cat' Hawk. RAF Valley

Therefore a new 4 or 7 FTS instructor fresh from a front-line tour undertakes a 105-hour course to become a QFI/TI and to reach QWI standard a further three-months course with the Weapons Instructor Flight at Chivenor is required.

What might have appeared a rather inconsequential announcement in January 1992 about the introduction of a shorter 'mirror image' pilot training course at Chivenor and Valley is without doubt a major and very significant change. Its

introduction has not been without controversy, but that can be said of most departures from established practice in the RAF throughout its 75 years history. The success or otherwise of this new route for training fast jet pilots will take some time to establish. In the meantime the instructors at Chivenor and Valley are solidly determined to make it work to the best advantage of the students and from the 'mirror' produce for the RAF 'the fairest pilots of them all'!

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Above: Bulldogs and Hart Fighters of No 23 Sqn lined up at Biggin Hill. Left: Hawker Demon K2848 – the seventh production aircraft – of No 23 Sqn taking off over the Bromley-Westerham road on 1 June 1934. Photographs James D Oughton collection



October 1992 saw the parting of the ways for Biggin Hill and the Royal Air Force. Indeed this was the end of a 75-year era for the world's most famous fighter station, which opened during the days of the Royal Flying Corps in World War 1. Actually the RAF ceased flying at Biggin Hill in February 1959, when ownership of the airfield was passed to the local authority. However, the RAF retained the administrative area and buildings, together with two hangars, and the Officers and Aircrew Selection Centre (OASC) moved there in 1962. In July 1992 the last candidates attended Biggin Hill prior to the OASC moving to new purpose built accommodation at RAF Cranwell, Lincs in September the same year.

Fortunately one small part of RAF Biggin Hill will remain when the bulk of the site is



Right top: J7283, the first production Grebe II fighter that was used for service trials with No 56 Squadron at Biggin Hill in September 1924. Right: A Vickers-built Siskin IIIA (J9895) of No 56 Squadron at Biggin Hill in 1927. Photographs James D Oughton collection



Right: Replica Spitfire VIII, displayed as Mk I 'N3194'/GR-Z, stands outside the RAF Memorial Chapel along with a replica Hurricane IIC which is displayed as Mk I 'L1710'. Brian Strickland



END OF AN ERA

Flt Lt Oliver Andrews

passed to the London Fire Brigade as a training centre. The RAF Chapel which was dedicated on 10 November 1951 as a permanent memorial to the Few, together with the two representative veterans of WW2 – a Spitfire and a Hurricane, will continue to be open to the public. So RAF Biggin Hill will not be entirely erased from the map! Several buildings, including the Officers' Mess, are likely to be made the subject of preservation orders.

The airfield with an elevation of 600ft on the chalk escarpment of the North Downs is one of the highest points in Kent. A flat field of some 75 acres was initially acquired for a Wireless Testing Park in 1916. The following year saw the establishment of wooden huts, tents, a canvas hangar and RFC Biggin Hill first opened for flying when an RE7 landed in January 1917. In the early days of Biggin a lot of experimental and design work with wireless telephony was undertaken. Many Bristol Fighters were fitted with air-to-air wireless equipment at the airfield prior to going to France. Fortunately much encouragement was given by Major General (later Marshal of the Royal Air Force Lord) 'Boom' Trenchard, and the RFC developed a much more effective air-to-air wireless system than the Germans.

No 141 Sqn was the first operational squadron to be based at Biggin Hill, being posted there on 8 February 1918 with Bristol Fighters, each of which had a bright red cockerel painted on the fuselage. When the Royal Flying Corps (RFC) and the Royal Naval Air Service (RNAS) amalgamated to form the Royal Air Force (RAF) on 1 April 1918 Biggin Hill became the centre for all wireless research. In that year the Officers Mess, barrack blocks, laboratories and a concrete 'Belfast' hangar were built and more fields requisitioned to enlarge the aerodrome, to enable the Handley Page O/400 and DH10s to operate.

In 1923 the Army moved into the South Camp to form an Anti-Aircraft School and

Searchlight Experimental Establishment, but still working closely with the RAF acoustical section. For most of the 1920s not a lot of flying was undertaken at Biggin. Just before the end of the decade an extensive building programme was started to give a new technical site, hangars, workshop, additional barrack blocks and administrative offices. Some of these buildings still remain though many were destroyed by enemy bombs in 1940.

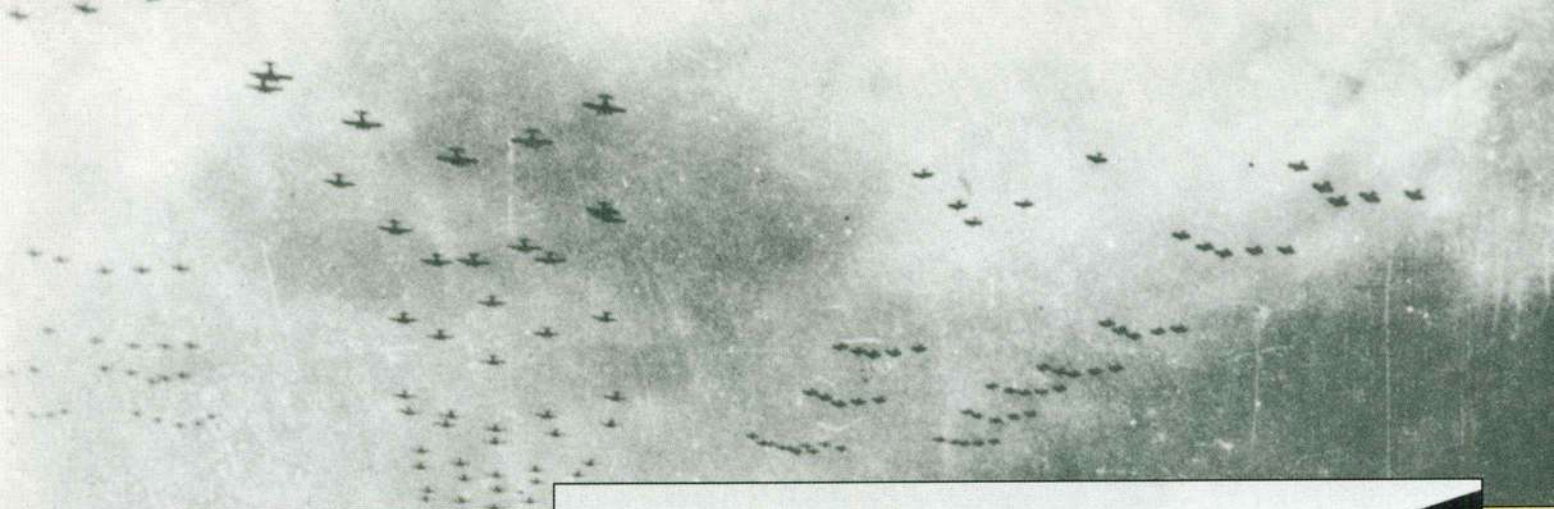
In 1932 two squadrons moved in from Kenley, No 23 with Hawker Demons and No 32 with Bristol Bulldogs. A new unit, the Anti-Aircraft Co-operation Flight was formed at Biggin Hill to provide training for the growing number of AA sites in the Home Counties. No 23 Sqn left for Northolt in December 1936, but No 79 Sqn re-formed from 'B' Flight of No 32 Sqn, equipped with the Gloster Gauntlets soon after. More married quarters were erected in 1938 and, following the Munich Crisis of that year, No 601 (County of London) Auxiliary Sqn was formed, also with Gauntlets. Nos 32 and 79 Sqn re-equipped with the Hawker Hurricane in 1939, shortly before the outbreak of WW2. Following the reorganisation of the RAF Command

structure in 1936 Biggin Hill came under the new Fighter Command, with its headquarters at Bentley Priory, Middlesex.

Shortly after the outbreak of war the main tarmac runway of 4,800ft was constructed. Two other shorter cross runways were subsequently added at a later date. No 79 Sqn, then based at Biggin, became the first to claim an enemy aircraft when it shot down a Luftwaffe Dornier Do17 on 2 November 1939. At the height of the Battle for France Nos 72, 213 and 242 Sqn were based there flying Hurricanes. By the time the Battle of Britain was at its height in September 1940 Biggin was operating a host of Spitfire squadrons including Nos 72, 79 and 610. Between August 1939 and January 1941 Biggin Hill was attacked by the Luftwaffe on 23 occasions. No doubt RAF Biggin Hill's longest weekend must have been between Friday 30 August 1940 and Sunday 1 September when the station was the target of enemy bombing raids on no fewer than six occasions. A great deal of damage was done and there were extensive casualties. Fortunately German raids eased considerably in the Spring of 1941 when the enemy launched Operation



Close-up of K1952, a Hart Fighter of No 23 Sqn. The aircraft in the background is a Vickers Virginia. James D Oughton collection



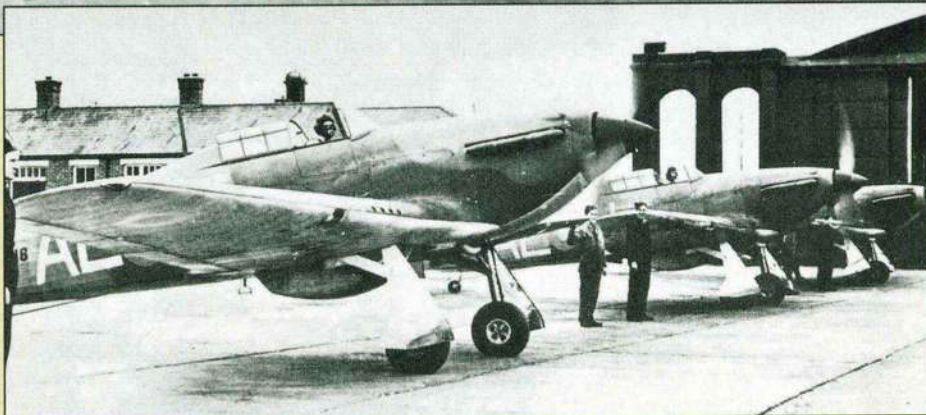
Above: View from the ground during one of the heavy German raids on the airfield during the Battle of Britain. Right: Hurricane Is of No 79 Squadron at Biggin Hill in 1939.

Barbarossa, the invasion of Russia. This respite enabled Fighter Command to turn to the offensive and Nos 72, 92, 264 and 609 Sqns acquired the first Spitfire Vbs, with their two 20mm cannons and four 0.303 machine guns. These squadrons made offensive sweeps over Northern France, with attacks on all types of strategic targets. Convoy escort in the Channel was also provided at this time.

In August 1942 Operation *Jubilee*, the combined raid on Dieppe, was launched and the Biggin Wing claimed 15 enemy aircraft shot down, for the loss of six RAF pilots. That autumn Biggin received its first Spitfire IXs, which were a considerable improvement on the Vbs, in their battle with the Luftwaffe's formidable new Focke Wulf Fw190. By July 1942 the station's score of enemy aircraft destroyed reached 900 – the 1,000th victim was claimed on 15 May 1943. This was a section record, which remained unequalled to the end of the war. September 1942 saw the return of No 609 Sqn, for the third time, newly equipped with the Sabre powered Hawker Typhoon. No 133 Sqn departed and was replaced by Nos 340 and 611 Squadrons. July 1943 saw the arrival of New Zealand squadrons and later that year the Canadians moved in.

Soon after D-Day (6 June 1944) the first V1 flying bombs were launched against London. The close proximity of Biggin Hill to London meant that it was in the middle of 'Bomb Alley' and the station was taken over by Balloon Command. Later in the year various fighter squadrons returned to Biggin Hill, escorting Lancaster and Halifax bombers on daylight raids into Germany. Early in 1945 the fighters were joined by aircraft of Transport Command and Biggin Hill became a terminal for services to the various parts of liberated Europe. In four years of continuous front line fighting more than 1,600 enemy aircraft were shot down by Spitfires and Hurricanes operating from Biggin Hill.

Following the end of the War Biggin Hill was transferred from the famous No 11 Group Fighter Command to No 46 Group, Transport Command. RCAF No 168 Sqn and USAAF No 314 Sqn operated from the transport base with Douglas DC-3 Dakotas. On 13 May 1945, the three RAF Regiment squadrons based at Biggin Hill

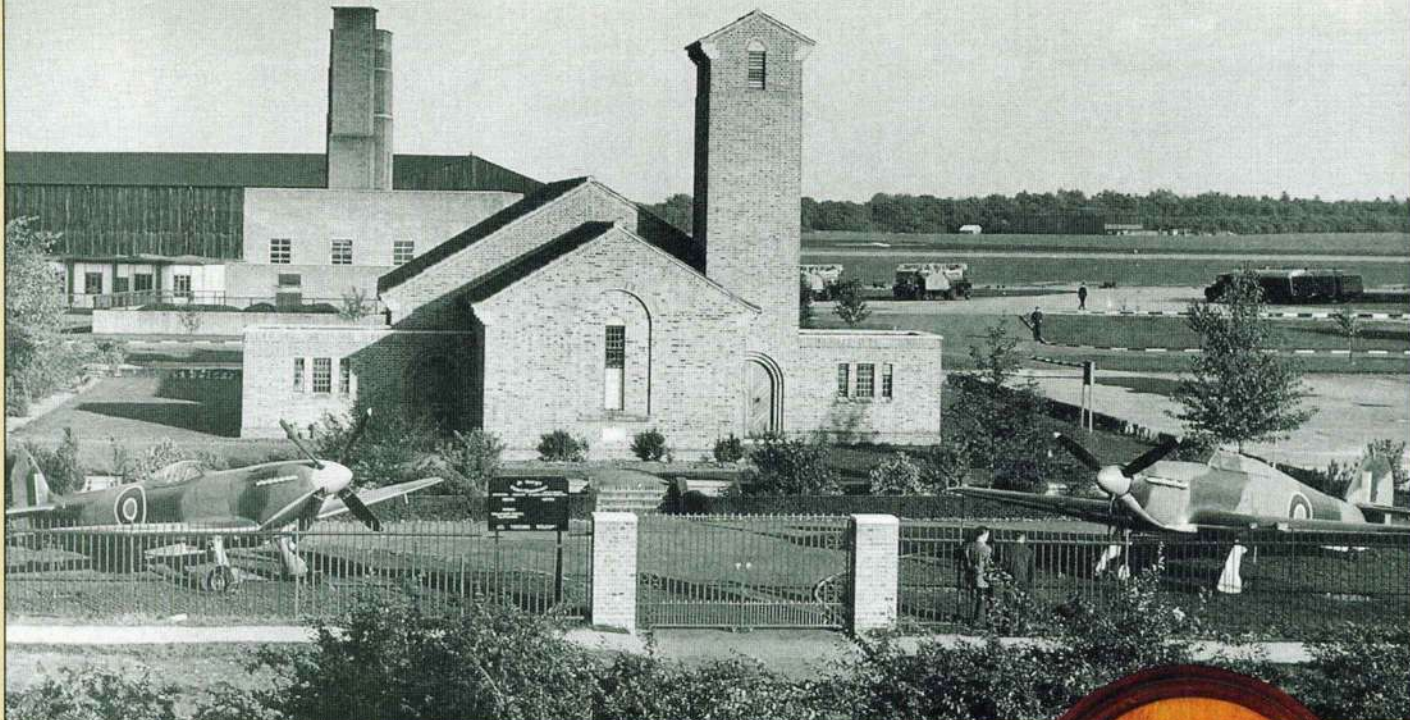


Above: Spitfire FR XIVe of No 600 'City of London' Squadron, Royal Auxiliary Air Force – at Biggin Hill from May 1946 until disbanded in March 1957. James D Oughton collection

represented the RAF at the Victory thanksgiving service in London. A year later in May 1946 the Royal Auxiliary Air Force Squadrons, Nos 600 (City of London) and 615 (County of Surrey) returned 'home' to Biggin Hill. In August 1946 the station was handed to Reserve Command, under whose control it remained until November 1949, when it again switched back to Fighter Command. The Jet Age came to Biggin Hill in 1950 when the two R Aux AF squadrons exchanged their Spitfires for Gloster Meteors. In March 1951 No 41 Sqn, a regular squadron, joined Nos 600 and 615 Sqns, from Church Fenton.

The main runway was extended in 1957 to enable No 41 Sqn to operate the Hawker Hunter. Sadly on 10 March 1957 all auxiliary squadrons were axed in sweeping defence expenditure cuts. This meant that Nos 600 and 615 Sqns were disbanded. The writing was on the wall for





Above: St George's Chapel of Remembrance (seen here in 1955) was dedicated in November 1951 as a permanent memorial to The Few. This Chapel remains in RAF hands and is open to the public.

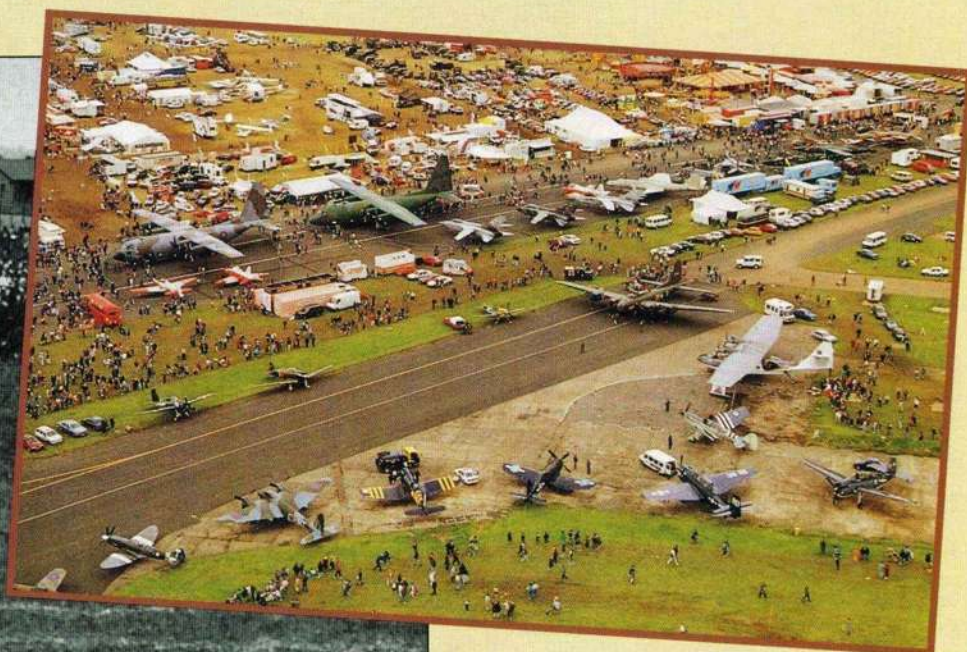
Biggin Hill as a fighter station. With the eventual rundown of Fighter Command, together with the increasingly crowded airspace over South East England, No 41 Sqn disbanded on 31 January 1958. Biggin Hill then took on a new role as No 1 Air Experience Flight was formed in September 1958 for the purpose of providing ATC cadets with flying experience. The unit operated ten DH Chipmunks and the pilots were all former R Aux AF and RAFVR personnel who gave their services on a voluntary basis. However this did not last long as the RAF ceased flying operations there on 7 February 1959 when No 1 Air Experience Flight transferred to White Waltham. The RAF retained the North Camp to house the new Officer Selection Centre which opened in April 1959 and was joined by the

Aircrew Selection Centre three years later. The main block of the Officer and Aircrew Selection Centre (OASC) occupied the site that was once the large Belfast hangar and parade ground.

In 1983 the RAF Benevolent Fund's International Air Tattoo decided to perpetuate the memory of Sir Douglas Bader, one of WW2's most famous fighter pilots, with a scheme for the award of flying scholarships to enable disabled people to learn to fly, and where possible, to obtain a private pilots licence (PPL). Each March some 20 candidates have undergone aptitude tests and medical examination at the RAF's OASC before a special Board convened to select a total of nine plus two reserves. This facility has now moved to RAF Cranwell following the transfer of the OASC to its new location in September 1992.



Above: This plaque, commemorating the Battle of Britain, hung in the bar of the Officers' Mess. Brian Strickland



Contrasting scenes at Biggin Hill: Left: Empire Day crowds gather in 1934. Above: The annual Biggin Hill International Air Fair in full swing. This year's 30th event takes place on 19-20 June. PRM

A total of 453 aircrew were killed while flying from the Biggin Hill sector between 1939 and 1945 and they came from 52 squadrons. Their names are inscribed on the oaken reredos to each side of the altar in the Chapel of Remembrance. The foundation stone for the Chapel was laid by Lord Dowding, C-in-C of Fighter Command during the Battle of Britain, on 25 July 1951 and the Service of Dedication conducted on 10 November 1951 by the Bishop of Rochester. The Chapel contains twelve stained glass windows, each telling a story depicting the spirit of Biggin Hill. There are also the badges of the seven squadrons who served at Biggin Hill during the Battle of

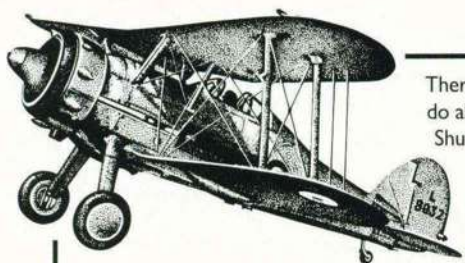
Britain. Outside stand examples of the two famous fighter stalwarts – the Spitfire and Hurricane.

On 20 September 1954 the two 'gate guardians' were placed as a permanent memorial to the Few. More recently the two original aircraft were replaced by replicas to better face the ravages of English weather. For 42 years St George's Chapel has been the place of worship for visitors from all over the world as a lasting memorial to 'The Few' and all those airmen who have lost their lives defending their country while flying.

Today, Biggin Hill Airport is a very busy General Aviation and light aircraft centre. With the closure of Croydon in the late

1950s many operators and flying clubs moved to the nearest available site. Major airshows have also been a feature at Biggin Hill, with the RAF presenting a Battle of Britain Airshow each September for many years. In 1963 the first Biggin Hill International Air Fair was organised by founder Jock Maitland and his son James. Thirty years later the Air Fair remains one of Europe's top displays, attracting participants and visitors from far and wide. Opened prior to the birth of the Royal Air Force, 'Biggin on the bump' features prominently in its history and is a living memorial to the world's first independent air arm that is celebrating its 75th anniversary this year.

Below left: The interior of St George's Chapel of Remembrance showing the inscribed oak reredo to each side of the altar. The Chapel contains 12 stained glass windows, each donated and telling a story, depicting the spirit of Biggin Hill. Below right: The Officers' Mess, only one of two built to this pattern in the 1920s, and now the subject of a preservation order. Photographs Brian Strickland



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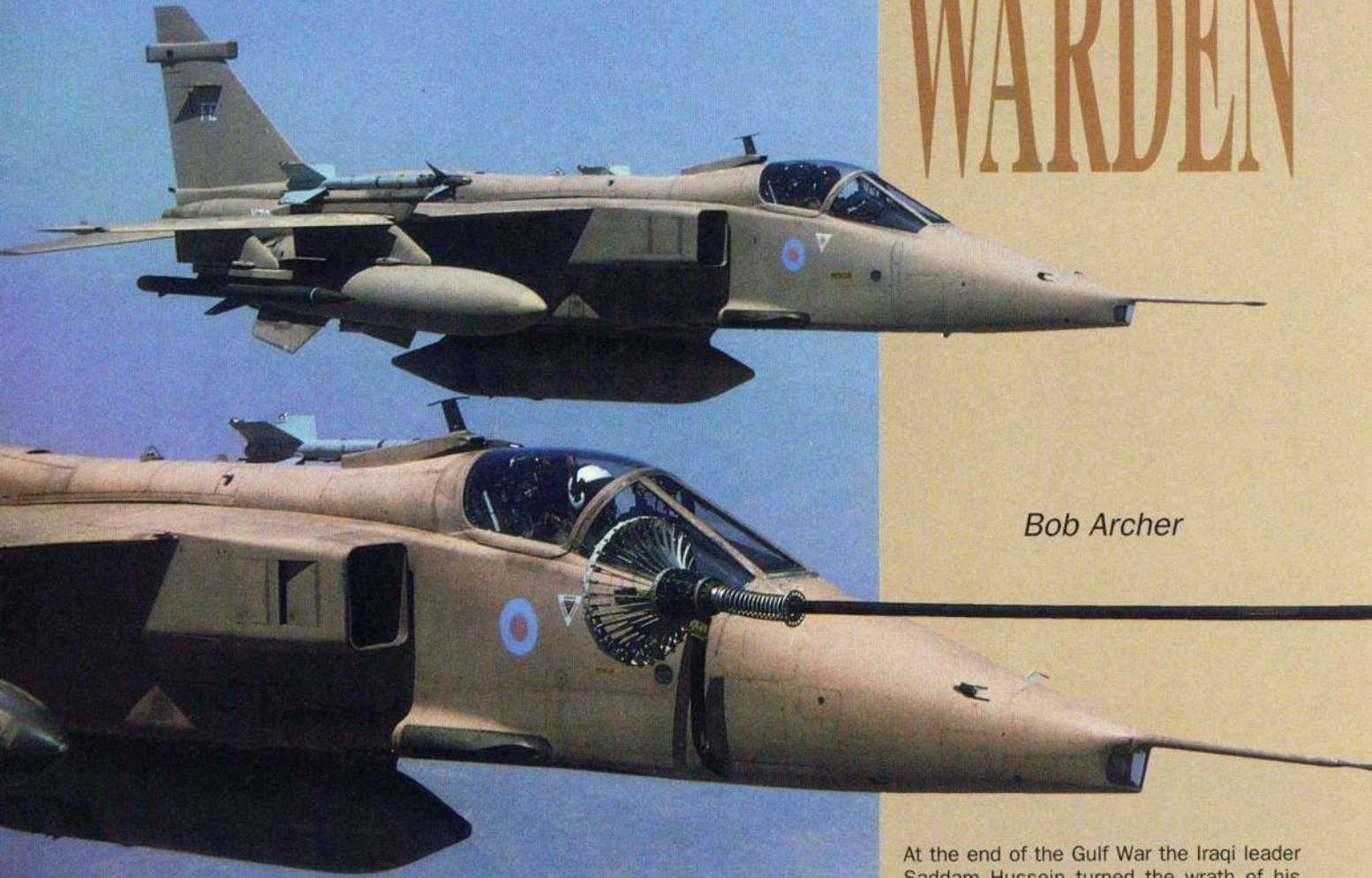
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Main picture: No 41 Squadron's CO Wg Cdr Steve Griggs refuels from a VC10 tanker while wingman Sqn Ldr Dave Froggatt keeps watch. Middle: The detached VC10 K3 of No 101 Sqn parked at the end of the massive apron at Incirlik. Bottom: A desert camouflaged Jaguar GR1A basks in the heat of the Turkish summer, with a white canopy over the cockpit to deflect some of sun's heat. All photographs Bob Archer unless otherwise credited

OPERATION WARDEN



Bob Archer



At the end of the Gulf War the Iraqi leader Saddam Hussein turned the wrath of his defeat, and the humiliation of vacating occupied Kuwait, by launching attacks against ethnic minorities particularly the Kurdish population. In their attempt to escape persecution, the Kurds in the north of Iraq fled to the mountainous region bordering Iran, Turkey and Syria resulting in a massive refugee problem. The United Nations (UN) was quick to respond with thousands of fixed wing and rotary resupply flights before the situation stabilised enabling the professional relief organisations to assume control. To ensure Iraqi forces were prevented from further aggression a comparatively small area was established by the UN as a Security Zone and a safe haven for the Kurdish people. Furthermore the area of Iraq above 36deg N was designated an air exclusion zone to Saddam's pilots. A Military Co-ordination Centre (MCC) was established in the Iraqi town of Zaku a few miles from the Turkish border, where representatives of the UN regularly meet with Iraqi forces in a safe house to discuss all manner of issues.

To ensure compliance with the United Nations resolutions, a Coalition Task Force (CTF) was formed to patrol the area primarily to discourage Iraq from infringement but also to respond in the event of flagrant disregard of the UN edict. With a vested interest in the stability of the region the Turkish government agreed



Jaguar GR1A XZ363 of No 41 Sqn and XZ367 of No 54 Sqn flying the corridor over eastern Turkey near Batman.

Film cassettes are unloaded from the plane by the crew of the No 41 Sqn Jaguar, to be rushed to the ground crew.

to join the coalition, composed of the USA, the UK and France, and for operations to be conducted from Incirlik Air Base.

The majority of aircraft were drawn from the USAF under the operational name of *Provide Comfort*, although a distinct lack of tactical reconnaissance assets in Europe resulted in the British and French governments being asked to provide appropriate aircraft, personnel and support. To enable operations to be conducted effectively by the four nations a Combined Forces Air Component (CFAC) was established.

The Turkish Government agreed to the use of Incirlik Air Base as the most suitable facility for the CFAC to be located due to its proximity to Iraq. The USAF provided the air defence and fighter/bomber role shared with a small Turkish commitment, while the British and French provided the tactical photo reconnaissance element as the US lacked this component in Europe. The French committed eight Mirage F1CRs while the RAF provided a similar number of Jaguar GR1A aircraft to observe and record Iraqi military activity within the Air Exclusion Area (AEA).

The British commitment was formed during August 1991 and given the name Operation *Warden*, with an RAF Group Captain as Commander. John Morley was the detachment Commander for the six month period during the Summer of 1992. The Jaguar GR1A was selected as the most suitable aircraft as its photographic systems record their imagery on film unlike the Tornado GR1A which uses video cameras. In addition the Jaguar is a one-man operation while the Tornado requires a two-man crew.

The eight aircraft assigned to *Warden*

were drawn from all three squadrons stationed at Coltishall, and were painted in the now familiar desert 'pink' scheme. The first four departed Coltishall on 4 September followed five days later by the remaining aircraft. Five of the Jaguars were provided by No 41 Squadron with the remaining three from No 54 Squadron, although frequent exchanges for maintenance in the UK have resulted in contributions by No 6 Squadron also. The No 41 Squadron Reconnaissance Interpretation Centre (RIC), plus support personnel, equipment and spare parts were flown out to Turkey aboard a dozen Hercules flights performed by the Lyneham Transport Wing. A pair of VC10 tankers from No 101 Squadron at Brize Norton supported the Jaguars' non-stop flight to Turkey, with an ongoing detachment to provide air refuelling.

Apart from personnel assigned to the Jaguar and VC10 detachments, British Forces *Warden* was composed of UK Military Air Movement Squadron (UK MAMS) to support the twice weekly Hercules resupply flights from the UK, along with military representatives of the Military Co-ordination Centre at Zakhu.

Although No 41 Squadron was the only Jaguar unit dedicated to photo reconnaissance, both Nos 6 and 54 Squadrons have been trained to enable their aircrews to perform this role. Each Squadron performs two months with Operation *Warden* before being relieved by the next. The CO of No 41 Squadron, Wing Commander Steve Griggs, explained that his unit seemed to perform their detachments to Incirlik during mid-Summer

and mid-Winter when the local weather was at its most extreme. Summer temperatures frequently soared towards 100degF (38degC) while the winter weather was quite often very wet. Each detachment was composed of eight combat ready pilots, together with approximately 60 ground crew, 30 support personnel and 14 RIC staff.

The role of the Jaguar is that of armed photographic reconnaissance with aircraft fitted with a variety of cameras housed in a reconnaissance pod mounted beneath the fuselage. The type of cameras installed in the pod are dependent upon the nature of the targets to be photographed, but normally consist of equipment of mixed focal length. Various photographic sensors are fitted including those with 3" and 6" negative format along with the Vinten 401 infrared linescan system. In addition the 36" Long Range Optical Pod (LOROP) is employed to provide images of subjects up to 20 km distant. The large format negatives provide prints with superb detail enabling senior staff to effectively monitor Iraqi ground activity.

The imposition of the AEA above 36degN has not prevented the Iraqis from continuing to conduct some military ventures on the ground. Therefore, the Jaguars are required to regularly overfly all known military sites and photograph activities to provide constantly updated intelligence. Targets include Iraqi troop concentrations, air defence sites, military airfields (with at least five located above 36degN), railway terminus, barracks, and vehicle parking areas. Whereas many of these are fixed



...o reconnaissance pod beneath RIC for processing.



The portable Reconnaissance Interpretation Centre (RIC) is positioned behind one of the aircraft shelters.



The No 41 Sqn Jaguar pilot reviews the results of his mission in the RIC.



Right: Aerial view of Iraqi tanks and their tracks photographed from the Jaguar during its routine reconnaissance sortie. RAF No 41 Sqn.



locations which require frequent updates to assess the build up of troops and equipment, other items of interest are mobile and therefore need to be regularly assessed. Close up photography of specific targets such as gun emplacements, surface to air missile (SAM) sites and aircraft dispersals are obtained from low level, while horizon to horizon imagery provides the exact position of known and potential targets.

As all of these targets to be photographed are located in Iraqi territory, and are therefore potentially hostile, the Jaguars are fitted with defensive weaponry composed of a pair of AIM-9L Sidewinder missiles fitted to the overwing rails as well as the two 30mm Aden cannons installed in the nose. An electronic countermeasures suite includes a jamming pod and a Phimat chaff/flare dispenser, both fitted on underwing hardpoints. Periodically the reconnaissance pod is replaced by a 1,000 lb bomb to demonstrate to the Iraqis the determination of the CTF to retaliate if necessary. The range of the Jaguars is extended by the fitment of a pair of underwing fuel tanks although the distance between Incirlik and the AEA requires at least one air refuelling by the VC10 tankers.

The reconnaissance task is shared between the RAF Jaguars and French AF Mirage F1CRs with targets identified by the central reconnaissance cell at the CTF who determine the planning and allocation. The daily sorties are composed into a

Fragmentation Order which details every flight by the aircraft of the CFAC. The French Mirages invariably perform the early morning slots while the RAF fly later in the day. The location of each target to be photographed is carefully plotted on a giant map to determine their exact position. The number of aircraft required to perform the mission and photograph all the targets is determined by the quantity of subjects of interest. Unit insignia and personal items are exchanged for survival equipment and a pistol in the same routine as aircrew experienced in the Gulf prior to combat sorties.

The Jaguars normally operate as a pair with up to six aircraft flying each day, although the number of sorties generated can be changed as requirements dictate. All preparations are conducted with a built in additional time factor to permit the sortie to commence precisely as scheduled as all the aircraft movements take place under the watchful eye of the E-3 AWACS. Following take-off by the tanker and the first Jaguar cell, each of the aircraft report to the AWACS and head

east along a designated corridor separated from the Syrian border by a buffer zone. Three refuelling areas are employed, one at the eastern end of the corridor with the other two over Iraq in the vicinity of Zakhu. Once air refuelling is complete the Jaguars leave the VC10 and commence their mission. The tanker remains in one of the refuelling areas to await the next receivers.

Many small targets need to be photographed individually requiring the Jaguars to fly at low level, while other parts of the sortie require the aircraft to operate at medium level for a general overview. Some targets are overflown at extremely low level enabling personnel on the ground to be clearly identified looking up at the aircraft! Footage returned by the Jaguars frequently reveals fresh intelligence, with one sortie returning some spectacular shots of missiles and their mobile launchers being unloaded from open railway trucks in a siding. During the sortie the pilots may discover a previously unknown item of interest which

requires further examination. These new targets can be photographed at the time, provided the pilot has sufficient fuel, or will be plotted for a later sortie.

The build up of ground forces and military equipment in the area north of the 36th parallel during the Summer of 1992 was such that the Jaguars and Mirages were extremely busy. Brigadier General Jim Mathers, the US Commander of the CTF stated that by the Summer of 1992, Iraqi forces had doubled their presence in the region over the previous six months. Assessing the situation, Turkish Commander Brig Gen Resat Turgut stated that this was not a serious threat for the coalition forces at present, although it could jeopardise the stability of not just the Kurds but also those countries neighbouring Iraq in the future. Therefore the regular reconnaissance updates are vital to ensure the coalition forces are of sufficient strength to remain a viable deterrent.

As the aircraft operate over potentially hostile territory the pilots fly with all defensive equipment and radar warning receivers activated. The 30mm shells and the Sidewinder missiles are live as there is always the possibility the Jaguar crew could be shot at by ground forces.

Once the sortie is complete the Jaguars return to the safety of Turkish airspace for the flight back to Incirlik. Occasionally a Jaguar develops a fault which forces the pilot to abandon the mission. In these circumstances one of the other aircraft will act as a replacement which may dictate a second air refuelling. The VC10 always remains on station until the last Jaguar has left Iraqi airspace and is well on the

way back to Incirlik. The French and British aircraft both refuel by the hose and drogue method and can therefore tank from each other's refuellers if required. Likewise the USAF KC-135s can air refuel the British and French aircraft with the fitment of the appropriate attachment to the flying boom.

Having landed and taxied back to the flightline, the ground crew remove the film canisters from the pod and rush these to the RIC. The processing equipment inside the RIC is 25 years old but nevertheless is still in full working order and performs well even in the heat of the southern Turkish Summer. The films must be processed within 45 mins, although in reality the highly experienced staff of the RIC have the rolls of negatives developed and ready for scrutiny within 15 to 20 minutes! The record stands at just ten minutes from engine stop. The rolls of processed negatives are mounted on reels and placed over a light table which enables the pilots and the staff of the RIC to preview the results. All items of interest are noted so prints can be made for later analysis. Debrief of the mission is the final part of the sortie.

The VC10 tankers of No 101 Squadron have supported the Jaguar detachment since the commitment was established in September 1991. Initially the VC10s were stationed at Akrotiri but moved to Incirlik in March 1992. The relocation of the VC10 detachment to the same base as the Jaguars has improved the co-ordination of the sorties and reduced the flight time of the tankers as Incirlik is much closer to the three refuelling areas than Cyprus. No 101 Squadron has only nine aircraft with

which to fulfil its commitments, and is therefore frequently at full stretch. However, the squadron is scheduled to receive the first of five additional VC10 K4s later this year which will give a welcome addition to its capabilities.

A minimum of two VC10 aircraft are dedicated to the CFAC with aircraft rotated regularly for maintenance or to trail the exchange of Jaguars from the UK. While operating from Incirlik the VC10s spend much of their time airborne in one of the refuelling tracks located over Iraq. Not surprisingly the radar warning receivers aboard the tankers reveal the presence of Iraqi ground radar watching the CFAC aircraft over its airspace but unable to respond.

The VC10 detachment operates from one end of the gigantic main flightline at Incirlik Air Base within a small self-contained unit which includes the UK MAMS element. The detachment is on the opposite side of the air base from the Jaguar operations, which is located within one of the many Hardened Aircraft Shelter (HAS) areas.

Personnel from No 41 Squadron were the first to detach to Operation *Warden* during the late summer of 1991 and were the last Coltishall unit to participate. The squadron began the final Jaguar commitment during the second week of December 1992 coming to an end in February this year. At the time of writing it seems likely that Harrier GR7s from Nos 3/4 Squadrons at Laarbruch will assume responsibility for photo reconnaissance alongside the US, French and Turkish forces to maintain Operation *Provide Comfort* for at least a further six months.

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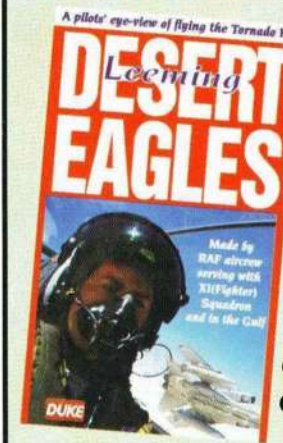
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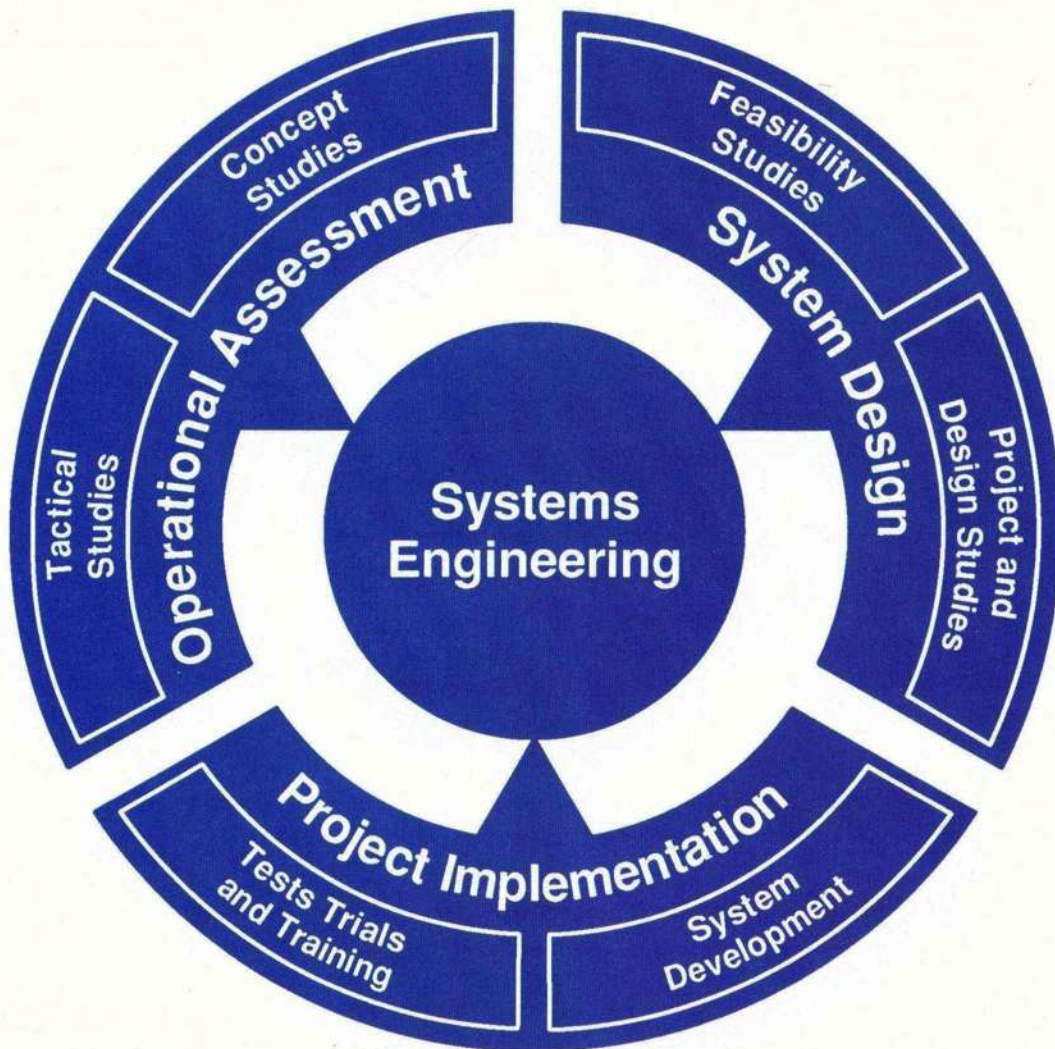
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INSTITUTE OF AVIATION MEDICINE

Lindsay Peacock

Often referred to as the birthplace of aviation in the United Kingdom, Farnborough occupies a very special place in any history of aeronautical endeavour and its fame has spread far beyond these shores. Now, as it has done for most of this century, Farnborough continues to explore ways and means of enhancing man's ability to fly and, perhaps more importantly, to survive in the often hostile environment of the sky.

One establishment which is intimately associated with the latter aspect of this work is the RAF Institute of Aviation Medicine (IAM). Under its current title, it has been stationed at Farnborough for nearly 50 years, although it can actually claim a line of descent that dates back to the Royal Flying Corps days of 1917, when a physiological laboratory was established at Hampstead in North London. In those early days, the primary task was that of assessing medical standards of RFC personnel but it was also involved with the effect of flight on pilots, protective equipment such as oxygen systems and cold weather clothing.

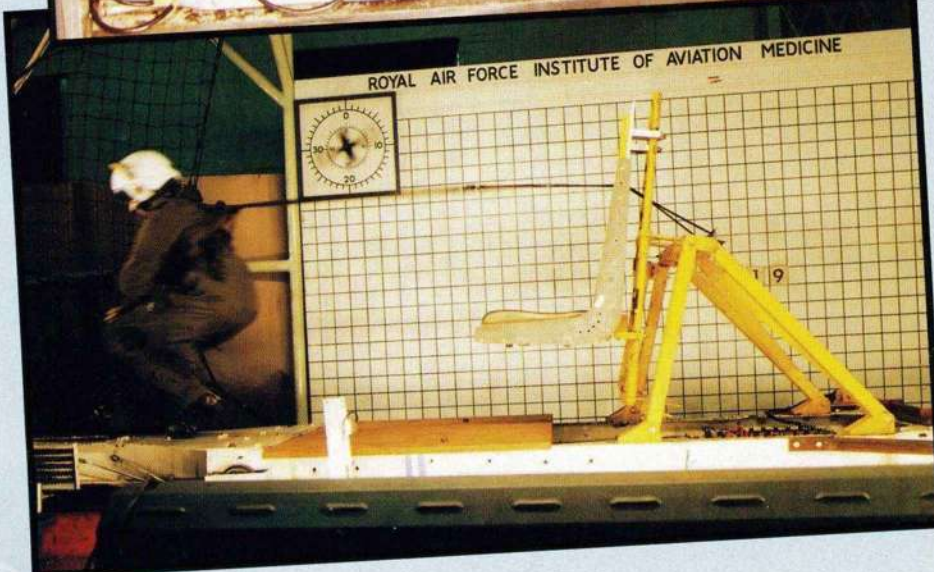
It was this organisation that provided the basis for the RAF Physiological Laboratory in 1918, subsequent moves taking it to Clement's Inn in the Strand in 1927; to Hendon in 1937 and to Farnborough in 1939, where it eventually evolved into the IAM in 1945. The RAF Physiological Laboratory was mainly involved in research during WW2 and it is research that today constitutes the lion's share of the workload. The nature of the work performed by the IAM is infinitely more sophisticated than that of its forebears, for the incredibly rapid progress of aviation has had to be matched – and, indeed, often surpassed – by developments in areas vital to the well-being of those whose job it is to fly.

Although it occupies premises near the Aerospace Division of the Defence Research Agency, the IAM is an independent unit within RAF Strike Command. The role of IAM is officially described as being 'to support the operational task of the RAF by research on factors that affect or may affect the safety and operational efficiency of flying personnel, in both the short-term and the long-term'.

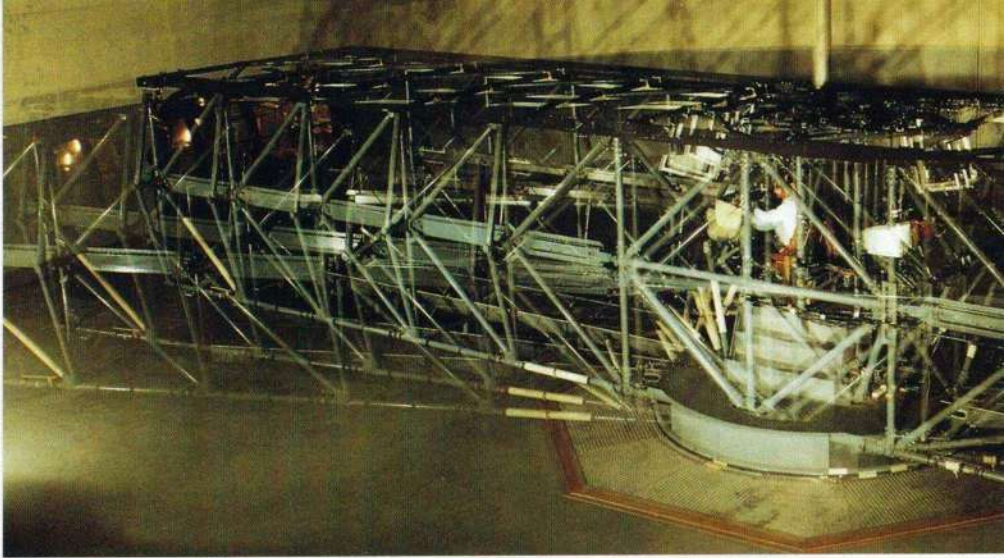
Methods and concepts used by personnel of the IAM are broad-based and embrace theoretical and practical aspects as well as investigative ones. Basically, though, they fall into six strands, four of which are very much at the 'sharp end' of the aviation medicine world. In no particular order of merit, these are: establishing human tolerance limits to specific stresses and emergencies in flight; investigation of the effects of physical and psychological stresses of flight and related matters such as workload on human performance; developing and assessing means of maintaining and improving human performance in air systems and, finally, contributing to design and development of the cockpit, life support equipment and

Left top: Subject seated in the small compartment of the high performance decompression chamber wearing high altitude pressure clothing – prior to decompression to 55,000ft.

Left: Subject undergoing deceleration at 4G on the IAM Decelerator Track to assess the performance of a restraint harness for Air Loadmasters.



Right: Man-carrying centrifuge at the IAM with the subject seated in the gondola at the end of the arm and the medical officer in charge seated at the centre of the machine.



man-machine interface.

The remaining two strands are rather different in nature, although their value is no less far-reaching. The first is the investigation of failures and IAM personnel do as a matter of routine examine such items as life support equipment and ejection seats used by individuals involved in accidents or incidents. This kind of study provides valuable data on performance and sometimes reveals ways in which equipment can be improved. Finally, there is education. The RAF IAM is the organisation providing post-graduate education in aviation medicine.

Tasking from the three Services' Defence Staffs on all of these aspects of the IAM role is monitored by Strike Command Headquarters. Not all of the work is RAF-orientated, for the IAM's responsibility for aviation medicine research does mean that it engages in projects that are applicable to the three military Services as well as civil aviation.

In the latter instance, this is primarily at the behest of the Civil Aviation Authority (CAA), one facet of this being management of 'CHIRP' (Confidential Human Factors Incident

Below: Subject undergoing vertical vibration tests in the Institute vibration laboratory.



Reporting Programme) and distribution of the 'Feedback' bulletin by which selected incidents and occurrences are brought to the attention of a wider audience than might otherwise be the case.

In addition, close links are maintained with a number of similar agencies elsewhere in the world – these include the USAF's Human Systems Division at Brooks AFB, Texas and NASA's Ames Research Center at Moffett Field, California as well as research facilities in several European states.

Looking at the organisation in fairly broad terms, the IAM is headed by the Commandant, a post that is presently occupied by an Air Commodore who has overall responsibility for the activities of about 200 personnel. Functions performed by those personnel fall into three main areas, specifically support, research and teaching. The former is principally concerned with administration and supply while the role of the latter is self-evident. This leaves research, which constitutes the core of the unit's existence and which is undertaken by no fewer than seven divisions, each specialising in a particular discipline. For the record, these are Aircrew Systems; Biodynamics; Environmental Sciences; Neurosciences; Numerical Sciences; Psychology and, last but not least, Special Senses.

Since it is the *raison d'être* behind the IAM, it follows automatically that by far the greater majority of the effort expended at Farnborough is directed towards research and this currently accounts for about 85% of the output, with the corresponding figure for teaching and training being only a fraction under 8%. The residue – just over 7% – is devoted to support in the medical examination of aircrew, treatment of aircrew who suffer from motion sickness and work on patient monitoring systems and audiometers. Clearly, though the IAM is not primarily concerned with the practice of clinical medicine, its work in medical teaching does mean that it is enormously influential in setting and maintaining standards when it comes to the selection and treatment of aircrew of all arms of the British Services.

Returning to aeromedical research, the majority of it can be said to be 'reactive' in that it is applied research directed towards the solution of aviation medicine problems arising from or causing concern to the MoD (80%); to the CAA (12%) and to the aircraft



Above: Evaluation of ease of boarding a single seat life raft conducted in the experimental pool at the Institute.

industries and other agencies (2%). The remaining 6% of the effort is 'pro-active', involving the long-term basic research necessary to provide knowledge and consider techniques that might be needed in future applied research programmes.

On-going projects are remarkably diverse in nature. Since it is expected to be the next major type to enter service with the RAF, the European Fighter Aircraft (EFA) figures high on the list of priorities and investigation into aeromedical and human factors aspects is now in progress. One element of the IAM which has a particular interest in EFA is the Aircrew Systems Division and amongst the EFA-related projects that they are involved in is pressure breathing systems for high altitude protection.

This work is carried out using decompression chambers which are



amongst the facilities managed by the Aircrew Systems Division for research into life-support systems and other items of kit. The Division currently has three decompression chambers available and there is also a recompression chamber which can be used for treatment of the 'bends' by compressing the patient to six atmospheres pressure, although there have been no cases of serious 'bends' involving IAM personnel during the last 25 years.

Another most important activity is the development of a G protective system for the agile EFA which will be capable of applying up to 9G at very rapid rates of onset. This work, which is conducted by the Biodynamics Division, is performed on the man-carrying centrifuge and in the Institute's aircraft. The protective system being developed by IAM employs extended-cover G trousers and pressure breathing with G, a technique which greatly reduces the physical effort required of the pilot at high G.

In the near future, trials of pressure breathing with G equipment are to move into the air, aboard a Hawk T1A which, in company with a long-serving Hunter T7, comprises the IAM's aircraft test fleet. The IAM has one specialist RAF test pilot and one medical officer pilot. The flight research programme does keep these two machines quite busy, other recent areas of activity including research into head mobility in the cockpit and the assessment of different types of oxygen system. In addition, they are also used for the 'desensitisation' of aircrew who suffer from motion sickness.

While it is undoubtedly one of the most important sources of work, EFA isn't the only one by any means, especially in the aeromedical and human factors fields. Other projects currently under way are examining these criteria with regard to the Harrier GR5/7 for the RAF, the Merlin for the Navy and the Attack Helicopter for the Army.

Nor is such work confined to actual testing, for there are many other aspects that must be considered before an item of equipment can be cleared for service. Some are fairly arcane – others less so, a good example of the latter relating to anthropometry (the study of the dimensions of the body), for it would be senseless to invest in new kit if one then learned that it

did not fit the whole range of aircrew in the cramped confines of the cockpit.

The pressure chambers, centrifuge and aircraft alluded to earlier are by no means the only research tools that are available to the various divisions which make up the IAM. Other assets of this type include a deceleration track, and immersion pool and climatic research facilities such as a wind tunnel and a climatic altitude chamber. Using these devices, it is possible to test and evaluate the restraining powers of seat harnesses, the efficiency of life jackets and immersion suits, the effects of impact acceleration forces (ie G loadings) and the problems associated with exposure to extremes of temperature.

While much of the work naturally concentrates on equipment and clothing, IAM efforts certainly do not end there. For instance, the Neurosciences Division focuses its energies on the man by studying functions and implications of the central nervous system. Current work includes an examination of sleep patterns and wakefulness in connection with workload and performance. The findings of this project might, ultimately, be of great value in clearing the way for military personnel to use stimulant drugs as a means of remaining alert throughout extended duty periods.

Similar work in the past cleared the way for use of a medication to aid sleep for transport aircrew in the Falklands campaign and this division also undertook research into anti-histamines which resulted in a 'drug of choice' being recommended for aircrew who suffer from hay fever. Factors considered in making such recommendations include unwanted side effects and residual effects, such undesirable aspects perhaps being best illustrated by the propensity of many anti-histamines to induce drowsiness. For most of us, that is unlikely to present too much of a problem – for aircrew, however, the consequences could easily be fatal and are clearly unacceptable.

While it may only constitute a relatively small part of IAM activity, the effect of its work in the education area is certainly far-reaching and influential. Of the courses that are presently on offer, the 'flagship' must surely be the Diploma in Aviation Medicine. Lasting seven months, this annual course is

Below: Hawk T1A aircraft are utilised for in-flight research on protection at high G and for the treatment of aircrew suffering from air sickness.



recognised by the Royal College of Physicians and is open to personnel from all three British military services as well as to a limited number of overseas and civilian candidates.

Student intake is limited to 20 per course and each course runs between January and July, combining a mixture of classroom teaching with practical experience and visits to various military and civil establishments. With regard to tuition, much of this is satisfied 'in-house' by Institute staff but other specialists visit the Teaching Section providing confirmation of the close links that are maintained with academic bodies and civil concerns. On completion of the Diploma course, members of the British armed forces then undergo a three-week Advanced Aviation Medicine course directed toward military issues.

Other aspects of the teaching task include an initial Medical Officers' course of two weeks duration which is specifically designed for the RAF; a general aviation medicine course run in conjunction with the CAA and aimed at civilian doctors such as GPs who perform aircrew examinations, and there are also specialist courses dealing with various facets of aviation medicine.

While it may be one of the lesser-known elements of the RAF, there can be little doubt that the RAF Institute of Aviation Medicine is of tremendous value. Whether it be in helping to roll back the barriers of human tolerance to the stresses and strains of flying or in the training of Medical Officers for the service, the influence of the Institute extends far beyond Farnborough and can truly be felt throughout and beyond today's Royal Air Force.



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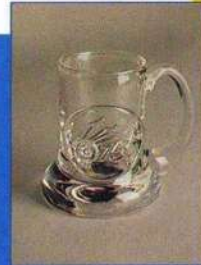
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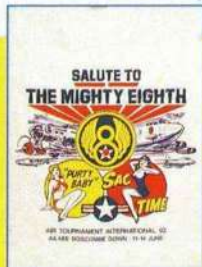
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INTERNATIONAL AMBASSADORS

Peter R March looks at the *Red Arrows*' busy display season and joins the RAF aerobatic team for a unique overseas weekend.



Above: Pilots from the six international teams that displayed at Bratislava take a unique photocall. All photographs Peter R March

The *Red Arrows*' 28th season last year brought the total number of displays to a staggering 2702 since the team was formed in 1965, having added 93 in 1992. It should have been 99, but unusually six performances were cancelled, primarily due to bad weather at display locations. Not surprisingly the cancellations were all after the 'end of the summer' at the beginning of July. The final display of the season should have been at Genoa in Italy over the weekend of 4 October, but it was called off by the show organisers because of extremely bad weather that had caused severe flooding in the city.

After a hard work-up during the winter 1991-92, in which three new pilots (Flt Lts Rob Last *Red 2*, Barry Cross *Red 3* and Jerry Bird *Red 5*) joined the team, together with a new Manager (Sqn Ldr Les Garside-Beattie) and Engineering Officer (Flt Lt Sid Miller), the *Arrows* detached to Akrotiri, Cyprus for the annual Exercise *Springhawk*, making final practice flights and seeking formal clearance to display by the Air Officer Commanding-in-Chief, RAF Support Command. This secured, Sqn Ldr Adrian Thurley led the team, for his second season, into the first three full public shows at Paphos, Akrotiri and Limassol on 25 and 28 April 1992.

Returning to the UK the *Red Arrows* were

soon into full swing with opening displays at Middle Wallop on 9-10 May and Abingdon on 15 May. One of the team's growing problems, dangerous infringements of the five-mile display area by other aircraft while they are performing had already arisen at Middle Wallop and was potentially so serious at North Weald on 16-17 May that they could only give flypasts on the second day. A close re-examination of the safety record of each display site has accordingly been made before planning the 1993 venues.

The second of the seven overseas countries visited by the *Red Arrows* in 1992 was Spain, where the team operated from Rota to give a very well received display at the Expo 92 site at Seville on 21 May. Returning to the UK for the major Spring Bank Holiday shows at Mildenhall and Southend it was off again, this time to Vaxjo, Sweden for what has become an annual trip to Scandinavia.

Most regions of the UK get a visit from the *Arrows*, 1993 being no exception. Displays were given at Prestwick and Leuchars (Scotland), Douglas (Isle of Man), St Athan and Brawdy (Wales), Newtownards (Northern Ireland), Jersey and Guernsey (Channel Islands). Major airshows, like the RAF Benevolent Fund's Air Tournament International at A&AEE Boscombe Down



A unique formation flypast – Albatros, Hawk, MB-339, Alpha Jet, Flanker and Aviojet – closed the CSIAF.





Above: Team Manager Sqn Ldr Les Garside-Beattie (left) with a Czechoslovak TV announcer, who translated his commentary.

Right: A stalwart performance from the Arrows in the difficult conditions at Bratislava.



and the Farnborough Air Show are always attended by Europe's premier jet display team, as are some of the major sporting events such as the British round of the Formula One Grand Prix at Silverstone, saluting (on 12 July) Nigel Mansell's great achievement on his way to winning the World Championship. On the following day, 13 July, it was a sad final display at RAF Kemble, the team's former base for many years, that closed soon afterwards.

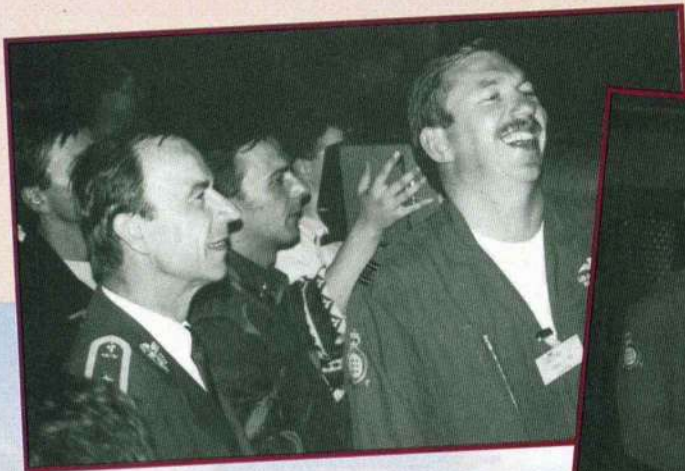
The first of two visits to Belgium in 1992 was unfortunately hit by poor weather, limiting the team to a flat display at Koksijde on 5 July. After a mid-season break at the beginning of August the Red Arrows visited their fifth overseas country. The two displays in Malta, the team's first visit to the George

Cross island for 14 years, were to commemorate the 50th anniversary of the WW2 historic siege of the island. Commenting on return from the visit, the Red Arrows' team manager Sqn Ldr Les Garside Beattie said that it was "One of the best received overseas visits ever. Our entire 1992 publicity stock would not, had we been able to take it with us, been enough to satisfy the people of Malta".

The traditional round of seaside displays from Whitby to Fowey kept the team busy for the remainder of August, which ended with a performance at the Great Warbirds Air Display at the event's new site, the Science Museum airfield at Wroughton, yet another new UK display location for the Arrows. Into September and what was to be

one of the year's highlights for team, the first visit to Czechoslovakia, the 46th foreign country that the Red Arrows have displayed in. It was also the last visit as Czechoslovakia divided at the end of the year into two separate countries, the Czech Republic and Slovakia.

Venue for the two day Czech and Slovak International Air Fest '92 was Ivanka civil airport at Bratislava, now the capital of Slovakia. The participants, from all over Europe, were scheduled to arrive on Thursday 3 September, ready for the public displays on Friday and Saturday 4-5 September and departing on Sunday 6 September. This unusual arrangement would allow the Red Arrows to give a further display at Beauvechain in Belgium on the



Left: 'LGB' as he is known, enjoys the entertainment with General Jan Ploc, Commander of the CSAF, at the post show 'Hangar party'. Below: Adrian Thurley presents a framed photo of the Arrows 'Bomb Burst' to Col Pavel Strubl - CSIAF Director. Bottom: The Reds prepare for departure from Bratislava.





Left: The Red Arrows prepare to taxi for the start of their display at Beauvechain. Above left: Leader Adrian Thurley (centre) briefs the team for the display. Above right: Weather conditions at Beauvechain were excellent.

way home to Scampton.

A Hercules C3 from No 24 Sqn at Lyneham was tasked to support the tour, carrying the spares back up, tools, smoke dye and all the other essential equipment needed away from base. It also carried 18 of the 'Blues', the first line technicians who provide the specialist support necessary to rectify any minor faults that occur when the team is 'on tour'. The remaining tradesmen fly as 'backseaters' in the Hawks on transit flights as they are responsible for preparing the aircraft that they fly in for their next display or transit flight.

The day began early for Flt Lt Ed Patching and his Hercules crew at Lyneham. Not only did the aircraft have to be 'role readied' but they had to contend with a station 'faceval' exercise that put them into special clothing and an 'air raid' on Lyneham that 'blocked' the taxi way. The C-130 eventually reached Scampton for the early morning loading, or more appropriately squeezing in the mass of equipment under the careful supervision of the *Arrows'* engineering officer Flt Lt Sid Miller and the Hercules' loadmaster.

By 08.30 the pilots had assembled for a planning meeting with the Manager, at which the domestic issues, such as meals, accommodation, social events and programme were detailed. The all important Met Brief followed, which revealed that conditions would be good for the transit flight out via RAF Gutersloh, Germany and at Bratislava. The bad news was that the weather looked much less happy for the two days of the show, with a cold front likely to produce rain and strong

winds. It would be much better for the return journey and the Belgian Air Force show. Unfortunately this forecast was to prove extremely accurate.

Recognising the importance of this first visit to Czechoslovakia by the *Red Arrows*, the Commandant of the Central Flying School Air Cdre Gordon McRobbie headed the deployment, flying out one of the Hawks in place of *Red 4* who was suffering from an ear problem and did not want to fly at high level for the transit. With the pilot's brief from team leader Sqn Ldr Adrian Thurley completed in his customary precise and detailed way, the ten Hawks were all set for their 10.04 departure, on a fine, sunny morning. There was still more work to be done on loading the Hercules, but it too was ready for the scheduled departure an hour later. But what was unforeseen was the announcement of an air traffic control delay due to the high level of both military and airways traffic.

The plan was for the Hercules to be flying overhead Gutersloh about the time that the Hawks were due to get airborne for the second leg of their journey, shortly before 14.00 local time. If all was well the C-130 would proceed on to Bratislava without landing. However, soon after getting airborne from Scampton the Hercules received word that one of the 'backseaters' had been taken ill and needed to be picked up at Gutersloh. Eventually, somewhat later than planned, the transport arrived at Ivanka Airport to park in front of the lines of aircraft from the Spanish, French, Italian and Czechoslovak AF aerobatic teams, the Russian *Test Pilots* with their two Sukhoi

Su-27 Flankers and of course the *Red Arrows*. It was to be the year's biggest gathering of national military teams which was to present several unique opportunities during the next two days.

After the inevitable arrival procedures, both formal and social, the pilots and groundcrew were driven into Bratislava, and for many their first encounter with the relative austerity and warm friendship of this former Eastern bloc country. This was underlined at the evening meal taken at a large Military High School in the town, that clearly now had little place in the post-communist country. The day's work was not over for the *Red Arrows'* leader and team manager who were invited to an airshow press conference with the other teams, and ended up doing a long tv interview.

In contrast to the warm sun for the arrival, the first day of the airshow dawned grey, damp and cold. With most of the scheduled airline traffic suspended for the duration of the flying display, the Czech and Slovak Air Force organisers were able to take over most of the large airport terminal building. The very thorough briefing, attended by all of the solo display pilots and aerobatic team leaders, was given by the CSIAF '92 organising team led by Colonel Pavel Strubl, Deputy Commander of the Air Force. It was at this meeting that it was decided to call all the aerobatic team pilots together for a unique photograph and the seeds of an idea to fly a formation of a representative aircraft from each of the teams, was mooted.

The airshow opened on time at 11.00am with a spectacular flypast of



Back home at Scampton and the task of unloading gets underway.

CSAF Mi-24 and Mi-17 helicopters, MiG-29s, MiG-23s, Su-22s, Su-25s, L-39s and L-410s. For the next seven hours, with light rain falling from a 6,000ft cloud base, there was a procession of top class displays from ten countries in addition to the host nation. The first formation team was the CSAF's unusual quartet of L-410 twin turboprop light transports, which was followed by the *Biele Albatrosy* – the *White Albatroses* – making one of their first appearances flying six white painted L-39C Albatroses. In turn the Spanish *Patrulla Aguila*, Italian *Frecce Tricolori* and the *Patrouille de France* all took to the air, interspersed between solo displays from many different types. Final national team display slot fell to the *Red Arrows* who were able to give a full aerobatic performance in improving conditions, producing spontaneous applause from the appreciative audience when they made their final break.

Although the second day was dry it posed even greater problems for the pilots as the cloud was lower and there was a strong, gusty wind. Some of the displays were curtailed but the aerobatic teams all gave their performances. At the end of the airshow, in a final salute to this extraordinary international event, the leaders of the six aerobatic teams took to the air for a series of unprecedented flypasts. Unthinkable just a few years ago, a

The *Red Arrows* escorted the *Vulcan* for its final public display at Cranfield on 20 September 1992.



CSAF L-39C Albatros leading an RAF Hawk T1A and an Italian AF Aermacchi MB-339A on its port wing and a French AF Alphajet and a Spanish AF CASA Aviojet on its starboard, with a Russian Sukhoi Su-27P Flanker tucked tightly into the box.

The public airshow was over but the event had not finished for the pilots and groundcrew. There was the big 'hangar' party to attend – the post show international gathering that is often judged very critically by some of the participants. Although this one was not held in a hangar, but in a 1500 seat restaurant in Bratislava, it had all the right ingredients to make it a very successful and enjoyable evening. For the *Red Arrows'* leader, manager and pilots it was an opportunity to meet the other teams and participants in an informal situation. At the same time they were able to represent the RAF and the UK in a more formal way to their hosts from the CSAF. And after all this, like Cinderella, the pilots had to head back to their hotel in good time as there was a long flight to be made the next day and another display to give in Belgium.

In keeping with *Murphy's Law* Ivanka Airport was bathed in warm sunshine for the *Red Arrows'* departure in mid-morning for the direct flight to the Belgian AF airbase at Beauvechain. As most of the heavy equipment had remained on board the Hercules, the ground crew soon had the remaining items stowed and Ed Patching was ready to get airborne. Once again flight clearance across Germany was proving difficult and as time wore on the prospect of not reaching the Belgian airshow in time loomed up. At literally the eleventh hour the C-130 was cleared for take-off and managed to reach its destination just one minute before the flying display commenced.

The second day of the two-day Belgian Air Force International Airshow was attended by a very large crowd who were able to enjoy a good mix of military and civilian items including the *Patrouille de France*, like the *Red Arrows*, hot foot from Bratislava. Having a very different military airfield layout, with no large aprons for the participating and static aircraft, it was not possible to see many of the aircraft on the ground at Beauvechain. However, pride of place was given to the Hawks and attendant Hercules by parking them on the operational readiness platform near to the runway threshold.

After a faultless display, which brought the

crowd to their toes and produced a crescendo of applause when they had finished, the ground team made a rapid turn round and within an hour, and before the airshow had finished, they were winging their way home to Scampton, with the Hercules in ponderous pursuit. Of course there was more work to be done by the groundcrew once they were back at base – all of the spares and equipment had to be unloaded from *Fat Albert* and returned to the appropriate stores – another hour's work.

Was it all worth it? There can be no doubt from the team's point of view as represented by the comments of Manager Les Garside-Beattie: "Bratislava will most certainly remain in our affections for a long time to come. The enthusiastic crowd on both days of the event summed it all up for me. It was an excellent experience for all the team". It is of course the public reaction and that of the leading service, government and business personnel attending the airshow that makes an overseas visit like this so important and worthwhile for the *Red Arrows* as international ambassadors for the RAF and for the UK.

Into the final four weeks of the 1992 season and the traditional appearances on the three public days at the Farnborough Air Show, followed by the Battle of Britain Displays at Jersey, Guernsey and what should have been key performances at Leuchars and Finningley on 19 September. However, poor weather at the Scottish base restricted the team to a flat display and persistent fog for much of day prevented them from even reaching Finningley. The weather improved the following day for the Cranfield Airshow where the team made a nostalgic flypast with the RAF's Vulcan to mark the V-bomber's retirement, as well as giving their own impeccable final performance of the season.

What transpired to be the *Red Arrows'* last overseas visit was to Gibraltar for the RAF station's Open Day on 26 September. The team had an unusual variation to their programme on 29 September. This was a flypast from London to Dundee, overflying the major towns on the way, to mark the 25th anniversary of BBC Radio 1. A live commentary was broadcast from *Red 1* by Noel Edmonds who flew with Adrian Thurley. Sadly, once again this unusual flypast was marred by inclement weather which limited visibility from the ground. An appearance at Genoa was scheduled to be the *Arrows'* last performance of 1992, but it was cancelled by the organisers due to extreme weather conditions whilst the team was making an en route refuelling stop at Stuttgart.

Looking back on his first season as manager of the *Red Arrows*, Sqd Ldr Les Garside-Beattie commented: "It was a very busy but highly successful season for the team, only marred by some atrocious weather. Our biggest disappointment was not being able to fly for the Queen Mother when she visited Scampton to present a new Queen's colour in June. It poured with rain all day long. The highlights for me were Expo 92 in Spain where the eyes of the world were on us; the near-fanatical reception we received in Malta and the warmth of our reception in Czechoslovakia". A memorable year for the RAF's international ambassadors.

RED ARROWS ON DISPLAY 1993

Squadron Leader Adrian Thurley leads the Royal Air Force Aerobatic Team the *Red Arrows*, for his third and final year, into its 29th display season at the beginning of May. Over 100 shows have been programmed around the UK and Northern Ireland, in Cyprus after the team's final late April training sessions, quick visits to Belgium and Denmark and a five-week flag flying tour to the USA at the end of the home season.

The *Red Arrows* has two new pilots flying with the team this year. They are Flt Lt Sean Chiddention, aged 28, from Maidstone and Flt Lt Benny Ball, aged 29, from Bedford. Sean is a former Jet Provost pilot and more recently he has been flying Jaguars at Coltishall. He spent many months in the Gulf and subsequently took part in Operation *Warden*, patrolling the borders of northern Iraq, flying from Incirlik in Turkey. Benny also started his operational flying career on Jaguars and but more recently was a weapons instructor on the Hawk at No 1 TWU, Brawdy.

The team also has a pre-season appearance to prepare for flying in the 148 aircraft Royal Review flypast at RAF Marham on 1 April and performing part of the 1993 display before Her Majesty. After Easter the team flies out to Cyprus for the customary final practices and if all goes well, clearance for public displays.

The following provisional display schedule details the *planned* venues for the 1993 season. At the time of going to press it is still subject to final confirmation.

April

1 RAF Marham, Norfolk

May

1 Paphos and Akrotiri, Cyprus
4 Limassol and Nicosia, Cyprus
15 Sonaca Airshow, Belgium
16 Bournemouth, Dorset
19 Derwentwater, Cumbria
22 Brough, North Humberside
23 Drumlanrig Castle, Scotland
28 Blenheim Palace, Oxon
29-30 RAF Mildenhall, Suffolk
30-31 Southend-on-Sea, Essex
31 Swansea, W. Glamorgan

June

4 RAF Odiham, Hants
5 Scunthorpe, S. Humberside
6 Aalborg, Denmark
Cumbemald, Strathclyde
8 Douglas, Isle of Man
9 RAF Coltishall, Norfolk
10 Ramsey, Isle of Man
Douglas, Isle of Man
12 RAF Coningsby, Lincs
13 Blackpool, Lancs
19 RAF Locking, Avon
19-20 Biggin Hill, Kent
20 RAF Cosford, Shropshire
24 Edinburgh, Lothian
25 ETPS, Boscombe Down, Wilts
26 Woodford, Cheshire
RAF St Athan, S. Glamorgan
27 RAF Swanton Morley, Norfolk

July

2 RAF Waddington, Lincs
3 RAF Cottesmore, Leics
Eindhoven, The Netherlands
4 Koksijde, Belgium
9 RAF Scampton, Lincs
Bowness, Cumbria
10 Durham, Tyne & Wear
Newtownards, Co Down
11 Silverstone, Northants
16 Shrivenham, Wilts
17 RNAS Yeovilton, Somerset
18 RAF Church Fenton, N. Yorks
Humberside Airport,
South Humberside

19 Edinburgh, Lothian
24-25 RAF Fairford, Glos
27 RAF Odiham, Hants
Lyme Regis, Dorset
28 RNAS Culdrose, Cornwall
RAF Chivenor, Devon
29 RAF Shawbury, Shropshire
31 RAF Leeming, N. Yorks
RAF Valley, Gwynedd

August

4 RAF St Mawgan, Cornwall
Lands End, Cornwall
5 Swanage, Dorset
6 Eastbourne, E. Sussex
18 Cromer, Norfolk
Weymouth, Dorset
19 Fowey, Cornwall
20 Torbay, Devon
21-22 RAF Alconbury, Cambs
22 Leicester Airport, Leics
26 Clacton-on-Sea, Essex
27 Weston-super-Mare, Avon
Dartmouth, Devon
28 Plymouth, Devon
28-29 Carlisle, Cumbria
29-30 Wroughton, Wilts
Plymouth, Devon

September

3 Skegness, Lincs
4 RAF Kinloss, Moray
5 RAF Manston, Kent
Shoreham, Sussex
9 Llandudno, Gwynedd
10-11 Bristol, Avon
RAF Benson, Oxon
12 Duxford, Cambs
Southport, Lancs
16 Guernsey, Channel Is
Jersey, Channel Is
18 RAF Leuchars, Fife
RAF Finningley, S. Yorks
25-26 Denver, CO

October

2-3 Salinas, CA
6 Sheppard AFB, TX
9-10 Fort Worth-Alliance, TX
16-17 New Orleans, LA
19 Andrews AFB, WA

PHONE THE REDS... 0891 664424

The crack *Red Arrows* Aerobatic Display Team of the Royal Air Force is only a telephone call away. Noted broadcaster and airshow commentator, Sean Maffett, hears from team pilots about the ten things people most often ask – why do the *Reds* use the Hawk trainer, how is that red, white and blue smoke produced, will a woman ever be a member of the team?

During the air display season from April to October, dial 0891 664424 for up-to-the-minute information on the *Red Arrows'* country-wide programme of appearances over the following six weeks. Don't miss the chance to see the incomparable *Reds* in action.

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CZECH MATES

I live in Axbridge, in north Somerset, a small place which most would call a village; it is, however, a 'town', this being decreed by Royal Charter back in 1229. It sits at the foot of the western limits of the Mendip Hills where – on 27 April 1942 – a Spitfire came down through cloud and crashed into a stone outcropping on the Mendips. It was, of course, a total write-off and the pilot was killed. He was a young Czech who belonged to No 312 Sqn, at that time based about 20 minutes flying time away at RAF Fairwood Common on the Gower Peninsula.

The old hands in Axbridge – some of them only children at the time – still remember this sad incident, not only because a young pilot had lost his life, but because he was from another country, one

Below: *The highest scoring pilot in RAF Fighter Command in September 1940 was Sgt Josef Frantisek, then flying with No 303 (Polish) Sqn. By the time of his death Frantisek had shot down 28 enemy aircraft.* via Barry Kudlacek



Below: *First of the Czech few: Pilots and a Hurricane fighter of No 310 Sqn at Duxford in 1940. Formed on 10 July, the Squadron had claimed the destruction of nearly 40 enemy aircraft by the end of September.* via Barry Kudlacek

James D Oughton

of those who had escaped from Europe to fight again when France collapsed in 1940. The memory remains strong, despite the passing of half a century.

But, sometimes memory falls short – to most of us it will come as a surprise to find that the highest-scoring fighter pilot in Fighter Command in September 1940, when the Battle of Britain was at its height, was another Czech – a sergeant-pilot in the Royal Air Force, Josef Frantisek. He was a remarkable man, having left his native country in March 1939 to join the Polish Air Force. Soon after the German attack began in September he scored his first victory, flying a somewhat ancient PZL fighter with fixed landing gear.

After the fall of Poland, Frantisek escaped to Rumania, where he was detained in an internment camp. He broke out of there and got to Syria and finally to France, where he enlisted in the Armée de l'Air and resumed his career as a fighter pilot. He had scored 11 victories by the time France fell.

With many others, he came to this

country and joined the RAF – he opted to join a Polish squadron (No 303) where he was 'taken on strength' on 2 August 1940. He was a highly individual character who surprised even the Poles by his cavalier attitude to discipline in the air, just breaking off whenever he saw the chance to shoot down an enemy aircraft. They became resigned to Frantisek's ways and regarded him as a 'flying guest' of the squadron. He shot down his first enemy on 2 September 1940 and his 17th, and last, on 30 September. This brought his overall total of enemy aircraft destroyed to 28 – higher than anyone else in the RAF at that time.

Sadly, Josef Frantisek met his death in an unexplained flying accident on 8 October 1940, his Hurricane crashing at Ewell in Surrey. He had been awarded the Polish VC, the Virtuti Militari, the French Croix de Guerre, the Czech War Cross and the British Distinguished Flying Medal; he was 27 years old when he died.

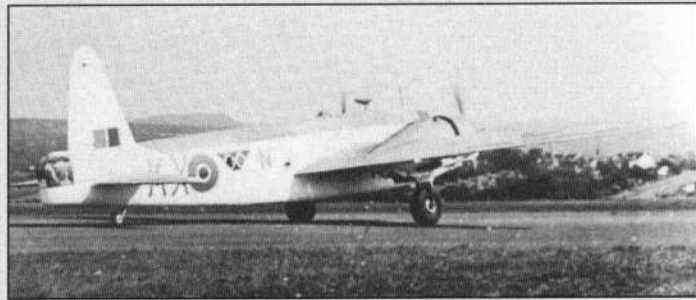
There were others – K.M. Kuttelwascher, who joined No 1 Sqn RAF on 4 October 1940, went on to become a Flight Lieutenant, an accomplished night fighter and intruder pilot. He was credited with 18

Below: *The young Czech pilot killed in the accident at Axbridge on 27 April 1942 was Flt Lt Rudolf Rohacek of No 312 Sqn. His Spitfire V was seen to break off into a dive from which it never recovered. The photograph shows Flt Lt Rohacek's funeral at Swansea on 1 May 1942.* via Barry Kudlacek





On the night of 6 February 1941, Wellington T-KX of No 311 Sqn was forced down over Germany. It was repaired and flown by the Luftwaffe for a short time until engine failure brought about its final demise. via Chris Ashworth



After more than 1,000 operational sorties with Bomber Command, No 311 Sqn was transferred to Coastal Command in April 1942. Wellingtons were used in anti-submarine operations up to July 1943. via Chris Ashworth

enemy aircraft destroyed and five others damaged for which he was awarded the DFC and bar.

Another notable Czech pilot was Sqn Ldr Frantisek Fajtl, the first Czech to be given command of an RAF fighter squadron – No 122, with Spitfires, at Hornchurch. Flying sweeps and bomber escorts, Fajtl was shot down whilst flying escort to Boston bombers attacking Lille on 5 May 1942 – but he became an ‘evader’ and escaped through France and then Spain and got back to the UK within three months –

arriving in England on his 30th birthday. He was soon back in the fray and later became CO of No 310 (Czech) Sqn.

There was Edward Prchal, who had joined No 310 (Czech) Sqn RAF upon its formation and shot down several aircraft during the Battle of Britain – he later became a highly respected transport aircraft captain and was the pilot of the Liberator in which General Sikorski, then Polish Prime Minister, was killed at Gibraltar on 4 July 1943. Prchal, then a Flight Lieutenant with No 511 Sqn, was in later life much vilified by, largely, the

technically illiterate in both literary and theatre circles, and it is pleasant to record that he eventually obtained heavy redress from those concerned in the early 1970s.

So much for the individual. The large numbers of Czechs arriving in this country made it possible to form no less than four complete RAF squadrons, wholly Czech-manned and, eventually, commanded. Many others served in other RAF and Allied units of all kinds. There is an RAF squadron with a unique distinction – No 68, formed at Catterick on 7 January 1941 – which, when awarded its official badge chose one with a tawny owl’s head (it was a night fighter unit) and the Czech motto *Vzdy Pripraven – ‘Always Ready’*. This was done because of the preponderance of Czechs among its members including Czech flight commander Sqn Ldr M Mansfield; working up with Blenheims and Beaufighters, it eventually received Mosquitos and was disbanded at the end of the War, only to be reformed in March 1952 with Meteor NF11 jet fighters with which it served until renumbered No 5 Sqn in January 1959.

The first all-Czech squadron to be formed in the RAF was No 310 on 10 July 1940 at Duxford. It began receiving Hurricanes on 18 July and worked up very quickly – the Battle of Britain was in full swing – making its first patrol on 18 August and its first combat on 26 August. By the end of September the squadron had claimed the destruction of nearly 40 enemy aircraft. Thereafter, as a member of the Duxford

Below: *OVERLORD* offensive: In April 1944, the full Czech fighter wing moved to Appledram, near Winchester. Equipped with Spitfire IXs, No 310 Sqn – with Nos 312 and 313 – became part of the 2nd TAF, carrying out offensive sweeps, bomber escorts and attacks on flying bomb sites. via Chris Ashworth
Middle: In July 1943, No 311 Sqn began converting to Liberator GRV anti-submarine aircraft, ending the war with the GRVI version shown here. Flt Lt A S Thomas



Below: The third Czech Squadron to be formed was No 312 at Duxford at the end of August 1940, transferring a month later to Speke to assist in the defence of Liverpool. Hurricane DU-T is pictured on detachment at Penrhos to combat German bombing raids on the airfield. via Barry Kudlacek



Wing, the squadron went over to the offensive, carrying out fighter sweeps before being posted north in July 1941, where it took over the defence of the Aberdeen area from No 111 Sqn, based at Dyce.

Whilst in Scotland, the Hurricane was replaced by the Spitfire V and at the end of the year the squadron came down to Perranporth in the west country, flying convoy patrols and escorting photographic reconnaissance aircraft to the Brest peninsula. In May 1942 it moved to Exeter, using Redhill as an advanced landing ground, again in the offensive sweep business over France – it received the new Spitfire IX in February 1943 and then – in June – moved north again, this time to Castletown and Sumburgh to defend the naval base at Scapa for a couple of months. At this time it also operated the high altitude Spitfire VI to counter high-flying German reconnaissance aircraft.

In the late summer of 1943 it was decided to make the Czech Fighter Wing, originally composed of two of their squadrons, up to the full three-squadron force, and No 310 flew south to join its compatriots at Ibsley, near Ringwood in Hampshire.

The next Czech squadron to form was No 311, this time a bomber unit in No 3 Group, initially based at Honington. Formation took place on 29 July 1940, and the squadron was equipped with Pegasus-engined Wellingtons, the first of which arrived on 2 August. Training proceeded apace and the first operation – a raid on Deurne airfield near Amsterdam – was carried out on the night of 10/11 September. A few days later No 311 transferred to the satellite airfield at East Wretham in Norfolk which was to be its home for the remainder of its stay in Bomber Command. The Czech Training Unit was also based at East Wretham and became No 1429 Flight in January 1942.

No 311 maintained its part of the bombing offensive against Germany, making its first raid on Berlin on 23/24

September 1940, other targets including Mannheim, Wilhelmshaven, the Ruhr Valley, submarine bases on the French Atlantic coast and the battleships Scharnhorst and Gneisenau in harbour at Brest, long trips to Italy to bomb Turin, several raids on Bremen and cities such as Essen.

But No 311's time in Bomber Command was running out – it made its final bombing raid, a short-haul trip to the docks at Dunkirk, on the night of 25/26 April 1942. The desperate need for greater efforts to combat the menace of the U-Boat meant that Coastal Command needed reinforcement, and No 311 was one of the Bomber Command squadrons selected for transfer. During its time with No 3 Group it had flown more than a thousand sorties in 150 operations, during which time it dropped some 1,300 tons of bombs on enemy targets.

Transferring to the Coastal Command base at Aldergrove in Northern Ireland on 28 April 1942, No 311 quickly set about 'learning the trade' and made its first operational patrol, an anti-submarine sweep, with five Wellington aircraft on 22 May, and then moved to its new operational base at recently-opened Talbenny near Milford Haven overlooking St Bride's Bay. It arrived on 12 June, joining with No 304 (Polish) Sqn – which was also a new arrival at the satellite station at Dale – on anti-submarine patrols over the Bay of Biscay area. After being recalled to Bomber Command for the Thousand Bomber raid on Bremen on the night of 25/26 June, No 311 began operations from Talbenny in July. It was a hard period, the obsolescent Pegasus-engined Wellingtons having no useful single-engine performance and the weather proving to be almost as much a hazard as enemy defences.

Working under the control of No 19 Group, No 311 kept up a steady pattern of Biscay patrols and achieved their first success on 27 July 1942, when Sqn Ldr

Stransky and his crew attacked and severely damaged the Type IX-B U-Boat U-106, which had to abandon its patrol and return to base for repairs. Several other U-boats were found and attacked and these efforts culminated in the sinking of U-578, a Type VII-C boat, by Flying Officer Nyvit and crew on 10 August. There were also anti-shiping strikes, and all operations were carried out against increasingly heavy enemy air activity over the Bay, which inflicted losses on No 311 crews.

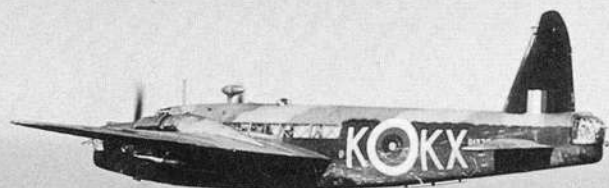
The second anniversary of the squadron's formation was marked by a visit to Talbenny by the Czech Foreign Minister, the Minister for Defence and the deputy Prime Minister. Operations proceeded, but the Wellington Ic was beginning to demonstrate its unsuitability for such intensive flying and in May 1943 the squadron was taken off operations.

Transferring to Beaulieu in the New Forest area on 26 May 1943, No 311 began training on the new Liberator V aircraft with a detachment from No 1 (Coastal) OTU, receiving its first squadron Liberator on 14 July. The Liberator V had provision for long range tanks and centimetric ASV (Air-to-Surface Vessel) radar – the latter equipment generally mounted in a 'Dumbo' fairing under the forward nose of the aircraft. The long range fuel system comprised outer auxiliary wing tanks and provision for further auxiliary tanks in the bomb-bay.

With these new and greatly improved aircraft, No 311 began operations from Beaulieu on 21 August but sadly this resulted in the loss of the Commanding Officer, Wg Cdr J Breitchet; there were other losses suffered in flying accident, but the new CO Wg Cdr V Nedved took over and morale began to rise again as the squadron's anti-submarine and shipping strikes began to bear fruit. The squadron now had a formidable armament with which to carry out its operations, including rocket projectiles mounted on stub wings or 'sponsons'. These were used when a No

No 312 Sqn became operational at Speke with Hurricanes on 2 October 1940 and six days later shot down this Junkers 88 of KG806 at Bromborough, in the Wirral. After the Battle of Britain, the Squadron went over to convoy patrols.
via Barry Kudlacek





Wellingtons of No 311 Sqn, the second Czech squadron to be formed, operating from East Wretham, Norfolk in March 1941. via Barry Kudlacek

311 Sqn aircraft piloted by F/Off O Dolezal, DFC attacked and disabled the German blockade-running ship *Alsterufer* on 27 December 1943, when the latter was trying to reach safe harbour in Bordeaux.

In February 1944 No 311 moved to Predannack in Cornwall, and later began to fly 'Cork' patrols in an effort to deny the English Channel and the Irish Sea to the U-boat. As the German Navy withdrew U-boat bases from France to more northern areas, the squadron was again transferred, this time to Tain, a bleak station on the Dornoch Firth, where it joined with the Liberators of No 86 Sqn to carry out anti-submarine patrols off the Norwegian coast and over the North Sea, combining these with anti-shipping strikes.

When the war in Europe came to an end, No 311 Sqn had taken part in the sinking of five U-boats and had damaged another, as well as damaging and sinking many German vessels. In June 1945 the squadron was transferred to Transport Command and began to assist in the repatriation of prisoners of war from Belgian and French airfields. In August 1945 it set up base at

Manston, where the Spitfires of the Czech fighter wing were already in residence. No 311 then began to repatriate Czech personnel to their homeland, using both Manston and Blackbushe as UK bases, and finally made it back to Prague, where it remained based until its eventual disbandment as an RAF unit in February 1946.

The third Czech squadron was No 312, formed at Duxford on 29 August 1940 with Hurricane fighters and within less than a month transferred to Speke, where it formed part of the RAF force defending Liverpool. No 312 became operational on 2 October and six days later scored its first victory – a Junkers Ju 88 – which came down on the banks of the Mersey. As the Battle of Britain died down, the squadron switched to convoy patrols and, after brief stays at Valley and Jurby, joined No 11 Group at Kenley to begin fighter sweeps and bomber escort missions before going to Martlesham Heath and then north to Ayr, where it became non-operational whilst converting to Spitfires.

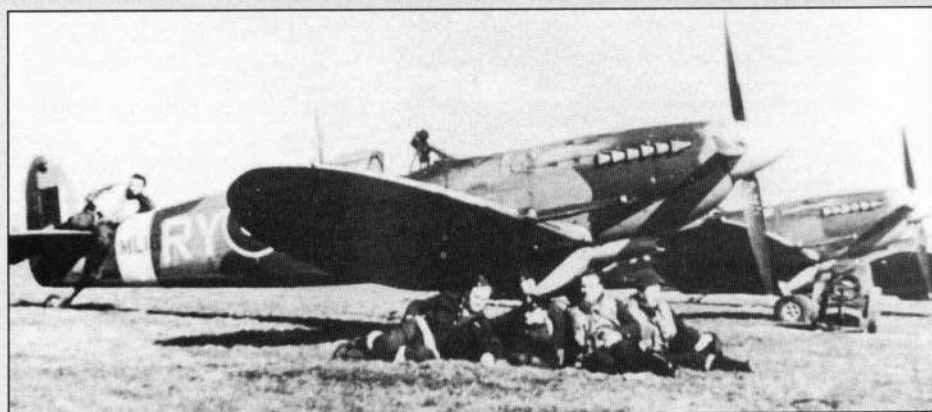
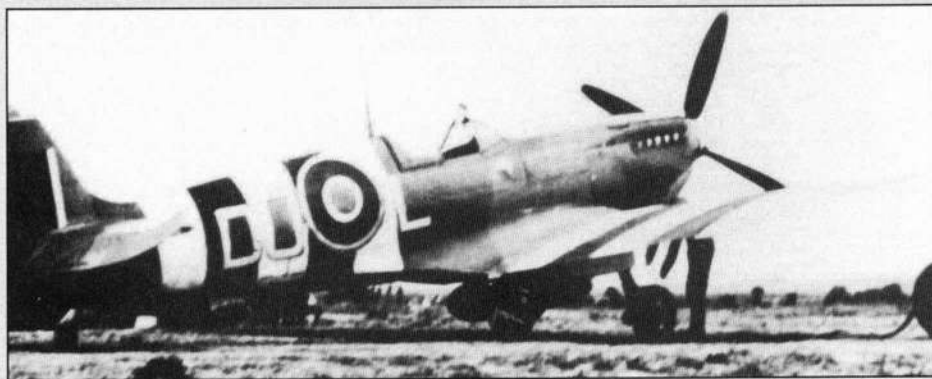
In January 1942 the squadron moved to Fairwood Common, flying convoy patrols, with

the added duty of working-up on ground attack exercises in conjunction with the Army. Transferring to Harrowbeer near Yelverton in Devon, No 312 went back on the offensive, escorting Hurricane fighter-bombers and carrying out sweeps, *Rhubarb* and *Ramrod* sorties. The squadron went to Redhill in August to take part, with its sister squadron No 310 in the air cover for the Dieppe landing – Operation *Jubilee*, then returned to Harrowbeer before joining No 313 Sqn to form, for the first time, the Czech Fighter Wing at Culmhead (also known as Church Stanton) near Wellington, Somerset.

The Wing operated from here for eight months, carrying out offensive patrols and, later, countering the Luftwaffe's 'hit-and-run' fighter-bomber attacks. Then, in June 1943,

Below: No 312 Sqn converted from Hurricanes to Spitfires late in 1941. Seen here at Tangmere in June 1944 is Spitfire IX DU-L, resplendent in D-Day invasion stripes. via Chris Ashworth

Bottom: The fourth Czech squadron was No 313, formed at Catterick in May 1941 equipped with Spitfires. Later becoming part of the Czech wing, No 313 eventually moved to Manston in February 1945, from where, wearing code letters 'RY' and often using long range slipper tanks, they carried the fight into Europe. via Chris Ashworth



Spitfires of the Czech Fighter Wing, together with a Liberator from No 311 Sqn, surround a parade ground at Ruzyn Airport, in their home country, in August 1945. As time went on, however, the homecoming of the heroes turned into a witch-hunt and many brave men found their dreams shattered. via Barry Kudlacek

the Wing was split up with No 312 going north to Skeabrae, a somewhat desolate airfield in the Orkney Islands, from where it took part in the Scapa Flow Defences. After three months, the squadron came south to Ibsley in Hampshire, where it joined with the other two Czech fighter squadrons to form the revitalised full Czech Fighter Wing.

The fourth and last Czech squadron was No 313, a fighter unit equipped with Spitfires which formed at Catterick on 10 May 1941. The squadron was declared operational the following month and was transferred to Leconfield before going to No 10 Group, Fighter Command at Portreath, Cornwall, where it joined No 130 Sqn on convoy patrols and offensive sweeps. In December 1941 it was transferred to No 11 Group and became part of the Hornchurch Wing alongside Nos 64 and 411 Sqn; full offensive operations began in February 1942 and the wing suffered steadily-rising casualty rates. In April No 313 moved to the Hornchurch satellite at Fairlop and then, in June 1942, went to Culmhead where the arrival of No 312 Sqn in October saw the formation of the first Czech Fighter Wing.

As with the other two Czech squadrons, No 313 went north in June 1943 to assist with the defence of the naval base at Scapa Flow, being equipped whilst at Peterhead

with high altitude Spitfire VIs before going south again to Hawkinge and, on 18 September 1943, to Ibsley – where, as mentioned above, the full Czech Wing was formed with all three squadrons taking part. From here offensive sweeps and bomber escort missions were carried out until the station was handed over to the USAAF. The Czech Wing then resumed operations from Mendlesham near Stowmarket, and – equipped by now with Spitfire IXs – worked up in the fighter-bomber role in addition to bomber escort and Ramrod operations. Once again the base had to be given up to the Americans, and the Wing moved to Appledram, in Sussex, where it became No 134 Airfield in No 84 Group, part of the 2nd Tactical Air Force – the cumbersome term ‘airfield’ was generally replaced by ‘Wing’.

Sweeps were resumed, as were bomber escorts and attacks on *No-Ball* (flying bomb) sites, the Wing flying standing patrols over the beachhead in Normandy during the D-Day landings on 6 June 1944. The threat of V1 flying bombs became so pressing that the Wing was transferred from 2nd TAF to ADGB (Air Defence of Great Britain, previously Fighter Command) and went to Tangmere on 22 June 1944. Spending a couple of days at B10 Plumetot, an airfield in the Caen area, the Wing left its aircraft and designation there

(No 134 Wing was taken over by the Lympe Wing comprising Nos 66, 331 and 332 Sqn) whilst the Czechs came back to Lympe. From here the wing split up with No 310 going to Digby in Lincolnshire, No 312 to Coltishall in Norfolk and No 313 to Skeabrae in the Orkneys.

In August 1944 Nos 310 and 312 Sqn returned to the south, arriving at North Weald late in August 1944, where they were joined by No 313 Sqn in October. From here they began operating again, as the Bradwell Bay (Essex) Wing, replacing the previous Wing (Nos 64, 126 and 611 Sqn) and then moving on to Manston – after the War had ended – in August 1945.

As has been mentioned, the Spitfires of the Czech fighter squadrons were joined by the Liberators of No 311 Sqn and preparation was made for the return to their homeland. The Spitfires went back to Prague, arriving there on 24 August after a dog-leg flight via Hildesheim, and the Liberators began taking their men home.

It had been a long and wearing war for these gallant Czechs – sadly, for many of them, it was to be a troubled time in their own country. For we British, from the little Somerset town in Axbridge to the outermost reaches of the British Isles – we shall remember them with gratitude, honour and affection.





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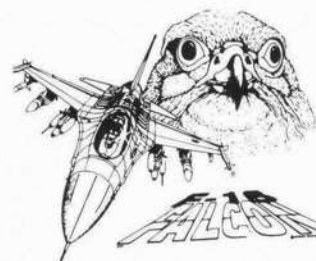
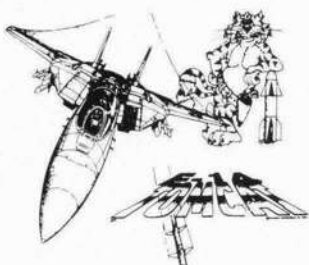
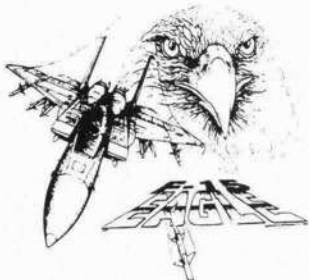
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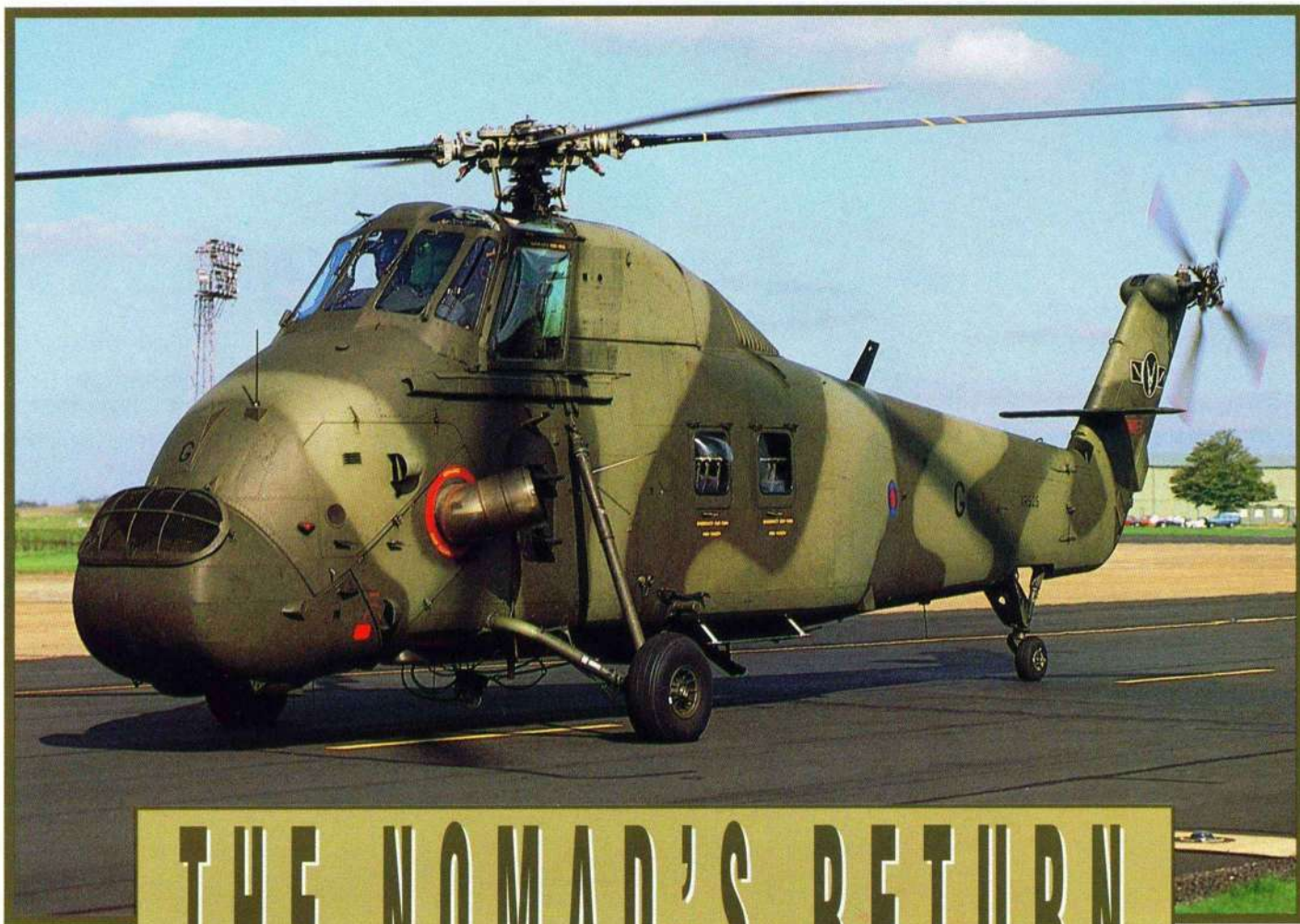
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THE NOMAD'S RETURN



Patrick Allen

In June 1992, two Wessex HC2s belonging to No 60 Squadron departed RAF Benson on an OCU formation training sortie. Their callsign 'Goat Formation', a reference to the Squadron's insignia of a goat's head, was a name that had not been heard in the United Kingdom for over 73 years.

No 60 Squadron was originally formed at Gosport on 1 May 1916, prior to deploying to France operating the Nieuport and SE5. Returning to the UK after WW1 in 1919, the squadron subsequently re-equipped with DH9s, DH10s and Wapitis, departing to the North West Frontier for 19 years. Here it operated both in India and Afghanistan helping to keep the peace amongst the warring frontier tribesmen. It was during this Campaign that the squadron gained a further five battle honours and adopted the Markhor or Afghan goat head as its insignia.

On the outbreak of WW2, No 60 Squadron re-equipped with Blenheims and in 1941 took over the fighter/bomber role moving to Burma and Singapore. With the loss of Singapore the squadron moved to Lahore and began operating Hurricanes in support of General Slim's 14th Army in Burma until the end of the War.

On 21 November 1946, the squadron returned to Singapore, re-equipped with Spitfires and continued operations in the Malayan emergency. Here, No 60

Squadron flew the last operational Spitfire sortie on 15 January 1951. It then entered the jet age at the end of 1950, being equipped with Vampires, Venoms and later Meteors and Javelins, becoming No 60 (Night fighter) Squadron in 1961. Continuing operations in Malaya and Borneo, the squadron was the last to operate the Meteor in September 1961 and the Javelin in April 1968.

No 60 Squadron was disbanded at RAF Tengah in May 1968, but was reformed on 3 February 1969 at RAF Wildenrath operating Pembrokes and Andovers in the transport, VIP, aeromedical and survey

roles within Europe, until it was again disbanded on 31 March 1992.

In May 1992, the title of No 60 Squadron was awarded to a newly formed UK Support Helicopter Squadron based at RAF Benson. Operating nine Wessex HC2s in support of the Army the squadron is also responsible for the Operational Conversion training of RAF Wessex aircrew in the support helicopter role. On Saturday 19 September 1992, the official ceremonies reformation of No 60 Squadron took place at RAF Benson when the Squadron Standard was formally transferred from the Andover communications squadron to its helicopter successor.

As remarked by the Squadron's new Commanding Officer, Wg Cdr Alasdair Campbell, "No 60 Squadron has a history that can be broken down into periods spanning approximately 25 years. Originally a fighter squadron, it then changed to fighter/bombers then to transport aircraft and now helicopters. On its past record, the squadron should have at least 25 years operating the support helicopter!"

Home based at RAF Benson, No 60 Squadron took over nine Wessex HC2s plus a small nucleus of experienced Wessex aircrew, all formerly belonging to No 72 Squadron. The new squadron then established the Wessex Operational Conversion Unit (OCU) and began

Above: No 60 Squadron's Wessex are camouflaged in new colours, shown here on XR525 'G' as it taxis for take-off. All photographs Patrick Allen



Above: With the Army moving towards increased night operations, No 60 Squadron aircrew are well practised in NVG operations.

Right: Close up of No 60 Squadron's distinctive tail markings and in the background the last Wessex to remain in the old-style camouflage, XS674 'R'.

Below: Wessex aircrewmembers are expert map readers, helping with navigation by map reading in addition to operating the helicopter's radios. Many Wessex pilots and crew have moved from other support helicopter squadrons.



operational sorties in support of the Army, throughout the UK. In May 1992, the OCU began a busy work-up period training both ab initio and experienced aircrew to provide personnel for its own squadron and those designed to join other RAF Wessex squadrons operating in Hong Kong (No 28 Sqn), Northern Ireland (No 72 Sqn) and Cyprus (No 84 Sqn).

No 60 Squadron also began operational tasking and by the end of 1992 had supported numerous Regular and Territorial Army units during their training exercises around the UK, together with at least two major exercises in Germany. Capable of moving eight fully equipped troops or 14 without kit, the squadron's Wessex are an important addition to the UK based helicopter squadrons, helping to relieve some of the commitment from the equally busy Puma and Chinook fleet.

With the Army moving more and more towards night operations, the aircrew are all Night Vision Goggle (NVG)

experienced, equipped with the ANVIS Gen 3 NVG system. This equipment allows the Wessex to operate at night giving valuable realistic operational training opportunities for both troops and aircrew. The formation of the new No 60 Squadron OCU has allowed the opportunity for Wessex aircrew to gain their first experience at NVG operations as part of their OCU training syllabus.

Two Wessex are allocated to the OCU, along with ten instructors including the squadron commander, four pilots, four aircrewmembers and one navigator instructor. Ab initio students, arriving direct from flying training at RAF Shawbury, have already gained experience flying the Wessex HC2. The eight-week OCU course is designed to bring pilots, navigators and aircrewmembers up to full operational standard.

The OCU introduces students to operational low level flying and navigation in a tactical scenario. This includes planning and executing operational sorties, working with troops in various types of trooping roles (fast roping, hover-jumping etc). Flying training also covers instrument flying procedures, GPMG cabin door gun firing and the more advanced underslung load lifting techniques, which includes using an 80ft strop. Student pilots, navigators and aircrewmembers all fly on each other's sorties making the optimum use of expensive and valuable flying hours.

With the Army moving more towards night operations, Wessex aircrew gain their first experience of Night Vision Goggle (NVG) operations on the OCU. Ab initio students will

have already flown the Wessex at night and are required to undertake a one hour conventional night flying sortie prior to starting NVG operations. The six-hour NVG flying training programme covers all aspects of NVG operations including take-offs, landings, navigation and transits, confined area operations and load lifting techniques.

During NVG operations, the flying pilot concentrates on the world outside, while the co-pilot or navigator undertakes mission management, map reads, checks temperatures and pressures and during landing and take-offs gives the pilot a running commentary of the helicopter's height, speed when the aircraft is safe single engine, plus any other relevant information whilst also keeping a good look outside. One of the more difficult skills to overcome in NVG operations with poor depth perspective and a narrow field of view is precise and accurate navigation. Landmarks such as towns, churches and hill contours, which are easily picked out in daylight, can become insignificant in the green world of NVGs. For example, pylons, powerlines and small poles are extremely difficult to pick out through night vision goggles and these can be easily missed. Safe NVG flying is of paramount importance and the RAF spends a great deal of time making sure that low level NVG training routes and landing sites have all been well reconnoitred and are safe for student flying.

To help during NVG landing and take-offs, the Wessex can be fitted with a powerful Nightsun searchlight producing 30 million candle power of light. Fitted with an IR filter for NVG operations, the Nightsun can be directed onto a landing site by either pilot or aircrewman and is used to check for obstacles such as small wires, telephone lines and poles, etc.

OCU students get the opportunity to use this equipment during their training sorties. At the end of their eight-week, 35-hour flying programme, students undertake a final short





Above and inset: As part of their helicopter refresher training, troops secure the landing site for the Wessex and provide cover for each other during multiple troop moves. The ideal load for the Wessex is 6/8 fully equipped troops plus their Bergens. Carrying further troops means a trade-off between weight and fuel, resulting in reduced endurance and a shorter operational range.

exercise which is designed to test all their newly acquired skills. Having completed their training, the pilots join a Wessex squadron as P1 or Captain qualified. Navigators are qualified to fly with P1/Captain qualified pilots and aircrewmembers join their squadrons as 'Limited Combat Ready'.

Within a few days of becoming operational, No 60 Squadron Wessex were being tasked to support Army units around

the many UK training areas. The squadron's nine Wessex all proudly display their newly-designed No 60 Sqn tail markings and have been painted in the latest RAF camouflage colours. Over the last few years, a number of different paint schemes have been trialled, ranging from an all over black to an all over light blue. The present colour is now to become standard on all RAF support helicopters

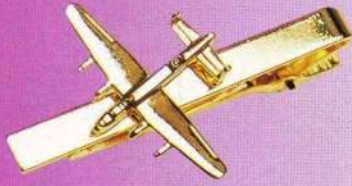
except for the RAF Chinook, which will be painted in a single tone dark green.

The squadron is already much in demand and is assured a busy future with its tasking diary already full for the foreseeable future. Having returned home after 73 years and surviving as a flying unit to join the Support Helicopter Force, we should be seeing a lot more of No 60 Squadron in the future.

Below: No 60 Squadron Wessex XR525 'G', flown by F/O Rich Webber and F/O Eamon Green, operating in support of 'B' Company Royal Regiment of Fusiliers and 1 Company Irish Guards during helicopter training drills at Pirbright near Aldershot.



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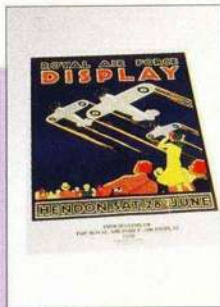


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Anytime, Anywhere

Lindsay Peacock

Vickers, Avro and Handley Page are names that are inextricably interwoven into the fabric of British aviation history and so, too, are three of their designs. Collectively known as the 'V-bombers', the alliterative trio of Valiant, Vulcan and Victor recall the

days when the RAF held the UK's sole responsibility for our nuclear deterrent. In today's world, when financial restraints take priority, the thought of developing and procuring three bomber types might seem like folly. In the late 1940s and 1950s,

though, the situation was different, with the result that the RAF acquired all three, each being unique in its own special way.

The Valiant, for instance, secured a place in the history books by being selected in 1956 to deliver Britain's first air-dropped H-bomb, although it was later to meet ignominious retirement when fatigue problems emerged in 1965. The Vulcan was the only one of the trio ever to employ conventional weapons in anger but may best be remembered as an air show performer that turned heads wherever it went. The Victor was arguably the most elegant of the three, by virtue of its slender crescent wing planform but is perhaps more significant in being the last of the V-bombers to see operational service, even though it was produced in fewest numbers.

Thirty years have passed since the 86th and last Victor was delivered on 2 May 1963, those three decades witnessing the demise of Handley Page as well as closure of the airfield at Radlett, where all the Victors were built. That same period also saw responsibility for providing Britain's deterrent capability, because of the introduction of Polaris, switch from RAF to Royal Navy control, an act that abruptly ended the Victor's career as a pure bomber. Today, it survives only as an in-flight refuelling tanker, but its days are

Below top: Victor B1. Bottom: A Victor B2 during a low-level display at Farnborough. PRM





Main picture: No 55 Squadron, with their converted Victors, maintain the final link with the V-bomber force. PRM Top: A Victor from No 55 Squadron replenishes the tanks of a trio of Jaguars en route to the Gulf during Operation Granby. Mike Rondot

re LAST OF THE V-BOMBERS

numbered, for it is scheduled to be retired from service before the end of 1993.

Barely a handful of examples remain in use with No 55 Squadron at RAF Marham, a pitifully small reminder of the peak years of the V-force, when scores of Valiants, Vulcans and Victors flew from stations such as Coningsby, Gaydon, Honington, Scampton, Waddington and Wittering. It was, in fact, the latter base that was the first and only home for the B2 strategic bomber version of the Victor. Production of this sub-type terminated prematurely after just 34 examples were completed, with another 25 falling victim to cancellation, and its career as a bomber was brief, spanning barely seven years following introduction to service by No 232 OCU in November 1961.

Armament options were spearheaded by Avro's *Blue Steel* Mk1 stand-off missile, a single weapon of this type being carried semi-externally. Alternatively, the Victor B2 could also employ gravity nuclear bombs, housing these in a capacious internal weapons bay. Finally, for conventional bombing tasks, it was able to tote an impressive 35 1,000 lb bombs, a figure that greatly surpassed the Vulcan's maximum capacity of 21 similar weapons.

Despite being demonstrably superior to the Vulcan in some respects, the Victor B2 was retired in late 1968, when Nos 100



V-bomber trio – Vulcan, Victor and Valiant. PRM

and 139 Squadrons stood down at Wittering, although some modified SR2s continued in the strategic reconnaissance role with No 543 Squadron at Wyton. At that time, most B2s returned to Radlett to await tanker conversion and they languished there in open storage for quite

some time, due to Handley Page being forced to cease trading in February 1970.

Eventually, 24 examples (including three former SR2s) were brought to K2 tanker configuration by Hawker-Siddeley at Woodford in a re-work programme that ran for most of the 1970s. Following

conversion, XL231 became the first Victor K2 to fly on 1 March 1972 and deliveries to the RAF began just over two years later, in May 1974, when the first example was delivered to No 232 OCU. Subsequent aircraft replaced Victor K1/1A tankers with two of the three squadrons that constituted the rest of the Marham Wing, Nos 55 and 57 converting to the K2 while No 214 was less fortunate, disbanding in January 1977.

For the most part, the K2 has enjoyed a fairly peaceful and untroubled career, with routine aspects entailing the support of RAF interceptors patrolling British air space and refuelling of fighter and attack aircraft deploying overseas for exercises. Occasionally, though, there have been moments of distinct anxiety and the Victor is certainly no stranger to war, even though it was only ever employed in a role far removed from that for which it was originally conceived and designed.

In the spring of 1982, for instance, aircraft from Nos 55 and 57 Squadrons deployed from Marham to Ascension Island. Flying from there, they eventually played a key role in *Corporate*, the code name given to the military operations that culminated in Britain retaking the Falklands. Without doubt the best known aspect of the work undertaken then was support of the marathon 'Black Buck' bombing raids by the Vulcan contingent at Ascension, but the Victor also performed maritime radar reconnaissance of the Falklands region and the intelligence gleaned was instrumental in recapturing South Georgia.

At that time, the number of Victor K2s on RAF strength was 23 (XL513 having been destroyed in 1976) and all but one of these aircraft supported *Corporate* in some manner, even though not all of them deployed to Ascension. In 1990-91, however, a very different picture prevailed when the Victor K2 again faced combat



duty during Operation *Granby*. By then, only ten remained in service and No 55 Squadron was the sole user, with No 57 Squadron and No 232 OCU having both disbanded in 1986.

Apart from assisting with the deployment of Tornado and Jaguar elements to the region, most of No 55's Victors also played a part in the ensuing air campaign to liberate Kuwait. In six weeks of intense activity, No 55 completed exactly 290 combat sorties and logged over 850 hours, while delivering just over eight million pounds of fuel. They were primarily employed in support of Tornado, Jaguar and Buccaneer strike aircraft flying from Muharraq and Dhahran but also provided fuel to other 'customers' such as Canada, France and the US Navy.

Since then, life for No 55 has perhaps been anti-climactic, highlighted by Operation *Warden* between September 1991 and February 1992, when Victors from Akrotiri supported Jaguars flying reconnaissance missions over Northern Iraq from the Turkish base at Incirlik. For the most part, though, aircraft and aircrew continue to perform sterling service from their base at Marham, as I discovered when I visited No 55 Squadron to learn more about the business of air-to-air refuelling, Victor-style.

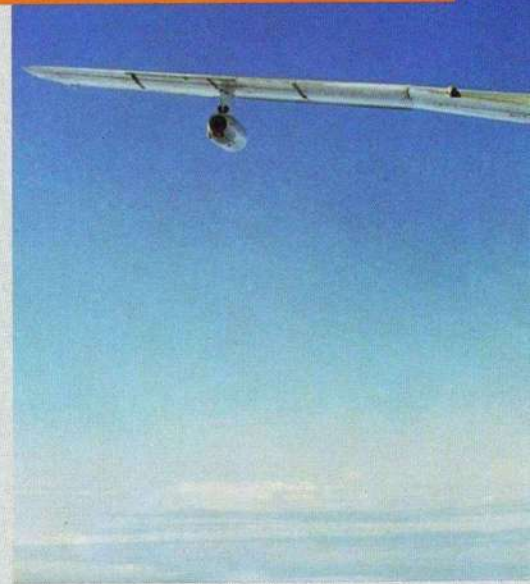
The squadron is justifiably proud of being the last operator of the V-bomber and isn't coy about making known either claim to fame, specifically that it has been equipped with the same basic type of aircraft for longer than any other squadron in the RAF. In its current incarnation No 55 reformed at Honington in September 1960 with the Victor B1, flying this and the B1A in the strategic bomber role until May 1965 when it moved to Marham and became involved in the aerial refuelling business, initially with conversions of the B1/1A series and, since July 1975, with the K2. If current

plans do not change, by the time No 55 officially disbands at Marham on 1 October 1993, it will have flown Victors continuously for exactly 33 years.

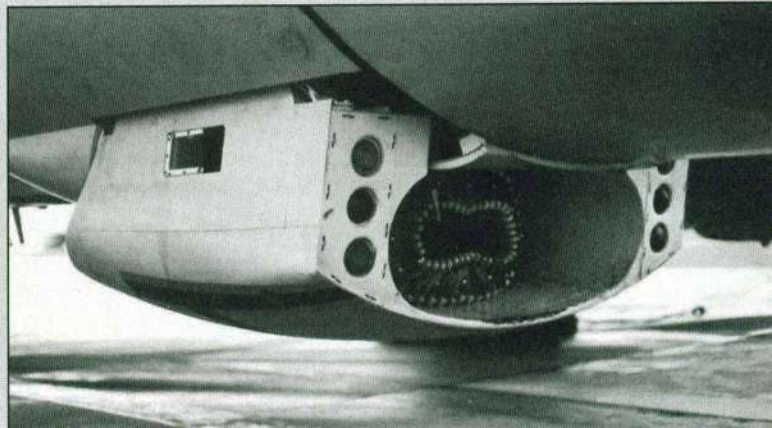
Currently led by Wg Cdr Al Beedie, No 55 has sufficient personnel resources for eight four-man crews, with each crew comprising a pilot, a co-pilot, a navigator and an air electronics officer. Normally, crews are not permanently constituted and it is thus commonplace to fly with different colleagues on different days when operating from Marham. No 55 presently has eight K2s on strength, two of which are 'in use' reserves.

Serviceability is generally good, bearing in mind the age of the aircraft and the type of technology that was extant when they were built and there are, inevitably, moments when meeting a specific task is difficult. By and large, though, No 55 succeeds in satisfying the demands made of it.

There is probably no such thing as a 'typical mission' and nor, for that matter, is there necessarily a routine one, as I



Inset left: Mk 17B HDU inside the bomb-bay, looking towards the rear. Below left: Mk 20B refuelling pod on the Victor's port side. Below right: The Mk 17B HDU in the lowered position showing the basket and signal lights. Photographs Lindsay Peacock





Thirsty customers. Main picture: A 29 Sqn Lightning takes on fuel from Victor K1A XH650.

Inset left: Probe-equipped Hercules were refuelled by Victor tankers for flights to the South Atlantic during the Falklands crisis in 1982.

Inset above: Victors provided crucial support during the Gulf crisis for a variety of aircraft, including Buccaneers. D.Bolsover

discovered when I accompanied one of No 55's crews on a sortie from Marham. Prior to that, I had been alerted to the fact that flexibility and adaptability were major factors in all aspects of the tanking business – now, I was to see those facets demonstrated to the full.

In general, tanker squadrons are notified of future tasks during the previous month, which allows sufficient time for unit personnel to prepare a working plan and draw up a weekly flying programme that specifies crews, receivers and operating areas. In this instance, I was to go with Flt Lt Jim McDines (first pilot), Flt Lt Hamish Imber (co-pilot), Flt Lt Jeff Hesketh (navigator) and Sqn Ldr Peter Lambert (AEO) and all four individuals duly began planning for the sortie some two hours before take-off time, this being the usual interval allowed for preparations. At that time, we expected to be airborne for two hours, which would include 30 min on station in a designated refuelling area, over the North Sea, east of

Newcastle. The 'customer' would be two Tornado F3s from No 43 Squadron at Leuchars.

Unfortunately, the weather was far from ideal, with the crosswind component at Marham being one cause for concern, since there was a distinct possibility it would exceed allowable limits and result in the mission being aborted. Nevertheless, planning went ahead, and it was at around this time that conditions in the refuelling area began posing problems. A telephone discussion between Flt Lt McDines and the receiver crews at Leuchars resulted in consideration being given to using a towline over a sparsely populated area of Scotland. That was soon abandoned in favour of one above the sea between Benbecula and Tiree, under radar control from RAF Benbecula.

It was then discovered that Benbecula's radar was unable to provide this service, but an alternative was soon found in the form of Scottish ATC, with RAF Buchan as a 'fall-back'. Throughout this interlude, when the plan was changing almost by the minute, the need for flexibility was most apparent. So, too, was the need for calm . . . and there's no doubt that Kipling would have been impressed.

Faced with a set of constantly moving 'goalposts', Flt Lt Hesketh endeavoured to update his navigation plan while Flt Lt Imber was busy with fuel calculations, since it was evident that we would need to go with more to fulfil the task. In the meantime, Flt Lt McDines was still discussing options with the receivers and it took a few fairly hectic minutes before the various strands began to come together in the form of a coherent plan.

On this occasion, the exercise did not prove futile, for the wind at Marham relented sufficiently to permit take-off. However, by the time we got airborne, the departure time had slipped by almost 30 min, the refuelling area had altered twice, the fuel uplift had risen, mission duration had been extended and the entire navigation plan had been revised. About the only items that had remained constant were the aircraft to be used (though it isn't known for that also to change), the names of the crew and the

A pair of Victors await their next mission on the Marham Flight line. No 55 Squadron currently has eight aircraft on strength. Lindsay Peacock



receivers. That is perhaps an oversimplification, but it was still an impressive demonstration of adaptability in the face of rapidly changing circumstances.

Once airborne, everything slotted quite neatly into place, with the northbound transit proving uneventful. Accomplished at 35,000ft, it culminated in a descent to 20,000 ft which was the altitude to be used for tanking. On arriving in the refuelling area, we set up a racetrack pattern, whereupon the AEO was authorised to stream both underwing hoses as we awaited the Tornados. On this occasion, the rendezvous was effected under GCI control, with the receivers being vectored to a point where they could establish visual contact with the Victor and it was not long before a pair of No 43 Squadron Tornado F3s slid into position off our starboard wing, forming with us until cleared by Flt Lt McDines to move to the pre-contact position astern of each hose.

Thereafter, they were individually cleared to make contact, their pilots using reference marks on the underside of the Victor to fly to that point in space which allows the probe to engage the drogue. Once in contact, it is necessary for the receiver to continue moving forward for a distance of some six feet, the process of 'pushing the drogue' culminating in a micro-switch being activated. It is only then that the pump comes into play and fuel begins to flow.

Lateral clearance between the pod hoses is sufficient to allow two receivers to be in simultaneous contact. As for transfer rates, these can vary according to the receiver's fuel state, but the maximum flow

achieved by the wing pods is 1,200 lbs per minute per pod. Since we gave 7,000 lbs to each Tornado in the first refuelling, it required them to remain in contact for somewhere in the region of six or seven mins – a second 'hook-up' with the same pair some 15 mins later saw both aircraft take another 4,400 lbs of fuel and was equally slick, both receivers plugging in satisfactorily at the first attempt.

In addition to the pair of Mk20B underwing pods, the Victor is fitted with a retractable Mk17B hose drum unit (HDU) in the rear of the weapons bay area. This is normally used for larger and 'thirstier' receivers (eg VC-10, Victor, Tristar) and has a much higher maximum flow rate of 4,500 lbs per minute. However, when using the HDU, it is only possible for one receiver to be in contact at a time.

Responsibility for monitoring the refuelling operation is a shared one, it being up to the captain (who is ultimately responsible for the safety of the crew and aircraft) to be the final arbiter as to whether refuelling can take place. As already mentioned, it is the AEO who streams the hoses and he also manages the control panel, it being possible to pre-select the amount of fuel to be given to a specific receiver by simply 'dialling-in' the appropriate quantity. Once that amount has been transferred, the flow of fuel is automatically shut-off.

Other duties undertaken by the AEO extend to keeping a written record of fuel supplied, while the navigator also has a part to play by using an aft-facing periscope under the forward fuselage section to first

verify that it is clear below and behind prior to the aircraft captain calling the receivers in. After that, the navigator continues to 'eyeball' them and gives a distance countdown as they approach and make contact.

Maintaining a visual check might sound unnecessary when there is radio communication between tanker and receiver, but many refuellings take place in conditions of radio silence and it is obviously desirable to know what, if anything, is behind, fast jet pilots not being averse to 'stealing' fuel if the opportunity presents itself.

As an example of this, in the Gulf War, when radio silence was strictly observed, there was at least one instance of a Victor being 'mugged' after having completed a planned refuelling of some RAF Tornados. The first indication the crew received that they had 'company' was an unexpected loss of fuel from one of the weapons bay tanks. On checking with the periscope to see if they were leaking fuel, the navigator discovered the culprit was a US Navy F-14 Tomcat – and a very persistent one at that, for it carried on taking fuel even as the house was wound in!

On the sortie I accompanied, there were no unexpected customers for fuel and we duly came off station after the allotted time was up, ascended to 37,000 ft and headed south, breaking out of the gloom for a night landing at an exceedingly wet and very windswept Marham. Uneventful it may have been, but it was an impressive and professional demonstration of the business of aerial refuelling by the personnel of No 55 Squadron and the last of the Victors.

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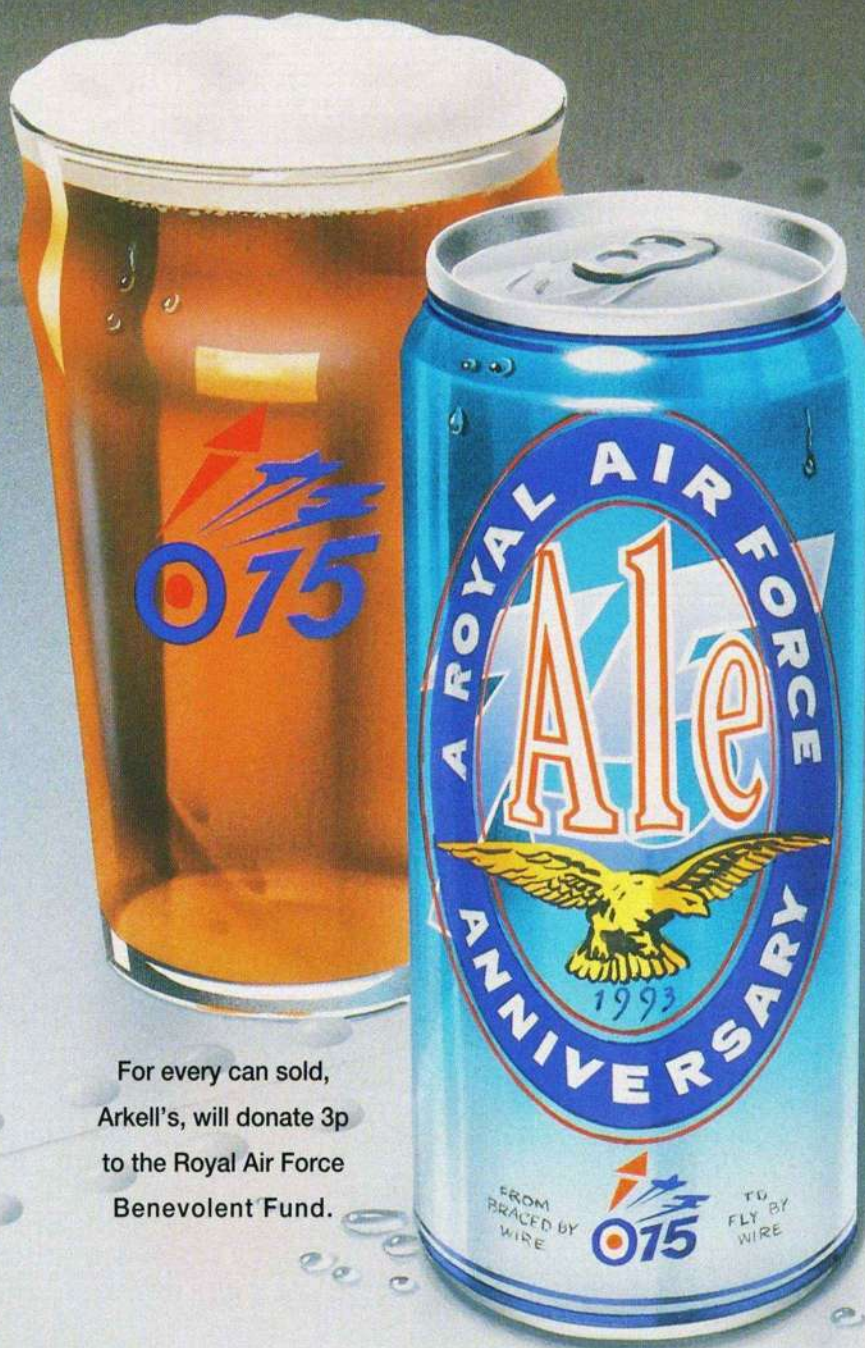
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MOVERS' TENTH

Flight Lieutenant Tony Freeman, RAuxAF

On 15 August 1992, No 4624 (County of Oxford) Movements Squadron, Royal Auxiliary Air Force (RAuxAF) celebrated its tenth anniversary with a parade and families day at its home base at RAF Brize Norton. The Queen's Colour for the RAuxAF was paraded on the day when the Reviewing Officer was the Honorary Inspector General of the RAuxAF, Air Commodore Sir Hector Monroe AE JP DL MP.

Just over one year earlier, No 4624 Squadron justified its formation and training when it was mobilised in support of the regular movements personnel of the RAF for Operation *Granby*, the liberation of Kuwait. On 15 January 1991, 124 personnel were called up for service in the UK, Germany and Cyprus. Due to existing legislation, it was not possible to invoke mobilisation until the outbreak of hostilities against Iraq which meant that much of the material required 'in theatre' for the campaign had already been moved before the squadron could bring its considerable manpower to bear in support of an acutely stretched movements organisation. However, elements of the squadron remained mobilised long after the cessation of hostilities in March, to assist with the recovery operation and in support of operations to alleviate the suffering of the Kurdish people in Northern Iraq.

Operation *Granby* proved beyond doubt that the wisdom and foresight of those responsible for the formation of 'citizen soldiers' who train in peace-time for support in war was fully justified. The nation should be proud of all those who put their own civilian jobs at risk in a time of gathering recession and who left their homes and families to serve their country for a common cause. On return to the UK, the squadron was honoured to receive a Unit Citation from the Lord Lieutenant of Oxfordshire, Sir Ashley Ponsonby.

No 4624 Squadron was formed in August 1982. The idea of an auxiliary movements squadron was mooted in the late 1970s when the RAuxAF was being resurrected from the ashes of the squadron and unit disbandments of the late 1950s. It was the lessons learned from the Falklands campaign which provided the catalyst for the formation of a reserve force to provide movements reinforcements to NATO in time of war. It also was at this time that an Aeromedical Evacuation Squadron was formed at Wroughton in Wiltshire and these two specialist units were the only RAuxAF squadrons to be mobilised in 1991.

Within a year of its formation, No 4624 Squadron had trained three operational flights and was already deploying personnel

on mobile air movements tasks in support of the RAF. In the same year, teams of auxiliaries were carrying out their Annual Continuous Training in support of the International Air Tattoo then at RAF Greenham Common and subsequent years saw a programme of annual training in Sardinia, Germany and Cyprus as well as augmenting the established movements squadrons at RAF Brize Norton and Lyneham.

1985 saw the first airwomen recruited into the movements trade as auxiliaries. Following this initiative, the RAF trialled a programme to introduce airwomen into the regular movements trade; this trial proved successful and 10% of the annual intake into the trade can now be women. In 1987, the squadron was declared fully operational with an establishment of eight operational flights of some 25 personnel each although this arrangement proved somewhat cumbersome to administer with the result that, in 1990, the squadron was re-organised into six flights, three each in two 'divisions'; this new arrangement proving highly successful in that a whole 'division' attends for training on a given evening or weekend.

In 1989, the RAuxAF was proud to receive from the Honorary Air Commodore-in-Chief, Her Majesty The Queen, its own Queen's Colour for the Royal Auxiliary Air Force. No 4624 Squadron provided the Colour Escort



on this most prestigious occasion and in 1990, to commemorate the 50th Anniversary of the Battle of Britain, a battle which saw such a significant contribution by the auxiliary squadrons in Fighter Command, the squadron provided the entire Colour party in London for the Parade and Flypast. The squadron maintains a small link with these ceremonial occasions: it retains a

'ceremonial flight' which participates in local parades and ceremonies as well as forming the backbone of squadron ceremonial events.

The squadron has two intakes of new recruits each year. Competition is keenly contested and all recruits have to undertake an aptitude test and a medical before being attested. There then follows two weeks of what is euphemistically known as 'boot camp' when the recruits

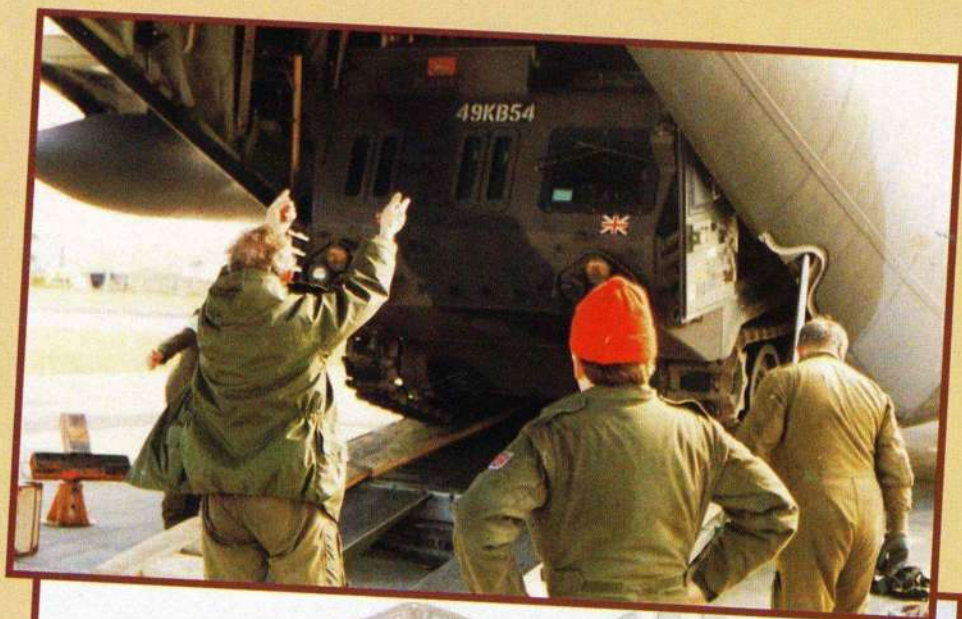
recruits will have their first experience of the VC10, Tristar and ubiquitous Hercules, aircraft with which they will become so familiar during their time on the squadron.

Once they are posted to an operational flight, each airman/woman is expected to attend for one evening and one weekend each month and to attend the Annual Continuous Training period of 15 days, usually at some location overseas where they will work alongside their regular colleagues. The work includes the physical aspects of loading or unloading passengers and/or freight as well as working in the preparation of loads in 'Load Control' or as Passenger Clerks in the Passenger Terminal. Most aspects of air movements are now computerised and training is given in a variety of systems and procedures. It is often forgotten that a large transport aircraft is nothing more than a flying cantilever beam or 'see-saw' and that too much weight forward or aft of the centre of gravity, or too heavy a weight in one part of the aircraft will 'seriously damage your health'. The RAF transport fleet has an impressive safety record and it says much for the professionalism of the 'movers', both regular and auxiliary, that this record is maintained.

On completion of basic Movements Training, squadron members can apply to sit the Air Movements Controllers Course and exam, successful completion of which is a pre-requisite to promotion beyond the rank of Senior Aircraftman/woman. Such is the enthusiasm and dedication of squadron personnel that some 50% of squadron members are 'controllers', including many who have risen to the rank of Junior and Senior NCO in addition to those who have been selected for commissioning and who now command operational flights and divisions in the squadron.

Auxiliaries receive the same rate of pay as their regular counterparts for the periods of continuous training, plus a travel allowance. They also receive an annual tax-free bounty, subject to them fulfilling their annual training requirement which includes remaining current in Operational Defence Training skills and personal weapon training. Uniform is issued free and each operational flight is encouraged to compete against each other in movements training exercises and on the sports field when annual trophies are contested.

This article is nothing more than a brief snapshot of what many regard as one of the more visible units of the RAuxAF. As a squadron officer, it can be said of me that "he would say that—wouldn't he". However, to a certain extent, all military formations in peace-time can be said to be 'training units' with an operational role which differs to a greater or lesser degree, depending on the role of the unit and circumstances at the time. In this respect, No 4624 Squadron is a training unit, but one which actually deploys and supports the regular movers in real-time and, along with our Aeromedical Evacuation Squadron colleagues, we have fulfilled the ultimate commitment of any reservist we were mobilised! No 4624 Squadron looks back on the past ten years with pride and satisfaction at a job well done and looks forward to the future with confidence.



Above (top): A tracked vehicle is offloaded from a Hercules by No 4624 Squadron personnel. Above: A Tristar being loaded at Gütersloh. Left: The Queen's Colour for the RAuxAF is paraded at the anniversary celebrations at Brize Norton.



learn the mysteries of Service life and Operational Defence Training. They round off the two-week course at a 'field' weekend when it usually managed to rain; the weekend culminates in a trailer race which has become a squadron tradition and certainly sorts out the men from the boys (and girls).

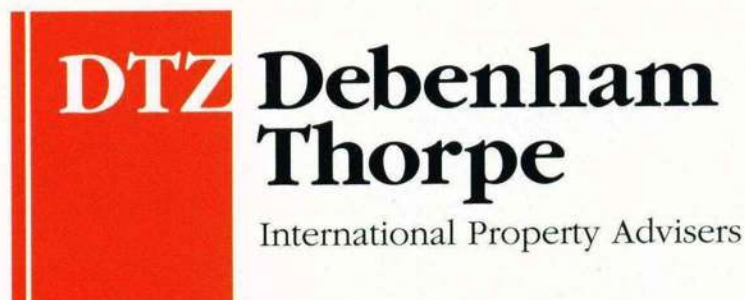
Following the two-week course, the surviving aspirants commence their formal Movements Operator training which will result in their reaching the dizzy rank of Leading Aircraftman/woman and being posted to one of the operational flights. Every effort is made to post an entire intake to one division so that the bonds and common suffering borne during the initial training phase is maintained in the group. During their initial training, the

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A) Canberra B) Valiant C) Vulcan |
| 3. Which famous RAF fighter aircraft was first flown at Eastleigh on 5 March 1936?
A) Spitfire B) Hurricane C) Tempest | 9. Which was the first jet basic trainer to be used by the RAF?
A) Balliol B) Prentice C) Jet Provost |
| 4. Which was the last biplane fighter to enter RAF service?
A) Bulldog B) Gauntlet C) Gladiator | 10. Which RAF V-bomber was involved in the Black Buck raid during the Falklands War?
A) Vulcan B) Victor C) Valiant |
| 5. Which type of RAF bomber took part in the No 617 Sqn Dams raid of 1943?
A) Stirling B) Lancaster C) Halifax | 11. Which RAF helicopter has twin main rotor blades?
A) Wessex B) Chinook C) Puma |
| 6. Which Avro bomber was the successor to the Lancaster?
A) Lincoln B) Shackleton C) Vulcan | 12. Which type of aircraft is flown by the Red Arrows?
A) Tornado B) Lightning C) Hawk |

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RAF

Exercise Distant Frontier '92

"One of the attractions of deploying Tornado F3 fighters to the wastes of Alaska as part of a complete RAF package to work with/against elements of the United States Air Force is the ability of the scenario to provide a target rich environment with adversaries of both equal or superior performance." A lasting comment made by Group Captain Mike Bruce, detachment commander of RAF Exercise *Distant Frontier 92/1*.

However, to take six Tornado F3 fighters and eight Tomado GR1/GR1A bombers plus an E-3D Sentry AEW1 from No 8 Squadron, and supporting VC10 K3 tanker from No 101 Squadron, to a training area on the other side of the North Pole is not something that can be accomplished overnight or without a tremendous amount of detailed planning.

Peter R Foster

Thoughts on such a deployment were considered as long ago as July 1990, just prior to Operation *Granby*, when four Tornado GR1s from Nos 9 and 617 Squadrons were hosted by the 343rd Tactical Fighter Wing at Eielson AFB. The jets and crews were at the time on an annual low-flying training detachment at the Canadian Forces base at Goose Bay, Labrador when they made the eight hour flight to Alaska.

This mini-deployment was, to all intents and purposes, a look-see at the facilities which could be offered by this remote region in respect of low-level training and suitable range areas, although this was

principally aimed at the 'mud movers' rather than air defenders. However, before any formal decision could be taken the events that developed in the Gulf region precluded any thoughts that senior officers may have had for a major training package in the immediate future.

After the cessation of hostilities in and around Kuwait the air forces of the coalition forces, and in particular both ourselves and the United States, were beginning to re-think the methods of training in line with the experience gained through the conflict with Iraq. Arising out of this have come a number of integrated training packages with other coalition partners including one that was to be offered to the RAF by the USAF in the use of the Eielson range facilities in Alaska.

Main picture: Three Tornado F3s pose for the camera against a typical Alaskan background. Inset: A VC10 K3 of No 101 Sqn fulfilling its essential 'top-up' task with a Tornado GR1A and an F3. All photographs Peter R Foster





The F3s, with the aid of external fuel tanks and a Tristar tanker, arrived at Eielson AFB combat ready.

Expanding upon the original concept of low-level training for the Tornado GR1s as perhaps a pre-Red Flag work up, the lessons in the Gulf of working as complete packages, had been firmly brought home. The grace factor of five months of training during Operation Desert Shield served to highlight the change of emphasis in respect of the role the air force was now needing to play.

Exercise Distant Frontier 92 was therefore seen by many as a chance to put together a complete package and deploy it

over a long distance and once in situ to undertake a progressive but high value training syllabus. It was also hoped that by working as a cohesive package the team would be in a position to develop scenarios to obtain a mutual training benefit, this applying equally to both the RAF and USAF elements involved.

The initial advice to the squadrons came in June 1991 when the respective project officers were appraised of what was being considered. Sqn Ldr Nick Randall as the

'NRL' navigator-radar leader, for No 111 Squadron was tasked as part of the main planning team in deciding on the massive logistic back up necessary to get six Tornado F3 fighters to Alaska and to have them serviceable upon arrival.

One of the decisions taken at these early planning meetings was to assign to the deployment Tornado F3 'stage one plus' aircraft. These were some of the 40 that were modified for service in the Gulf as part of Operation Granby. The aircraft themselves received several additional modifications which included more use of radar absorbent materials so as to cut down on the radar signature and the addition of EPM pods, a Philips/Matra Phimat chaff/flare dispenser and ALE-40 flare dispensers. The 40 aircraft concerned are all on the strength of the Leeming or Coningsby wings. A number of these were therefore loaned to the Leuchars wing in time for them to be prepared for the long haul to Alaska.

One of the many items that needed careful preparation was the installation of oil efficient engines to enable the long legs to be accomplished without any major engine problems. This may sound as though the Tornado suffers unduly from heavy oil utilisation but, as with any engine, some use less than others. In the end the detachment took four aircraft normally assigned to No 25 Squadron and two that belonged to No 23 Squadron. Interestingly, five out of the six jets concerned had been on the 'stage one' wave that deployed to the Middle East from Leeming for Desert Shield and subsequently Desert Storm.

In a similar fashion Wg Cdr Barry Holding, OC of No 2(AC) Squadron at RAF Marham was detailing officers to become part of this very important planning team. The initial meeting for the planning group took place in September 1991 but it was a further six months before the hours of planning were to



Left top: Wg Cdr Pete Walker (right) and Gp Cpt Mike Bruce welcome Wg Cdr Barry Holding to Eielson AFB at the start of Distant Frontier '92.



Left bottom: Preparations for an attack sortie.



come to fruition. On 6 April 1992 at approximately 1105hr four Tornado F3 fighters crewed by No 111 Squadron took off from Leuchars to rendezvous with a Tristar K1 tanker for the first leg of this marathon deployment, initially to CFB Goose Bay and then Eielson AFB, Alaska.

The first cell was followed some 30 min later by a second cell of two more Tornado F3 fighters and a pair of No 2 Squadron Tornado GR1A reconnaissance aircraft from RAF Marham. Again these four were to join up with a Tristar tanker to CFB Goose Bay where they were augmented with aircraft drawn from the normal RAF Goose Bay detachment. The second leg, spread over several days, saw the Tristars continue westwards with reduced cells of three aircraft each due to the longer transit leg. The eight GR1s followed over successive days.

The RAF is well versed in long distance deployment but this. However this deployment did not go without problems which included several Tornado GR1s having to divert into CFB Winnipeg and the loss of one Tristar tanker for technical reasons. The elements also contrived to cause problems with the unexpected arrival of an Arctic front which dumped several inches of snow on the airfield and surrounding area before introducing temperatures well below freezing. These in themselves did not bring operations to a halt but with the six Tornado F3 fighters subjected to such a severe cold soak for some five days it was inevitable that things would not go too smoothly on the first operating day.

Ground and air crews alike had to take precautions so as not to suffer from the very intense cold. It can be very easy to forget that in such conditions even the simplest of tasks, such as strapping in, can cause injury if protective clothing is not worn. The team was however very disciplined and came through the severest days without any problems. Fortunately more seasonal temperatures returned and a thaw set in only



A No 31 Sqn Tornado GR1, loaded up for another sortie, on the ramp at Eielson AFB.

a few days into the detachment.

The bonus of such conditions in the days prior to the exercise commencing were the excellent winter sports facilities available at Eielson AFB itself. Being considered a remote region the USAF has gone to great lengths to ensure recreational facilities are amongst the best that can be provided and these were made available to the visiting RAF crews who eagerly took advantage of the situation.

The complete deployment lasted six weeks with the detachment being split into two sections. The initial slot, *Distant Frontier 92/1*, was undertaken by Nos 2(AC) and 111 Squadrons whilst the second saw the units relieved by crews from Nos 20 and 43 Squadrons who were to return the aircraft to CFB Goose Bay. Obviously each squadron had individual needs as far as training was concerned but the overall stance was to work as a co-ordinated package and to prove tactics that, to date, had been difficult to train for in the relatively restricted airspace of Europe.

In the case of No 2 (AC) Squadron Wg Cdr Holding took with him to Alaska a relatively young squadron to an area where they were to train in their secondary role. The crews, many of which had only recently completed

the work-up to the primary role of pre- and post attack reconnaissance, were at that time not yet combat ready for the conventional attack tasking. Therefore the Alaskan exercise offered a great deal for this specific aspect of their operational training.

Wg Cdr (now Gp Capt) Peter Walker, OC of No 111 Squadron in his post exercise assessment states that "The main objective was to enable the unit to deploy out of theatre and to prove the tactics that they had developed with the airframe design and weapon systems available against adversaries of superior number and



Below: Two of the Tornado GR1As from No 2 Sqn that deployed from the UK and a pair of No 31 Sqn GR1s that made the shorter journey from Goose Bay. Right: De-icing a Tornado F3 canopy.



1918

75 YEARS

1993



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CELEBRATING 75 YEARS OF THE ROYAL AIR FORCE

Let Justice be Done

The birth of the Royal Air Force did not result in an instantly independent and self-sufficient force, as there were many elements which had gradually to be transferred to the new Service; policing was one of these. Initially the Army provided the majority of police cover for the RAF, but by 1918 the new RAF camps at Halton and Netheravon each had a handful of ex-RFC police and locally recruited airmen (drawn from the trade of Aircraft Handler/General Duties) who were the first RAF Service Policemen. Full transfer of policing responsibilities was completed in 1919 and in 1931 the office of Provost Marshal RAF and Chief of Air Force Police was approved by King George V. In those early days, the RAF Service Police built a reputation of firm but fair policing. Guardrooms became the focal point for security and discipline on RAF stations, and from these vantage points the Service Police observed all that moved; their responsibilities for the custody of airmen in detention now placed the Service Police at a central position in the administration of RAF stations.

As WW2 approached it became obvious that British Forces would be sent to Europe. To support the RAF element of the Allied Expeditionary Force (AEF), a specially trained formation consisting of about 50 officers and NCOs was formed using instructors from the RAF Police School at Uxbridge and selected NCOs from stations. On 3 September 1939 they landed in France as part of the Advance Air Striking Force and were based at Rheims. The contingent operated in the field performing provost duties, which included convoy escorts, traffic control, anti-vice patrols, maintenance of off-base discipline, investigation of criminal and security incidents, processing absentees and deserters and manning the field punishment and detention centre. Operational squadrons deployed to France from stations in the UK, taking with them their own station Service Police with whom the mobile RAF Police unit worked hand-in-glove.

From the beginning of WW2 the RAF expanded rapidly, with the increase in aircraft and equipment being accompanied by a corresponding expansion in the number of Servicemen. Up until 1940, RAF Service Police undertook disciplinary patrols in towns and villages in the vicinity of RAF stations; later those tasks were performed by RAF Police working under the direct control of the Provost Marshal, through eleven Police Regions each commanded by an Assistant Provost Marshal (APM).

In the initial stages, the war in Europe was fairly static and there was time for Service life to be properly organised; but with the advance of the German forces this changed. Fighter aircraft took off from one field, but landed at another as the AEF retreated towards Dunkirk. The task of the RAF Police element was to ensure that convoys travelling through a foreign country reached a newly selected airfield before

*Air Commodore
A C P Seymour, RAF*
looks back over the RAF
Police's 75 years of service.



their aircraft returned. This was the first time the RAF Police deployed a full scale operational force in active service circumstances. Conditions were appalling and the situation demonstrated clearly how essential a police organisation was in such an environment.

As the RAF expanded yet further, and employed more and more women, in 1941 it was decided that they should be augmented by a number of WAAFs employed on police duties connected with

security. In 1941 three volunteers were selected and sent to the RAF Security School at Halton. On completion of their course they were posted to the Provost Marshal's Department with the rank of sergeant. In addition to security duties they traced WAAF absentees and deserters, assisted with discipline patrols and were closely involved in welfare matters. The experiment was a success and in 1941 approval was given for WAAF Police officers and NCOs to be established throughout the UK; the first WAAF Policewoman was commissioned in July 1941 and so became the first WAAF provost officer. By July 1945 the WAAF Police establishment was at its peak of 386.

The increasing problems of war-time security and the policing of very large numbers of airmen required the Provost Marshal's responsibilities to expand in the areas of investigations, discipline patrols and training. Two APMs were each allocated a small staff of RAF Police NCOs, including a team of investigators, who were subsequently to form the nucleus of the Special Investigation Branch (SIB). The ranks of the SIB were filled by many ex-civilian police CID officers whose collective experience helped create a professional base for the new investigation service.

Dogs have been used for military purposes for centuries but it was not until WW2 that they were trained specifically for RAF duty. Although reference has been found to a 1918 Air Ministry Order directing that "Half a pound of soap was to be issued monthly for cleansing dogs on RAF units", it is thought that this related to some War Dogs that had been inherited from the Army. A Guard Dog School was formed at Woodford in November 1942 to provide security dogs for the Ministry of Aircraft Production. The Provost Marshal soon visited the School, recognised the wide benefit to RAF security of employing dogs and directed that a number of RAF Police trainees should be sent to the School. By October 1944 the Guard Dog School was transferred to the Air Ministry and within two years was fully integrated with the RAF Police training establishment. Thus began the illustrious service of Air Dogs to the RAF, employed in many roles and drawing world-wide acclaim. Almost 50 years later the Air Dogs remain a significant part of the RAF's police and security profile. Search dogs are trained to find dangerous drugs, firearms and explosives; patrol dogs on airfield used wind-scenting techniques to detect intruders; and dogs are used for area searches and on tactical deployments with a following response force. Additionally, the RAF trains specialist dogs for HM Customs & Excise, the Royal Navy, the Scottish Prison Service and the US Air Force and Navy in the UK. The most public face of the Air Dogs is the RAF Police Dog Demonstration Team, formed in 1948.

All overseas theatres in which the RAF served during WW2 saw RAF Police





involvement. The North African campaign was of particular significance because it was there that the self-supporting RAF field flight system first appeared. This involved a unit which was totally independent; it had its own MT, fitters, cooks, clerks, armourers and policemen. The system worked particularly well in the mobile war in North Africa and is still in use today with the Harrier Force.

Operation *Overlord* saw the first RAF Police units land in France to support Nos 2, 83, 84 and 85 Groups of the 2nd Tactical Air Force. Based upon the self-supporting flight system instituted in Africa, their function was to provide Beach Teams to escort RAF personnel and materials from the landing beaches to formation areas. Traffic conveying by RAF Policemen on 1300 cc Harley-Davidson motorcycles escorted ground crews and their equipment to the first Allied airstrips. Often the convoys, tasked only from a projected map reference, would take units up to and at times beyond the areas liberated by the forward line of battle. As the Allies established themselves the RAF Police Units supported their Group areas by providing security at airfields, arresting active Nazis and controlling displaced persons. On a wider geographical area, the RAF Police worked in docks and gave the necessary level of policing required to ensure the proper conduct of Servicemen at large in the newly liberated towns and villages.

By 1945 the strength of the RAF Police organisation, reached the huge total of 500 officers and 20,000 airmen. Those officers employed on provost duties were drawn from various branches but the majority came from the Administrative and Special Duties Branch. The officers

controlling the RAF Police who carried out duties outside RAF stations were under the direct operational control of the Provost Marshal and served in units termed 'Provost and Security Services'; those on stations were under the command of their station commanders. In due course the growth of the Provost & Security Services (P&SS) organisation at home and abroad justified the formation of a specialist (officer) branch, and on 1 July 1947 the Provost Branch was formally constituted. In September 1950 King George VI approved a badge and motto for the RAF Police. The badge shows the heraldic symbol of guardianship, a Griffin,

and the motto *Fiat Justitia* which translates as *Let justice be done*.

Following WW2, a new pattern of peacetime policing commitments emerged, though the word 'peacetime' is relative, as the RAF Police served in troubled spots such as Palestine, Suez, Kenya, Borneo, Malaya, Cyprus and Aden. Today they continue their functions in Northern Ireland, Belize and the Falklands. The need for RAF police to serve in those areas where UK interests were threatened meant, that until the mid-1970s, the majority of RAF Policemen spent the better part of their working life overseas.

The Cold War saw the RAF Police and





Provost Branch widen its security responsibilities in two ways. The British nuclear deterrent, based on the Thor missile and the V-Force jet bombers, demanded very special security requirements, which fell to the RAF Police and required meticulous attention to detail. Additionally, the tensions of the Cold War brought an escalation of

espionage cases requiring delicate investigation and effective protective security measures. The RAF Police provided the lead and support in setting up and implementing these procedures.


However, vigilance against the dangers of espionage and subversion were only a part of the RAF Police responsibilities throughout the 1960s and to the present day. Domestic and global terrorism gained pace in the 1970s and aircraft hijacks, bombing campaigns and shootings became commonplace. RAF interests and aircraft throughout the world required protection and the RAF Police concentrated resources to counter this new threat. Air Transport Security sections, both mobile and static – the latter using state-of-the-art scanning equipment – were formed; Air Dogs were trained to detect firearms and explosives; P&SS specialist surveys became an everyday part of the counter-terrorist armoury; and highly trained close protection teams were employed in special cases.

When the RAF deployed to the Gulf in 1990, RAF Police provided the security of the air force elements involving with *Operation Granby*. In addition, the fact that the RAF Police could combine the disciplines of policing, security, counter-intelligence and provost work was recognised by the Force Commander, who appointed an RAF Provost Squadron Leader as Force Provost Marshal. The RAF Police were involved in a multitude of tasks from close protection duties and security intelligence to criminal investigation. One of the most interesting tasks came about as Iraqi prisoners of war

flooded into the hands of the Allied Forces, with more and more British troops being required to guard them. A team of police dog handlers, hitherto involved in airfield security, were redeployed and immediately established themselves as a most effective guarding force. Daily dog demonstrations for the prisoners led them to acknowledge the capability of the teams and with the exception of one or two minor incidents the POWs settled into a passive state of custody. These roles echoes closely those of WW2 and numerous conflicts since, and were a vindication of the peacetime training and operational capabilities of the RAF Police.

Today the RAF Police remains a fully integrated part of the RAF. At the time of writing there are RAF Police NCOs wearing UN blue berets supporting air transport operations into the former territories of Yugoslavia; RAF Policemen are in the Gulf as tension again rises there; but the bulk of RAF Police men and women (equality across the sexes is a matter of fact and Policewomen are employed in all fields of police and security work) are employed on their ordinary and everyday duties guarding, securing and policing the Service, with specialist security services being provided by the regional network of the modern P&SS organisation. The RAF Police will continue to provide the RAF with effective police and security and support into the next millennium whilst living up to its motto *Fiat Justitia*.

Air Commodore Seymour is Director of Security and Provost Marshal (RAF)



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A No 74 Squadron Phantom FGR2 taking off from RAF Akrotiri, Cyprus during the fighter's final Armament Practice Camp (APC) in May.



THE RAF'S YEAR

1992

Brian Strickland reviews some of the RAF's highlights of 1992.

JANUARY

The last Phantom FGR2 XT899/B from **No 19 Sqn Wildenrath** was flown by the Station Commander Gp Capt Geoff Brindle to Prague on 16 January as a gift to the Kbely Military Museum.

On 14 January a new £5.2m building for the **Air Navigation School** was opened at **RAF Finningley**.

A VC10 C1 of **No 10 Sqn**, on an OCU training flight to Hong Kong, transported 30 Gurkha engineers and medical equipment to the Western Samoan Islands which were devastated by Cyclone Val.

A new Station Museum, the setting for which is the original station church built in 1944 by the USAAF who occupied the base from 1942 to 1945, was opened at **RAF Wittering**.

No 84 Sqn, which operates ex Navy Wessex HC5Cs from **RAF Akrotiri**, celebrated its 75th anniversary. During the month it also marked 20 years in Cyprus, having been formed on 17 January 1972, operating with the United Nations peace-keeping force.



FEBRUARY

The last **Canberras**, a TT18 and E15 from **No 100 Sqn** Wyton flew a 'farewell tour', together with four Hawks - the aircraft which has replaced them in the target facilities role, over various RAF bases.



The Ministry of State for Defence Procurement announced on 19 February that Bae had been contracted, with Flight Refuelling Ltd, to give No 10 Sqn's five remaining un-modified **VC10 C1s** a tanker capability. The order for six additional **Westland Sea King HAR3s** was also confirmed.

Four **Tornado F3s** from **No 43 Sqn**, Leuchars took part in mass flypasts over Kuwait City on 25 and 26 February to mark the first anniversary of its liberation from Iraqi forces.

RAF St Athan took on the major servicing of **VC10s** from Brize Norton and third line maintenance of Hawks and Jaguars from Abingdon.

A disbandment parade for **No 19 Sqn** was held at **RAF Wildenrath** marking the end of 15 years in the air defence role in Germany with **Phantom FGR2s**.

MARCH

On 3 March a **Sentry AEW1** airborne early warning aircraft of **No 8 Sqn** from **RAF Waddington** achieved a notable 'first'. During a 5hr 45min flight it twice refuelled in mid-air, using different refuelling techniques. The first top-up was from a Tristar of **No 216 Sqn** using the standard RAF 'probe and drogue' system. The second was from a USAF Reserve KC-135E Stratotanker using the rigid boom method.

The final major servicing was completed on the **Victor K2** fleet when XH671 was handed over to **No 55 Sqn** based at RAF Marham. The Victor Major Maintenance Unit (VMMU) was disbanded at **RAF St Athan** on 1 March marking the end of 'V-bomber' major servicing by the RAF. The last Victor K2s are continuing in the AAR role until the squadron disbands at the end of 1993.



The **RAF Jaguar** detachment at Incirlik, Turkey clocked up 1,000 sorties and 2,000 flying hours during the month.

When 12 **Tornado GR1As** from **No 13 Sqn** RAF Honington deployed to Evenes in Norway for Exercise *Teamwork* they were given a temporary arctic camouflage for the first time.

On 17 March the Defence Research Agency's **C-47 Dakota** (ZA947), the last of the type still flying under RAF roundels, celebrated its 50th anniversary at Farnborough. Though taken into the RAE in 1971 it had previously served in the US Army Air Corps and R Canadian AF.



It was announced that RAF recruiting staff were to be integrated and form the Directorate of Recruiting and Selection based at **RAF Cranwell**.

Airfield operations at **RAF Kemble** ceased on 31 March at the same time that USAF flying ceased. The RAF withdrew from the site on 31 July and it was handed over to the Army for equipment storage.

APRIL

On 1 April **RAF Chivenor** and its Hawk T1A operating unit was transferred from RAF Strike Command to Support Command. At the same time No 2 Tactical Weapons Unit was re-designated **No 7 Flying Training School** (FTS) with the added task of advanced flying training in the new 'Mirror Image Programme'. It was announced that the two 'shadow' squadrons (Nos 63 and 151 Reserve Sqns) would be re-allocated the mantle of the recently disbanded Nos 19 and 92 Sqns respectively.

On 1 April the Tornado GR1s operated by the Tornado Weapons Conversion Unit at **RAF Honington** became **No 15 (Reserve) Sqn**. Both the previous unit title and the shadow designation No 45 (Reserve) Sqn ceased to be used.



The last Jaguar GR1A (XZ399) to undergo major maintenance at **RAF Abingdon** departed at the end of the station's 18-year role as a maintenance unit.

The disbanding of **No 60 Sqn**, the last squadron based at **RAF Wildenrath**, marked the end of fixed wing flying at the base. In the operational front-line for 40 years Wildenrath became the first RAF Germany station to cease flying under the 'Options for Change' reductions.

The RAF confirmed that British pilots had been flying the **Lockheed F-117 Night Hawk** 'Stealth Fighter' since 1988.

MAY

The crew of a **No 206 Sqn** Nimrod from **RAF Kinloss** was declared the winners of the 1992 Aird Whyte Challenge Trophy following a competition held 11-12 May. The competition is designed to test crew's ability to locate a patrolling submarine in a specific area.

A new **Puma HC1** squadron was established for service in Northern Ireland on 4 May and allocated the **No 230 Sqn** numberplate. The former No 230 Sqn handed over nine Pumas to No 18 Sqn at Gutersloh, augmenting the latter's fleet of eleven Chinooks.

On 13 May **No 11(AC) Sqn** based at Marham with **Tornado GR1As**, celebrated its 80th anniversary. It is claimed to be the 'oldest fixed wing squadron in the world'.

A nine-foot bronze statue of **Marshal of the Royal Air Force, Sir Arthur 'Bomber' Harris**, wartime leader of Bomber Command, commissioned by the Bomber Command Association, was unveiled by the Queen Mother on 31 May outside St Clement Danes Church in The Strand.

The seventh and last **Sentry AEW1** was handed over to **No 8 Sqn** at RAF Waddington after installation of its mission equipment.



JUNE

No 60 Squadron was formed at **RAF Benson** on 1 June with veteran **Wessex HC2s**.

The first **VC10 C1K** conversion flew for the first time at Bournemouth on 11 June having arrived with Flight Refuelling Ltd for conversion on 28 February.

A formation of 16 **Phantom FGR2s** from **Nos 56 and 74 Sqns** based at RAF Wattisham flew over Buckingham Palace on 13 June, following the Trooping the Colour, to mark HM The Queen's official birthday. Phantoms were selected as the type was due to be retired from RAF service at the end of September after 23 years use.

Ten **Phantom FGR2s** from Nos 56 and 74 Sqns deployed to **RAF Akrotiri**, Cyprus for the fighter's final Armament Practice Camp (APC). Three Hawks of **No 100 Sqn**, RAF Wyton were also deployed to provide banner targets.

A £20m contract was awarded for the update of the RAF's 11 Dominie T1 navigation trainers at No 6 FTS **RAF Finningley**.

All servicing of **Nos 32 and 115 Squadrons'** Andovers was moved from Benson to Northolt, following the award of a contract to the civilian company Lovaux.

JULY

On 1 July the RAF announced a two-year programme to re-title most of the operational conversion units and allocate 'new' reserve squadron numbers to these and some advanced flying training units, in order to preserve the 'number plates' of recently disbanded or re-allocated squadrons.

On 1 July the Multi-Engine Training Squadron at **RAF Finningley** was allotted the number plate **No 45 (Reserve) Sqn**.

The Canberra PR9s of No 1 Photographic Reconnaissance Unit, based at Wyton, were retitled **No 39 (1 PRU) Sqn** on 1 July.

On 1 July **No 229 OCU** at Coningsby, which was previously No 65 (Reserve) Sqn, was re-titled the (Tornado) **F3 Operational Conversion Unit, No 56 (Reserve) Sqn**.

Also on 1 July No 242 OCU at Lyneham became the **Hercules Operational Conversion Unit, No 57 (Reserve) Sqn** as its 'shadow' (No 57 disbanded with Victor K2s on 30 June 1986).

On 2 July the first RAF Hercules flew from **Lyneham** to help bring humanitarian relief aid to Sarajevo under *Operation Cheshire* as part of the UN sponsored mission.



A formal closure parade was held at **RAF Mount Batten**, Plymouth on 4 July when the RAF ensign was lowered for the last time. The School of Combat Survival and Rescue moved to RAF St Mawgan.

It was announced on 15 July that **Honington** will become the **RAF Regiment** Depot after the based Tornados are re-deployed in 1993/94. The Regiment's current base is Catterick.

Four Tornado F3s left Coningsby on 6 July, routing by Ascension Island, to the Falklands to replace the Phantoms of **No 1435 Flight**.



The task of servicing the Wessex HC2 helicopters of **Nos 60 and 72 Sqns** was moved from Benson to civilian contractors at RAF Shawbury.

RAF Abingdon closed on 31 July and the station's flying units - Oxford and London University Air Squadrons and No 6 Air Experience Flight moved to **RAF Benson**.

The 25th anniversary of the arrival of the **Hercules** in RAF service at **Lyneham** was celebrated on 31 July.

Two Strike Command Tornado F3s performed special escort duties on 8 July to mark the five millionth air traffic control movement handled by the RAF's **Eastern Radar Unit** at RAF West Drayton. The Tornados from **No 5 Sqn** Coningsby escorted British Airways Boeing 757 G-BIKO for part of its flight from Heathrow to Newcastle.



The death occurred on 31 July of Baron Cheshire of Woodhall, aged 74, shortly before his 75th birthday. Better known as Group Captain Leonard VC, DSO, DFC he was the most decorated bomber pilot of WW2.

AUGUST

On 16 August the Sea King HAR3s of **No 202 Sqn 'C'** Flight based at **RAF Manston**, completed their 3,000th call out since being established at the base in 1961.

The last RAF Germany squadron to disband under the 'Options for Change' reductions, **No 20 Sqn** at **RAF Laarbruch** made a final flypast before handing over its Standard to a colour party from the **Harrier OCU** at **RAF Wittering**.

The seven Boeing E-3D airborne early warning aircraft operated by **No 8 Sqn** at **RAF Waddington** assumed the full NATO role alongside their sister unit, the multinational E-3A component based at the NATO air base at Geilenkirchen, Germany.

All flying training ceased at **RAF Brawdy** on 31 August as part of the reorganisation of advanced flying and tactical weapons training which was switched to **4FTS Valley** and **7 FTS Chivenor**. Brawdy remained open to parent residual commitments, including SAR.

SEPTEMBER

On 1 September **No 233 OCU** at **RAF Wittering** reformed as the **Harrier OCU/No 20 (Reserve) Sqn**. On the same date the Hawk Aircraft Engineering Defect Investigation Team moved from Brawdy to Chivenor.

The **Directorate of Recruiting and Selection** formed at **RAF Cranwell** on 1 September, combining the Directorate of Recruiting, Inspectorate of Recruiting and Aircrew Selection Centre. The latter was formerly at Biggin Hill.

Six Tornado F3s, from **No 23 Sqn**, **RAF Leeming** and, for the first time, four Harrier GR7s, from **Nos 3 and 4 Sqn**s, **Gutersloh** departed the UK on 14 September to take part in a major air defence exercise in the Far East. Two VC10 tankers from **No 101 Sqn** accompanied the detachment.

Three Tornado GR1s and three GR1As, drawn from **Nos 2, 27 and 617 Sqn**s flew from **RAF Marham** to Dhahran, Saudi Arabia to assist US forces in upholding the air-exclusion zone over Southern Iraq, south of the 32nd Parallel.

A contract was awarded to British Aerospace to provide 13 two-seat Harrier II trainers for the RAF, for delivery in 1994. These **Harrier T10s** will be capable of fulfilling similar operational roles as the single-seat night attack Harrier GR7s.

The RAF's last airworthy **Vulcan B2 (XH558)** flew back to **RAF Waddington** on 21 September after its last airshow appearance at Cranfield the previous day. It was subsequently offered for sale by tender.

No 42 Sqn, the last Nimrod MR2 unit based at **RAF St Mawgan**, disbanded on 30 September. The number plate was transferred to the Nimrod OCU at **RAF Kinloss** (previously No 38 (Reserve) Sqn).

OCTOBER

No 74 (Tiger) Sqn flew its last operational sorties with **Phantom FGR2s** from **RAF Wattisham**, on 30 September. The squadron number plate was transferred to 3 Sqn at No 4FTS at **RAF Valley** equipped with Hawk T1/T1As.

Fixed-wing flying operations at **RAF Wattisham** ceased on 31 October. It is to be transferred to the Army Air Corps to provide a base for Lynx and Gazelle helicopters withdrawn from Germany.

RAF Regiment's HQ 3 Wing at **RAF Catterick** and **HQ 33 Wing** at **RAF Gutersloh** both disbanded on 1 October.

Following the scrapping of three **Nimrod MR2s** in September 1991, a further four aircraft were withdrawn on 1 October, completing the announced force reduction from 33 to 26. These four were placed in storage at **RAF Kinloss**.

The Ministry of Defence announced that the RAF's fleet of Search and Rescue **Wessex HAR2s** would be withdrawn by April 1996 and the bases rationalised. **RAF Leconfield**, **Lossiemouth** and **Boulmer** will retain their flights; **RAF Chivenor** and **Valley** will receive Sea Kings; **Manston's** flight will move to **RAF Wattisham** and the flights at **RAF Brawdy**, **Coltishall** and **Leuchars** are to be withdrawn.

The RAF was called in to use its expertise in aerial fire-fighting as fierce forest fires spread through cedar-clad mountains in the Lebanon. A **Wessex HC5C** from **No 84 Sqn**, **Akrotiri** was deployed with a specialised underslung fire-fighting bucket carrying 150 gallons.

With the restructuring and introduction of new navigator training programmes at **RAF Finningley** two new wings were formed at the **Air Navigation School** – the **Basic Navigation Wing (BNW)** and the **Advanced Navigation Wing (ANW)**. **No 6 FTS** now operates **Bulldog T1s**, **Tucano T1s**, **Hawk T1s** and **Dominie T1s** for navigator training.

NOVEMBER

No 38 Group was re-formed at **HQ Strike Command** at **RAF High Wycombe** on 1 November with responsibility for all RAF air transport and air to air refuelling operations, bases and training.

At **RAF Valley** 2 Sqn of **No 4FTS** adopted the number plate **No 234 (Reserve) Sqn**. The unit flies **Hawk T1/T1As** for advanced pilot and tactical weapons flying training at **Valley**.

Six **Tornado F3s** from **No 43 Sqn** **RAF Leuchars** flew to Kuwait, staging through **Decimomannu** and **Akrotiri**, to take part in **Free Sky 92** – an international air defence exercise. Whilst in the Gulf they undertook air combat training and flew affiliation exercises with the US Navy.

The first of **No 32 Sqn's** **Andovers** at **RAF Northolt** (E3A XS643) returned to service after being repainted in an all-over grey colour similar to that which has been adopted for the squadron's **Bae125s**.

The new **AN/FPS-115** phased-array radar at **RAF Fylingdales**, totally manned by the RAF, was formally commissioned on 13 November. It is a three-faced pyramid and replaces the well known 'golf balls'.



Harrier GR7s of **No 3 Sqn** flew from **RAF Gutersloh** to **RAF Laarbruch**, where they joined **No 4 Sqn** at the new Harrier base. **No 3 Sqn** has been stationed in Germany since the end of WW2. **No 4 Sqn** Harriers, also from **Gutersloh**, made the transfer in October.

The Headquarters of **No 22 Sqn**, the **SAR Wing Engineering Squadron**, the **SAR Aircraft Engineering Development Investigation Team** and the **Sea King Maintenance School** moved from **RAF Finningley** to **RAF St Mawgan**, Cornwall.



The first students following the RAF's new 'Mirror Image' Pilot Training Schemes at **4FTS Valley** and **7FTS Chivenor** commenced the flying phases of their respective courses.

The RAF took delivery of the first of eight additional **Tornado F3s** (ZH552-559), originally ordered by Oman but subsequently cancelled. This increases its procurement from 165 to 173.

RAF Coleme was reactivated to accept **Bristol UAS Bulldogs** and **No 3 AEF Chipmunks**, which had been based at **RAF Hullavington** following the closure of the RAF element at **Filton**.

DECEMBER

Two **Nimrod MR2s** returned to **RAF Kinloss** on 2 December after a two week tour of duty at **Sigonella** assisting the UN blockade of **Serbia** and **Montenegro**. Further deployments have subsequently taken place.

Two **Hercules** and four crews left **RAF Lyneham** on 12 December to participate in **Operation Vigour** – the support of **Somalia** relief efforts. Operating out of **Kenya** they carried supplies and military equipment from **Mombassa** to six rough strips within **Somalia** as well as the airports at **Mogadishu** and **Kismayu**. A 90-strong RAF detachment was deployed to operate in close co-operation with the **USAF**.

On 16 December the last 'military' flight by three **RAF Lightning F6s** (XP693, XR773 and XS904) took place at **Bae's Warton** airfield. On the 23 December XP693 and XR773 were flown from **Warton** to **Exeter** for new owners, the **Lightning Flying Club**.



An **Andover** of **No 115 Squadron**, on aeromedical flight, visited **Lithuania**, the first RAF aircraft to visit there since its independence from the former Soviet Union.

RAF, RN and HM Coastguard rescue helicopters and mountain rescue teams assisted 1,353 people in distress in Britain during 1992. The busiest SAR Unit was again 'D' Flight, **No 202 Sqn** at **RAF Leuchars**. Overall the 14 SAR Units around the UK were called out by the **RAF Rescue Co-ordination Centres** at **Edinburgh** and **Plymouth** to 2,017 incidents, slightly more than in 1991. In search and rescue terms, 1992 saw an increase in missions carried out in very bad weather.



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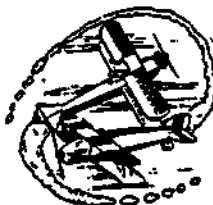
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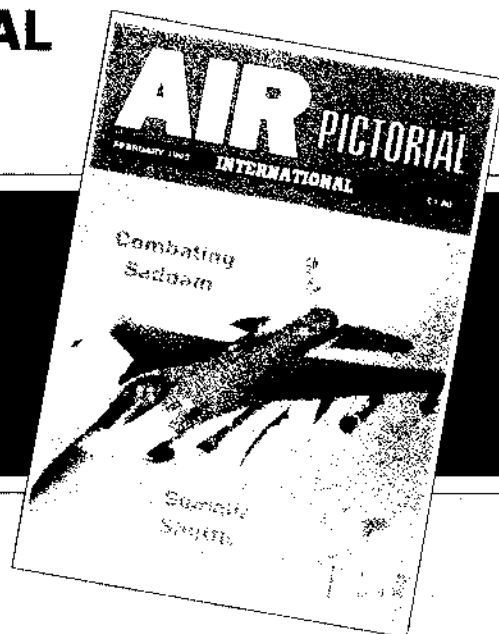
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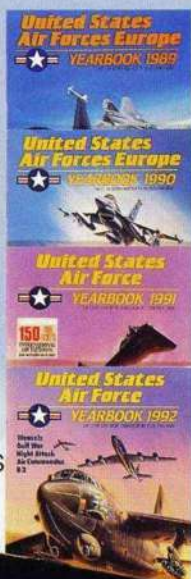
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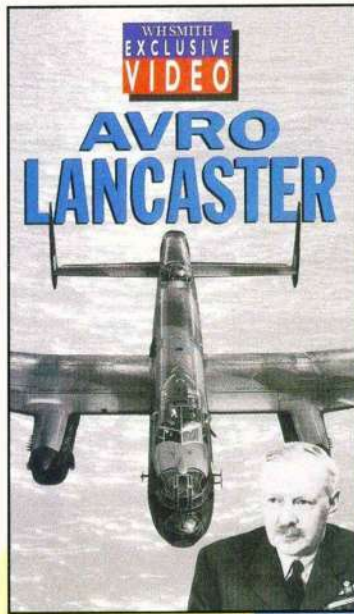
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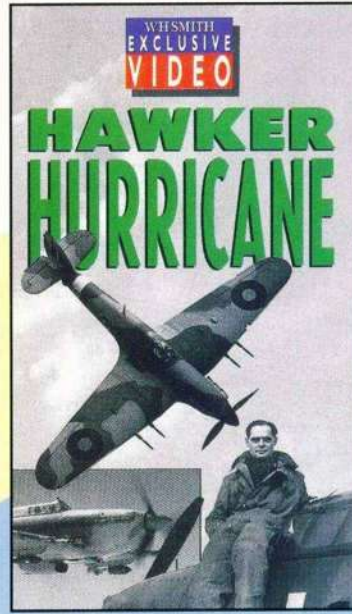
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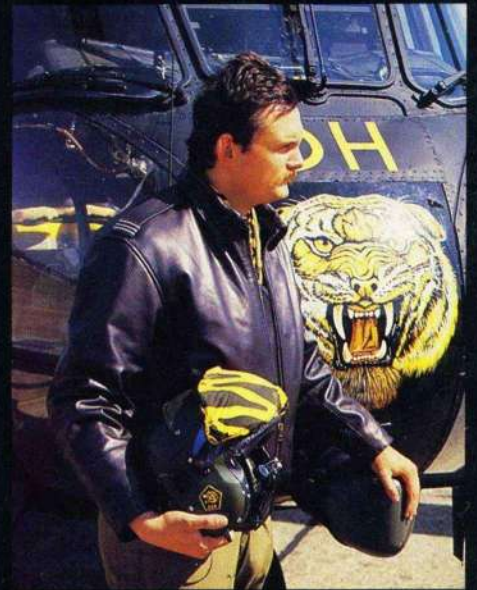


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