

Royal Air Force



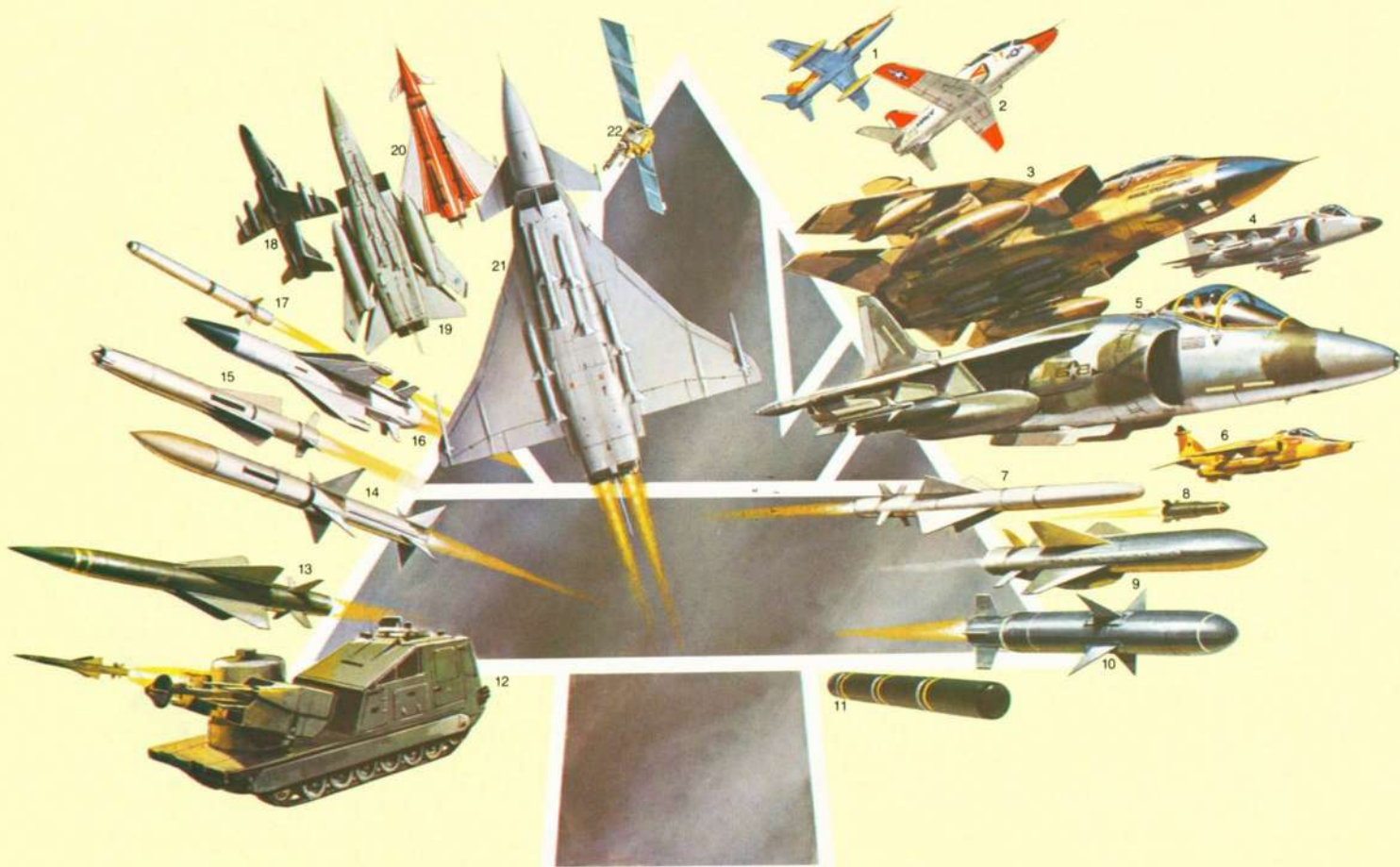
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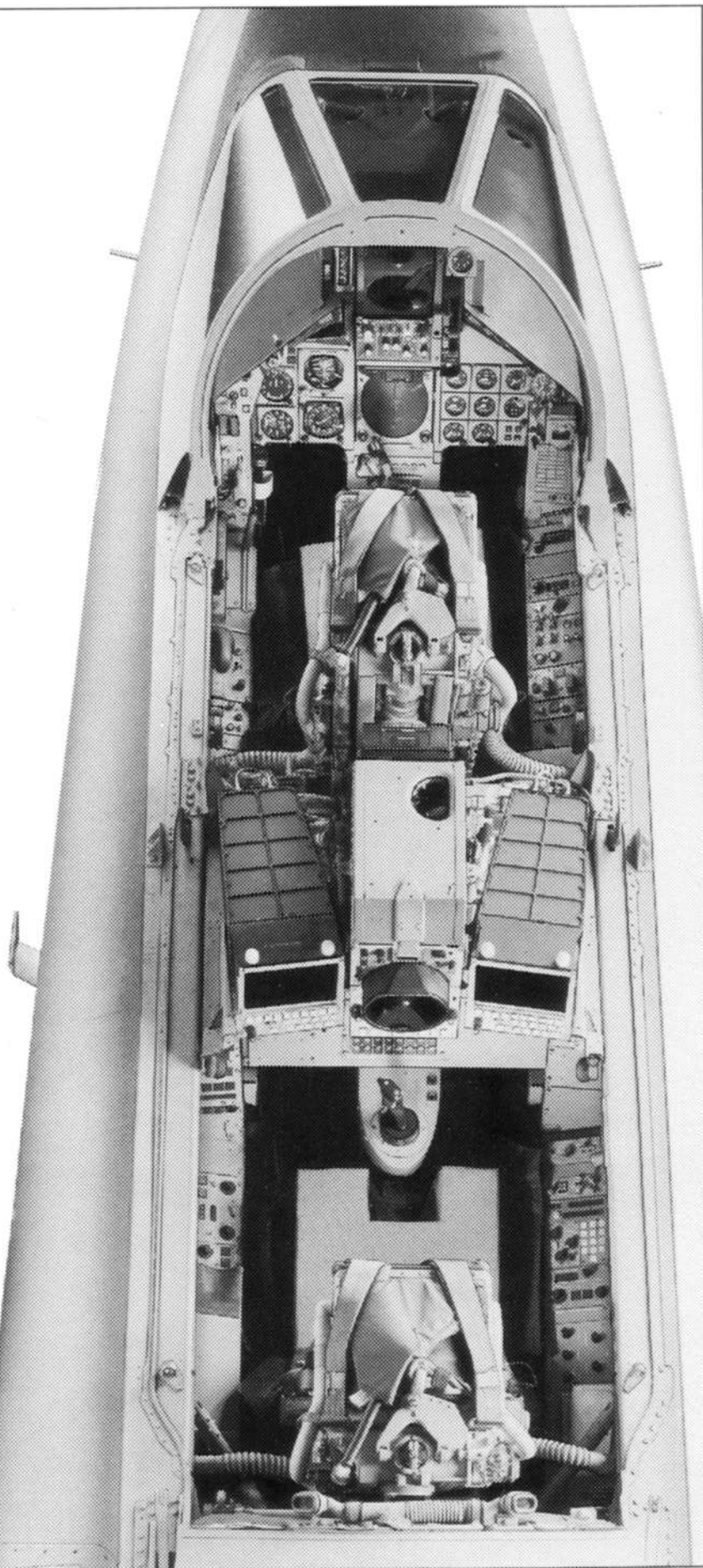
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Royal Air Force



YEARBOOK 1988

CONTENTS

INTRODUCTION	5
Air Chief Marshal Sir David Craig GCB, OBE	
THE RAF 1918-1988: 70 DRAMATIC YEARS	7
Michael J. F. Bowyer	
LESSER KNOWN ACHIEVEMENTS	16
Holly	
PLANES NEED PEOPLE	20
Air Marshal Sir Laurence Jones KCB, AFC, FBIM	
SPITFIRE — THE CLASSIC FIGHTER	23
John D. R. Rawlings	
HISTORY ON DISPLAY	33
R. Simpson	
A THOROUGHLY PROFESSIONAL SET OF AMATEURS	37
Sqn Ldr R. D. Longley RAF	

THE RAF ON DISPLAY 1988	
The Red Arrows Paul Jackson	41
The Battle of Britain Memorial Flight Sue J. Bushell	48
The RAF Falcons Gordon Bucknall	50
Display Flying Peter R. Foster	52
FAREWELL LIGHTNING, WELCOME TORNADO	57
Paul Jackson	
HERCULES MISSION	64
Sue J. Bushell	
DUAL ROLE	68
Wing Commander A.E.P. Webb AFC, RAF	
THE RAF'S YEAR 1987	74
Brian Strickland	
A DAY IN THE LIFE OF A CHINOOK	76
Edwin A. Shackleton	
SQUADRONS OF THE RAF	79
Paul Jackson	



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The Royal Air Force Benevolent Fund



THE CARING FUND

The Fund

The Royal Air Force Benevolent Fund was founded by the late Viscount Trenchard in October 1919 for the relief of distress or need, amongst past and present members of all ranks of the Royal Air Force, including the Women's Services, the Royal Auxiliary Air Force, the Royal Air Force Reserves, and their widows, children and other dependants. The Fund provides help for casualties arising in peacetime as well as in time of war.

There are no hard and fast rules about how those eligible may be helped or how much help may be given; each person's needs are considered in the light of their particular circumstances, the object being to provide relief in many cases where assistance from the State is either not forthcoming or inadequate.

The Fund aims to enable dependants to maintain some semblance of life to which

they have been accustomed, and to help children into careers which their fathers might reasonably have expected them to follow.

In 1987, expenditure on the relief of distress amounted to over £8.5m. The greater part of this went to help widows and the disabled. The survivors of the Second World War and their dependants are increasingly vulnerable to ill health and financial hardship as they grow older and we expect even greater demands in the next few years.

The Fund obtains its income from subscriptions from serving RAF Officers, Airmen and Women; from investment income, legacies, donations and various fund-raising activities. We must continue our efforts to increase our income if we are to meet the demands of the coming years and you can help us by supporting and giving help to the Fund.

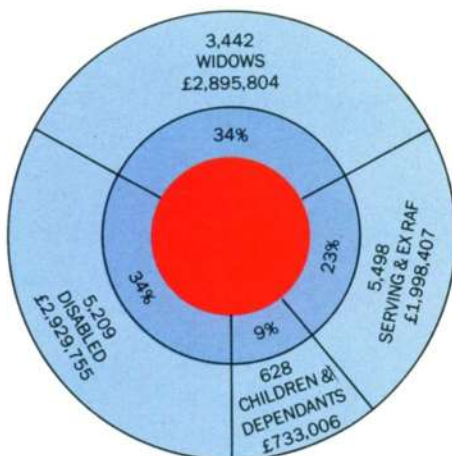


Princess Marina House



Boys at work at the Duke of Kent School

THE FUND'S WORK 1987



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Alastrean House

Alastrean House, Torland, Aberdeenshire, provides residential accommodation for partially disabled and elderly past members of the Service and their adult dependants.

Princess Marina House

Princess Marina House, Rustington, Sussex, provides convalescence for serving personnel of all ranks of the Royal Air Force; and convalescent and residential accommodation for partially disabled and elderly past members of the Service, their adult dependants and the adult dependants of those still serving.

Duke of Kent School

The Duke of Kent School, Woolpit, is an Independent Preparatory Boarding School administered by the Fund for the sons and daughters of Royal Air Force personnel of all ranks. Preference for admission is given to children (Foundations) whose fathers died or were seriously disabled whilst serving. Exceptionally, children of retired Royal Air Force personnel are also accepted particularly if the father dies through illness or disablement attributable to his service.

The Fund will also help pupils leaving the Duke of Kent School and assist with fees for their later education where necessary. Also, it helps with the fees for children of Royal Air Force personnel at boarding schools.

Dowding House

The Fund has joined with the Royal Air Forces Association to establish a £1 million sheltered housing development in the birth place of Air Chief Marshal Lord Dowding at Moffat, Scotland. When completed in late 1988, there will be 26 flats for single people and married couples, 38 residents in all, together with Warden's accommodation and community facilities.

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Royal Air Force Yearbook 1988

INTRODUCTION

**Air Chief Marshal
Sir David Craig, GCB, OBE**
Chief of the Air Staff

On 1 April 1988 the Royal Air Force celebrated its seventieth anniversary, and this Yearbook appropriately looks back at the developments and achievements which have taken place in the Service since 1918.

During that period there have naturally been significant advances in technology, and today's aircraft are considerably more capable than their predecessors. For example, the accuracy and capabilities of the Tornado GR1 enable us, with just a few aircraft, to attack successfully targets that in the Second World War would have required a very large force of bombers and hundreds of aircrew and support personnel.

Air Defence is another area which has benefited from improved technology. We are currently taking delivery of advanced ground radars and an associated command and control system, and are in the process of building up our force of Tornado F3 fighters. We have also improved our air-to-air refuelling capability and look forward to receiving the recently ordered E-3 airborne early warning aircraft. Taken together, these improvements will give us a far greater capability to defend the United Kingdom and its airspace than we have ever had before.

These technological developments will continue during the coming years with the introduction into operational service of the Harrier GR5 and improved weapon systems.

But if the last 70 years have seen a dramatic and continuing change in technology, one thing that has remained constant is our requirement for high-calibre personnel. The role of the Serviceman and Servicewoman will be the key factor in exploiting future technological advances, in preserving the peace and, in the final analysis, in winning any future war. The Royal Air Force will therefore need to continue to attract its share of the brightest and best of our country's young people, and Air Marshal Sir Laurence Jones' article in this issue of the Yearbook looks to the future in outlining the challenges and rewards that the Service has to offer its personnel.

Having read the articles in the Yearbook, I very much hope that you will find it possible to visit one of the several RAF 'At Home' days being held this year and see for yourself the quality of our equipment and the professionalism of our people.



BAe Harrier GR5 entering service at RAF Wittering

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THE RAF 1918-1988

70 *Dramatic Years*

Michael J. F. Bowyer

Three score years and ten — a goodly span during which skill, bravery, determination, excellence, comradeship and readiness to give of one's all for others have remained paramount. These supreme qualities hallmark the Royal Air Force ever the staunch and grandly successful defender of the Realm and Freedom. How thrilled and proud we were as its Hurricanes and Spitfires time and again raced to protect us in that frightening summer almost fifty years ago. It seems like yesterday when one gazed into the dawn for the sight of a dear friend long overdue, sometimes watched helpless as courage was overtaken by catastrophe. Yet always to follow a brave face, the smile, the belief that what had to be done would be done so that even the weakest would prosper.

The sights, the sounds and most certainly the smells of years long ago remain unforgettable. How could we ever forget the immaculate 'SWO' — stick tucked firmly beneath his arm, a 'Ginny' drifting backwards long before the Harrier emerged, "get yer hair cut laddie" and Chiefy's "you can forget yer '48". "By your beds, here comes the Air Vice-Marshal", "posting's through, you've got Kinloss", "well, you signed the 700", "I didn't mean to drop your screwdriver in the water Corp", and "coal may be black to you Bowyer, RAF coal is white". "The target, gentlemen, is the marshalling yard at Hamm". Hamm?

Not Hamm AGAIN! And when it wasn't Hamm it seemed to be Brest, night after night. Westerly went the Wimpey stream while far over the Atlantic largely forgotten souls manned seaplanes and escorted vital convoys flying long sorties over ever unwelcoming waves.

In the patrolling Sunderland, in the Aircraft Shed, or on one's hands and in one's hair was that absolutely unforgettable scent, produced by the mixing of hot metal with fabric, grease, oil and petrol. You secretly loved it all, felt great pride when marching behind the Central Band, memories of grand companions never fading.

To the majority now, it is the RAF's

aeroplanes that offer a strong attraction. How incredibly the 300 or so basic types have changed through 70 years. Very frail the early ones seem, in comparison with the spectacular afterburning jet. How quaint the bomb aimer leaning over to actually drop a bomb in hope, how incredible the invisible laser illuminating the target to tempt precise success. As for speed — how ironic that it takes hours to prepare for a short flight over land barriers which bedogged battling man for centuries and which now race by in moments.

The magic of flying must remain largely locked in memory. From photographs however it is possible to view the Royal Air Force during its 70 years.

On 6 June 1918, and under Major General Sir Hugh Trenchard, the Independent Force was formed to wage strategic war. Ten squadrons of bombers had as their largest bomb 1,660 pounds and the **Handley-Page 0/400** was the main aircraft, depicted being towed by a 35hp Clayton tractor. IWM

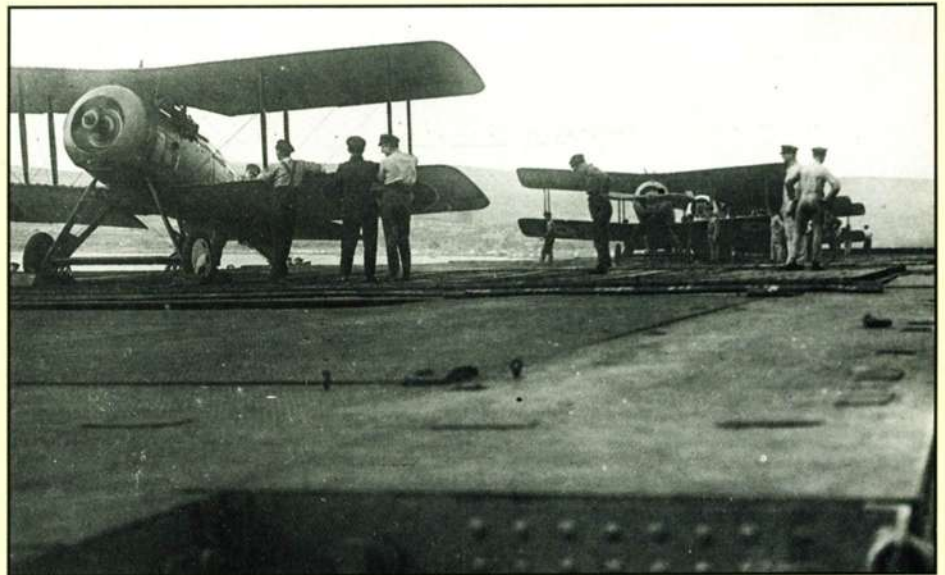




70 Dramatic Years

Following the 1918 Russo-German peace treaty, an RAF detachment in northern Russia prevented Germany from acquiring Arctic bases for her submarines. Aircraft used included **Fairey IIIc** seaplanes such as these shown on Lake Onega, Madvejde Gora during 1919, then co-operating with White Russian Forces.
IWM

RAF **Nieuport Nightjar** navalised fighters of No 203 Squadron Leuchars, aboard HMS Argus in 1922 during the Chanak Crisis. Turkish aspirations and conflict with Greece threatened the Dardanelles, prompting the British to place Brisfits, Snipes, DH9As and Fairey IIIDs in their Constantinople Wing.
Crown Copyright



Policing Mesopotamia (Iraq) and routes to India — not to mention coping with 'dissident tribesmen' — was a staple RAF activity from the 1920s to the 1950s. Brisfit, Gordon, Hart, Hardy and Wapiti armed Nos 6, 8, 20, 27, 30, 45, 47, 70, 55, 84 and 216 Squadrons among others, a group rarely home based until recent times. No 84 equipped in the 1920s with **DH9As** like H3515, here keeping an eye upon the trouble making Sheik Mahmud.

One by one, troops board a bomber transport, **Vickers Valentia** K2340. The Valentia, and its predecessor the Victoria, were used by Nos 70 and 216 Squadrons for transporting British power to Middle Eastern and African trouble spots. Some lingered long enough for 1940s war service, but they were excitingly rare in Britain. A handful were used by Cranwell's Electrical & Wireless School.





▲ R. J. Mitchell's Schneider Trophy racing seaplanes contributed greatly to the advance of aerodynamics and to the Spitfire design. **Supermarine S6B** S1595 was used by Flt Lt J. W. Boothman to win the Trophy outright, and then by Flt Lt G. H. Stainforth who, on 29th September 1931, established a World Speed Record at the then unbelievable speed of 407.5mph. *Real Photographs*

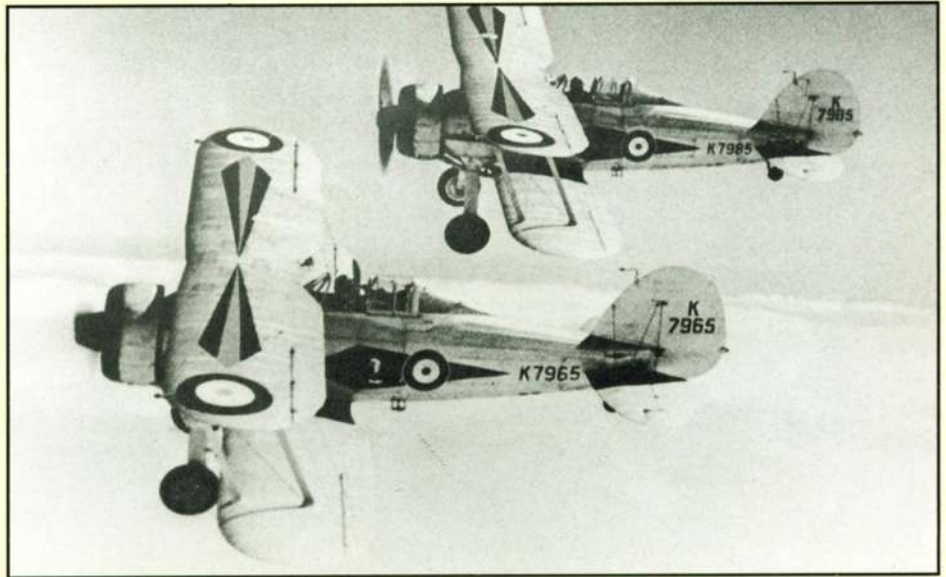


▲ The Hart of 1926, the Mosquito of 1941 and the Canberra of 1949 — three of a kind; all as fast as contemporary fighters. The Hawker Hart sired a swarm of variants including **Demon** two-seat traversing gun fighters like K2850, pictured at Mildenhall during the 1935 Jubilee Review. Hart Trainers also equipped many regular and reserve flying training schools. *Crown copyright*

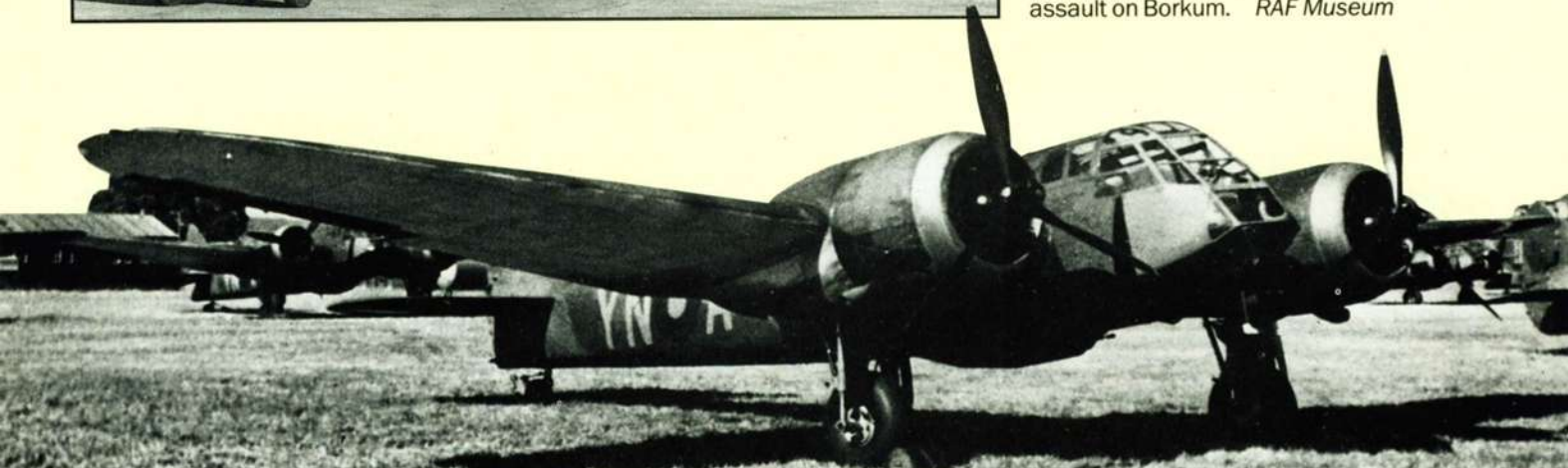
70 Dramatic Years

▶ Fighter design changed little between the 1914-1918 war and the 1930s. More power and better performance were achieved, but biplanes ruled. The **Gloster Gladiator**, portraying ultimate refinement, is seen here in the Middle East serving with No 80 Squadron. *RAF Museum*

▼ A dramatic change in December 1937, when the eight-gun high speed **Hawker Hurricane** entered service with 'Treble One' Squadron at Northolt. Startling, too, the introduction of 'brown and green' camouflage. Gone were bright squadron colours or numbers, superseded by grey unit identity letters applied as the Munich Crisis forced the RAF onto a war footing. *RAF Museum*



▼ In 1937 the **Bristol Blenheim 1** bomber was introduced into squadron service at Wyton. By 1939 a four gun belly gun tray changed many a Mk 1 into an 'auxiliary fighter' for longer endurance patrols over coastal convoys and for long-range strike duties. Its night fighter role came more by necessity than intent. These Blenheim 1Fs belong to No 601 (County of London) Squadron, Auxiliary Air Force, and probably participated in the early wartime anti-seaplane assault on Borkum. *RAF Museum*



70 Dramatic Years

▼ Britain's first really long range bomber was the **Whitley** which, lumbering along nose down, made the first night intrusion into the Third Reich. T4131, delivered in August 1940, became 'W' of No 78 Squadron and had flown 35 sorties when photographed. Later 'ZG:K' of 10 OTU Abingdon, it served until April 1945.



▼ Need for an advanced, specialised army co-operation aircraft led to the **Westland Lysander**. Outmoded by 1940 for its prime purpose, its fame came from landings in enemy territory to deliver and retrieve Allied agents. Throughout the summer of 1940 Lysanders like this No 239 Squadron machine, daily flew dawn and dusk patrols along our coastline watching for invaders. *via J. Robertson*



▲ On day two of the war Blenheims and Wellingtons attacked German warships lying off Brunsbuttel and Emden. Anti-shipping activity mainly occupied them until April 1940 when they made the long North Sea crossing attempting to thwart enemy progress in Norway. In May 1940 the strategic air offensive began against targets in Germany and in August and September 1940, Bomber Command played a vital part in the battle for Britain by bombing invasion craft gathered in French ports. Among the **Wellingtons** were Mk 1cs of No 149 Squadron operating from Mildenhall. *Crown Copyright.*

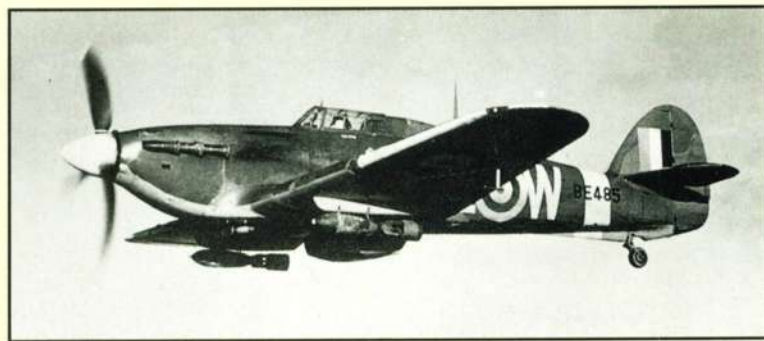


▼ In the Mediterranean theatre and the Middle East, **Blenheim** squadrons played a brave part in the 1940-41 action. This is a No 211 Squadron Mk 1 photographed in Greece during the fight to prevent the German takeover. *IWM*



▲ At the height of the Battle of Britain **Spitfire IIa** P7350 left Castle Bromwich, its birthplace, to join the fight. It is doubtful whether any other aircraft can acquire the praise and adulation afforded the Spitfire. Unforgettable that whistle, unmistakable the engine note on the climb and the chuckle of glee in a victory roll. Sights, sounds and sensations superb. *Peter R. March*

▼ Instead of a Blenheim bomber replacement came the **'Hurribomber'** carrying two underwing bombs. Devised for the desert war, it took over 2 Group's tough fight against Channel shipping, played a conspicuous part in the 1942 Dieppe raid and was much used overseas. BE485 served with No 402 Squadron. *Rolls-Royce*



70 Dramatic Years



What the Spitfire was to the fighter force the **Lancaster** was to Bomber Command. Combining reliability, excellent performance and amazing load carrying capacity it was unequalled by any WWII bomber. L7540 was initially used by No 44 Squadron as 'KM:J' and is shown here as 'OL:U' of No 83 Squadron in whose hands it took part in the Thousand Bomber raid on Bremen in June 1942. An early Lancaster, it has no combing around its dorsal turret and the ventral turret has been removed. Awaiting loading are 4,000lb 'Cookies'. IWM

Speed and precision personified the **de Havilland Mosquito**. Low level and shallow dive precision daylight attacks were followed by night raids with high flying Mosquitoes acting as *Oboe* leaders heading large scale raids. Mosquitoes roamed Germany at night causing air raid warnings over large areas while they disguised their presence by jamming the radar. Daniel March

The Women's Royal Air Force formed on 1st April 1918 and disbanded two years later. On 28th June 1939 the **Women's Auxiliary Air Force (WAAF)** came into being and became part of the Armed Forces of the Crown on 10th April 1941. Peak strength of 174,406 was attained in June 1944. Apart from fighter control duties during the Battle of Britain the WAAF maintained aircraft and, naturally, helped with feeding the Air Force. IWM



Mines were laid in enemy waters from 1940 to the end of hostilities. The first of the RAF's four engine bombers, **Stirlings** like this example from No 199 Squadron, Lakenheath, were frequently used for mining.

As a high flying photo-reconnaissance aircraft the **Mosquito** was unequalled. Mosquitoes flew exceptionally long 'PR' sorties in the Far East, where in December 1955 the last Mosquito operation was flown. Crown copyright

70 Dramatic Years

▼ RAF flying boats were, in the 1920s and 1930s, responsible for outstanding long distance flights. By the outbreak of war, with 27 **Sunderlands** in service, favour was shifting from 'boats towards maritime landplanes. Seaplanes needed specialised design techniques. Although they could reach inaccessible places, they flew slowly, lacking the agility increasingly needed for maritime activities. They needed sheltered, clear operating waters. Nevertheless the 'boats will always be affectionately remembered, particularly the Sunderlands for their excellent showing over Biscay against Ju 88 fighters. *Charles E Brown*



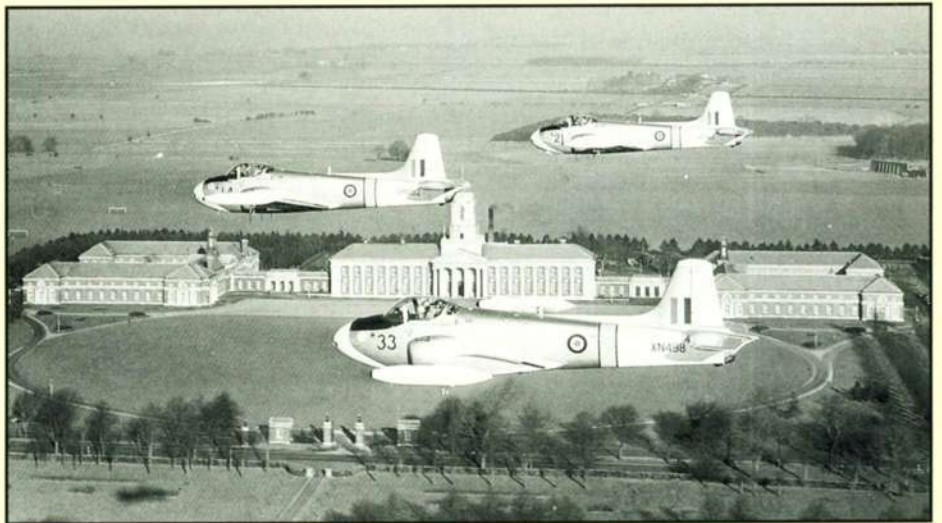
▲ German invasion of their homelands caused many a European to join the RAF. Some gathered in their own squadrons, a group of Royal Dutch Naval Air Service personnel manning No 320 Squadron, whose **Mitchells** are seen being 'bombed-up'. *IWM*

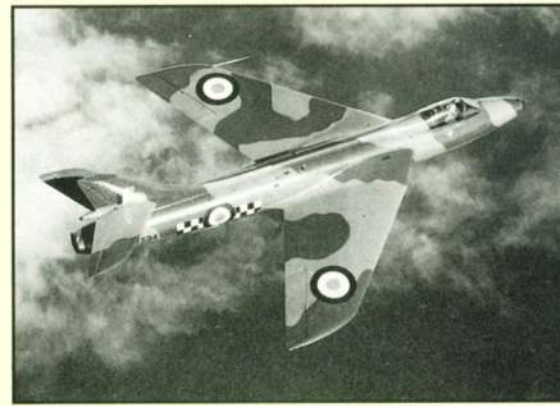
▶ Twenty post-war bomber squadrons were equipped with **Lincolns**. From October 1953 Nos. 49, 100, 61 and 214 Squadrons were rotated to Eastleigh, Nairobi, from where they flew 517 bombing sorties against the *Mau Mau*.



▲ Introduced to No 616 Squadron on 12 July 1944 the **Gloster Meteor** became the main home defence fighter in 1946. These are Meteor IIIs of 124 Squadron which soon after was re-numbered '56'. More sophisticated Meteors served as front line 'SRD' (short range day) interceptors until 1957. *Bruce Robertson*

▼ The **Hunting Jet Provost** was the RAF's first jet trainer. This trio is passing over the RAF College, Cranwell. It opened on 5th February 1920, and in 1934 the elegant College building came into use. *Crown Copyright*





▲ Fighter Command's equivalent to the Canberra came to be the **Hawker Hunter** although not always so. Its competitor, the longer-ranged Supermarine Swift was more favoured until its qualities were found to be inadequate by 1954. In autumn of that year the Hunter joined 43 Squadron and was soon found to be excellent. Easily seen in this photograph are its simple, classic lines, stemming from the talent of Sir Sydney Camm. *Crown Copyright*

▲ The **English Electric Canberra** jet bomber provided Bomber Command with a very advanced aircraft. An operating speed of over 500mph and the ability to easily operate well above 40,000 feet brought new potency. Not only could it attack a wide assortment of eastern European targets, its range was sufficient for long distance raids in the Far East. Pictured at Warton in February 1951 the first three RAF Canberras await delivery to No 101 Squadron. *British Aerospace*

▼ Only JEHU and naval helicopters were available for the Suez operation in 1956. By the time of the Indonesian confrontation, Belvederes were in action, while in Europe Gnome engined **Whirlwind 10s** equipped No 225 Squadron. For air/sea rescue, short range Bristol Sycamores were of limited use and were replaced by the Whirlwind, Wessex and Sea King. *Crown Copyright*



▲ The immediate post-war period saw a huge increase in Transport Command's long range strength. Yorks replaced Liberators and Stirlings in 1946, then came the exciting Comets and in 1960 the elegant **Bristol Britannia**. Like XL657 illustrated, they carried troops to overseas interests and trouble spots. *Crown Copyright*



▶ Vehicles and supplies were, in the 1960s, taken overseas in **Armstrong Whitworth Argosies**. Twin boom layouts allowing easy vehicular access to a fuselage 'pod' had been considered for a version of the Hastings and, alternatively, a swing tail. These Argosies are flying over the Persian Gulf. *Crown Copyright*





Soon after the war requirements were drawn up for two fighters, one for daylight operations, the other for night. The latter was soon looked upon as an all-weather fighter and two designs were chosen, one from de Havilland (the Vixen) and one from Gloster (the Javelin). The latter eventually went into service with the RAF. Throughout the planning stage the aircraft dramatically increased in weight, and that did nothing for its performance. Although designed around the Avon engine, a switch to Sapphires was ordered and to increase its performance, re-heat was added, along with steadily improved AI radar. No 29 Squadron's **Javelins** were at one time unusually detached for service in Zambia where this photograph was taken.

As spectacular a performer as any RAF aeroplane has been the **English Electric Lightning**. Its origins lay in OR268 and Specification E16/49 calling first for an experimental transonic 'fighter' able to attain a 'minimum speed of Mach 1.12 at 36,000 feet' in level flight, soon increased to Mach 1.80. Renewed demands including a rate of climb of 1,000 feet a minute at 55,000 feet and a 1 hour interception endurance were tabulated within Specification F23/49 and two prototypes of the English Electric contender were ordered in April 1950. The Lightning entered squadron service with No 74 Squadron in 1960 and has remained in front line service until this year. Memorable was its annual participation in the Queen's Birthday Flypasts when a swarm of Lightnings would fill the Wattisham air with thunder. XR711 of 'Treble One' Squadron is racing off to contribute.

70 Dramatic Years

The decision that Bomber Command should be able to deliver nuclear weapons completely changed the layout of the RAF. A handful of bombers could now deliver destructive power beyond any comprehension, but to achieve success would need to fly fast and high. While these specialised bombers were being devised an interim bomber — the **Vallant** — joined the Command to equip what had been 3 Group squadrons. Testing the V-bombers meant working through a very extensive programme at Farnborough and Boscombe Down where WP204 is seen taking off. *Crown Copyright*



'Wittering, Home of the **Harrier**' — perhaps the most remarkable of all the RAF's aircraft. The world's first VTOL fighter, it was declared operational at Wittering, with No 1 Squadron, in July 1969. Two months previously it had grabbed world headlines with an in-flight refuelled 6 hour 11 minute crossing of the Atlantic. *Crown Copyright*



70 Dramatic Years



Impressive on all counts was the **Avro Vulcan**, its giant delta form marking it out as unmistakable. It was the outcome of several design studies and for some time progressed as a five engine bomber. To improve their capability some Vulcan B.2's were modified to carry Blue Steel, the British stand-off bomb. Not the least surprising feature of its history was the fact that, almost as it retired, it was sent into action during the Falklands conflict. XL321 wears the overall anti-nuclear flash white scheme, pale identity markings and the triple fin flashes of 617 Squadron, 'The Dam Busters'.

Supplying our forces after their landings in the Falklands called for ingenuity, a steady nerve and reliable aeroplanes. Working for 24 hours a day, 7 days a week, Marshalls of Cambridge first converted some of the RAF **Hercules C1s** to in-flight refuelling capacity tankers. XV296, first of the latter, retains that capability.

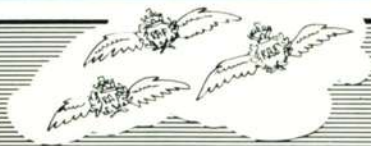


Produced in answer to OR229, the **Victor's** special feature is its crescent-shaped wing. The Victor shared with the Vulcan its ability to deliver British nuclear weapons, joining the RAF in November 1957. Now it is out-living its more glamorous companion but as an in-flight tanker refueller in which role it has served since the mid-1960s. The support it gave to Vulcans, Nimrods and Hercules during the 1982 Falklands conflict was vital to their success. *Crown copyright*

The RAF's longest serving front line aircraft is **Canberra T17A** WD955 whose 37 years almost certainly span a period of continuous service greater than that of any other aircraft supplied to the RAF which it joined late in 1951. Commencing active life with No 617 Squadron, it then served with Nos 98 and 245 Squadrons before returning to front line service with No 360 Squadron with whom, as a T17A, it currently serves at Wyton. *M. J. F. Bowyer*



70TH ANNIVERSARY



1918: NIGHT BOMBING ATTACKS MADE AGAINST TARGETS IN GERMANY, SOMETIMES BY AS MANY AS TWO O/400s



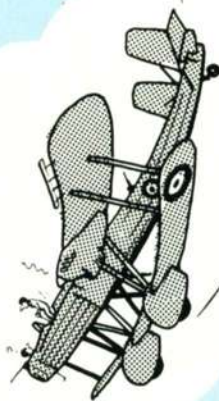
1921: WEEKLY MAIL SERVICE BEGUN BETWEEN CAIRO AND BAGHDAD. NAVIGATION RELIED ON TRACK PLOUGHED ACROSS THE DESERT



1923: AIR MINISTER ALLOTTED A SEAT IN THE CABINET



1927: FOUR SOUTHAMPTONS OF THE FAR EAST FLIGHT COMPLETED A CRUISE OF 27,000 MILES

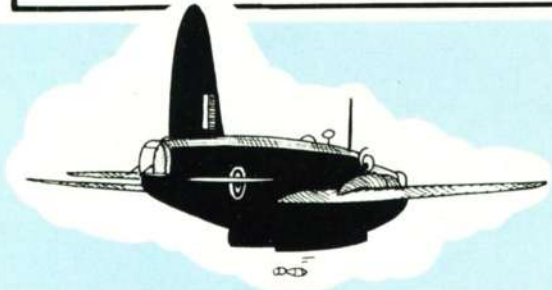


1930s: A DUBIOUS ACHIEVEMENT - IT WAS POSSIBLE TO LOOP THE HANDLEY PAGE HEYFORD, AND FOR IT STILL TO END UP AS A BIPLANE



1932: 'SKY-SHOULDER' USED TO WARN TRIBESMEN IN IRAQ

Some of the less well known achievements of the R.A.F



1939 : THE FIRST BRITISH BOMB TO DROP ON GERMAN SOIL, ACCIDENTALLY "FELL-OUT" OF A 115 SQUADRON WELLINGTON



1940: BLIND LANDING EQUIPMENT FITTED TO OPERATIONAL AIRCRAFT



1943-45: A MOSQUITO COMPLETED 213 OPERATIONAL SORTIES



1944: AN RAF FLIGHT SERGEANT JUMPED FROM 18,000 FEET OUT OF A BLAZING LANCASTER, WITHOUT A PARACHUTE - AND SURVIVED



1975: HARRIERS AND PUMAS COUNTER INVASION THREAT TO BELIZE



TWENTY YEARS ON

1952: 'SKY-SHOUTING' USED TO WARN TERRORISTS IN MALAYA



HOLLY

1980s: MAINTAINING THE BEST TRADITIONS OF THE ROYAL AIR FORCE

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PLANES need PEOPLE



RAF PERSONNEL IN THE 1990s

Air Marshal Sir Laurence Jones KCB AFC FBIM,
The Air Member for Personnel.

The House of Commons agreed: "That a number of Air Forces, not exceeding 150,000 all ranks, be maintained for the Service of the United Kingdom of Great Britain and Ireland at Home and Abroad, excluding His Majesty's Indian Possessions, during the year ending on the 31st day of March 1920."

In our 70th Anniversary year, we may be forgiven for looking back over our short but eventful history with a good deal of satisfaction and well-justified pride. It is inevitable, however, that the major milestones in our past are generally thought of in terms of our aircraft and the part they played in world events: the Camel and Bristol Fighter of the First World War; the Spitfire, Hurricane, Lancaster and Wellington of the Second; the Dakota and York of the Berlin Airlift; more recently the Vulcan and Harrier of the South Atlantic campaign; the Nimrod, Hercules and Sea King which feature regularly in the news of humanitarian activity. However, though the prominence given to familiar aircraft may be justifiable, it tends to obscure the real heroes of the hour — people.

I am not talking only of those who fly in the aircraft, but of all those personnel who contribute to the success of missions by providing the support to the men who fly. That support, which is largely behind the scenes and unrecognised by media and public alike, might be by way of preparation and servicing of aircraft, equipment and systems, or by involvement in the security, supply, administration, catering or medical services of our bases — all vital tasks without which success could not be achieved.

Today, 70 years on from the quotation at the head of this article, we have a strength of approximately 93,000 well trained and well-motivated men and women whose professionalism stems from a pride in the very high standards they have set and continually maintain. Professional pride is just one of the many characteristics which today's servicemen and women have inherited from their predecessors, who established and maintained a reputation of excellence in training and achievement throughout the 70 years of the Royal Air Force's existence.

Although in 1920 a strength of 150,000 was set as a target, the Royal Air Force did not reach that number until the dark clouds which loomed over Europe in the 1930s made increased recruiting a matter of urgency. During the war, of course, our numbers were swollen not only by the vast number of volunteers to serve King and Country but also by the imposition of conscription.

At the end of the war, National Service was a phenomenon that many older readers will remember only too well; some with fond memories, others perhaps less so. Whatever the experience at the time, many people seem to consider that short period in their life as worthwhile; a marvellous corporate spirit, the forging of

life-long bonds of friendship and excellent training of the mind and body. Those characteristics are still imbued in today's Service personnel, some 25 years after National Service was ended.

So much then for history — let me now look forward to the challenges that we in the Service face in the future. The most obvious and immediate one is to maintain the very high levels of expertise and strength of character that we expect from our personnel today — we can only achieve such levels by continuing to attract the right calibre of young men and women; people from all walks of life offering many different qualities and abilities. But finding such people will be more and more difficult. A low birth rate in the 1970s, a tendency for youngsters to stay in education longer, the welcome resurgence in the national economy, better employment prospects in civilian life and increased competition from other employers — all will make it harder for the Royal Air Force to attract sufficient young men and women of the right quality and calibre.

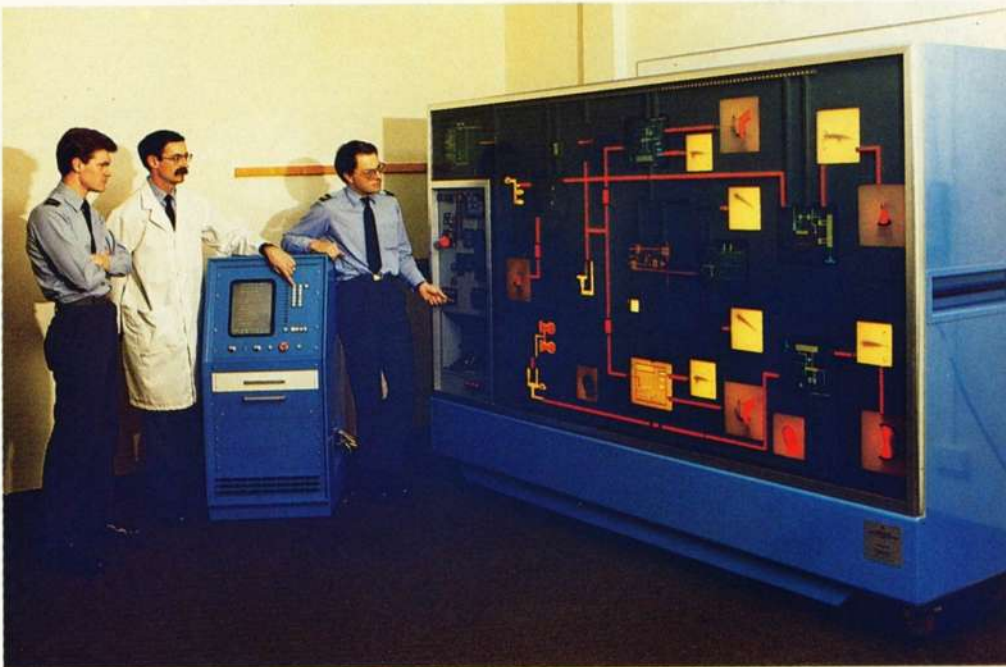
The qualities we seek in our personnel have changed little over the years; a sound education, determination, motivation, loyalty and enthusiasm, to name just a few. But now, more than ever before, our Service needs individuals who have the necessary flexibility to cope with the increasing demands of an ever-changing technical and social environ-

the high quality comprehensive training all our personnel will receive, in whatever branch of the Royal Air Force, be it as fast-jet pilot, cook, policeman, technician — whatever — they will still face challenges that only common sense, initiative and experience will solve.

We are currently in the middle of the largest and most exciting re-equipment programme since the Second World War; the Tornado GR1 and F3, the Harrier GR5, the Tucano, the E3 AWACS — all offer a quantum leap in capability and effectiveness, and, together with new equipment in all fields, offer a most exciting challenge to all our personnel through the 1990s and into the next century.

Although perhaps as in the past, new aircraft will get most attention from the media, we in the Service know that it is the quality of our personnel which will determine how effective this new equipment will be in use. The role of the Serviceman and the Servicewoman will remain the key factor in exploiting future technological advances, preserving the peace and, in the final analysis, winning any battle we are forced to fight.

As I indicated earlier, our current personnel are continuing a proud tradition and safeguarding a reputation of excellence, efficiency, dedication and skill built up over the last 70 years. We shall continue to need large numbers of people, to carry on this tradition; people from all



ment. Rapid advances in technology will continue to be made within the Defence field; the age of the computer has revolutionised many walks of life, not least modern weapon systems and the way we in the Royal Air Force carry out our business.

Computer-based training and simulation are taking the place of traditional teaching methods in our classrooms and workshops with the result that our young men and women now, and even more so in the future, will be right at the forefront of their particular trades and professions. But, despite technological advances and

walks of life to meet the many differing tasks and jobs that today's and tomorrow's Royal Air Force has to offer. We do not ask for supermen or superwomen — they do not exist.

We ask instead for enthusiasm, energy, dedication, integrity and a desire to seek and meet challenges; the Royal Air Force now and in the 1990s offers much in return — excellent career prospects, an exciting, rewarding life at the forefront of technology, and the good fortune to serve with individuals from all walks of life who share a common purpose and aim to get the job done.

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SPITFIRE

THE CLASSIC FIGHTER



50 years ago in July 1938 a significant new aircraft entered service at Duxford. *John D. R. Rawlings* outlines the service history of the Spitfire — the RAF's classic fighter

The 29th July 1938 started as any other summer's day for the RAF Station at Duxford in Cambridgeshire. Soon after 8.30am the hangar doors opened and the fitters began to push out the silver Gloster Gauntlet biplanes, the aggressive and purposeful looking aircraft with which Nos 19 and 66 Squadrons were equipped. They were parked in separate rows on the grass. Each aircraft had a placard hung on the interplane struts which gave the aircraft's serial number and carried the word 'Serviceable' so that the pilots, when they walked out, knew that their aircraft had been checked.

Flying began about 9am and continued spasmodically, but during that day something happened that would change the whole atmosphere of that scene for ever. What began as a typical RAF fighter station ended up as something 'pre-historic', already completely outmoded by events. People on the ground heard a deep roar emanating from the hills that rise to the south of the airfield and fold over to the villages of Strethall and Elmdon. Then a speck appeared which soon turned into the shape of a monoplane, which was sleeker and more beautiful than anyone at Duxford had seen before. Quickly the word

got around "It's coming" and all those who could left the offices and workbenches and walked out to see. The monoplane roared over the airfield, turned and settled on to the downwind leg. Two frail-looking undercarriage legs popped out of the wings, then came the familiar Rolls-Royce crackle, as the throttle was closed over Duxford village and K9792 began a steep, curving approach onto Duxford's turf. Bumping gently across the grass, it turned and taxied in, lining-up with the Gauntlets, where the pilot switched off. It was immediately surrounded by admirers. The Supermarine Spitfire had joined the Royal Air Force.

K9792 was the sixth production Spitfire Mk I and the first to enter the RAF. It was later joined by a full complement of aircraft for No 19 Squadron, which became the guinea pig unit to work the type into operational service and also bore the brunt of the attentions of the Press, who were not slow to herald the significance of the new aircraft. The men at Duxford needed no telling; their new machines had four times the firepower of the Gauntlets, a top speed half as much again, with 'modern' complications such as radiator shutters, flaps and a retractable undercarriage. K9792's first task was to familiarise all the Squadron's pilots and this was aided as further aircraft arrived from Supermarine's delivery airfield at Eastleigh. The type was very different to fly and new techniques had to be learnt. It was soon found that one of the problems for pilots was the narrow-track undercarriage which, in any sort of a cross-wind, could easily catch them out. Within the first year No 19 had five landing crashes, including K9792, which only lasted two months!

No 19's sister squadron at Duxford, No 66, was the second to re-equip, commencing in October, 1938 and as 1939 swung into view Duxford became the RAF's first operational Spitfire Wing. The Woolston factory was producing the aircraft at a very satisfactory rate. The next batch went to No 41 Squadron at Wittering and then the target was the Hornchurch Wing, all three squadrons (Nos 74, 54 and 65 in that order) being equipped by early 1939.

Whilst this was happening modifications were already taking place or envisaged. It was found that the cockpit canopy was too flat and confining, so this was 'blown' upwards and sideways to form a bubble shape that remained standard thereafter. A three-blade variable-pitch propeller was tried and this came on the line soon after the outbreak of hostilities. When the war began there were nine squadrons equipped with Spitfires of which two were Auxiliaries, a decision which had raised some eyebrows when first mooted.



Five of No 19 Squadron's First Spitfire Is operating from Duxford in 1938. Note the two-blade wooden propellers. IWM



Operated from Hornchurch during the Battle of Britain — a pair of Spitfire Is of No 41 Squadron. Crown Copyright



Flashback to 1940 — a typical wartime scene re-created for the forthcoming London Weekend TV series 'Piece of Cake'. Peter R. March

However, it was two Auxiliary Air Force Squadrons, Nos 602 and 603, that drew first blood for Fighter Command in World War Two. In the first months the Germans had begun probing raids against UK ports and on 16th October 1939 one such raid of Junkers and Heinkels were met over the Firth of Forth by Nos 602 and 603 Squadrons' Spitfires. Two Heinkel He IIIs were shot down, one by each squadron, and two JU 88s — without loss to the Auxiliaries. It had seemed almost too easy to the 'amateurs', thanks to their Spitfires.

However, during the 'Phoney' War this was the exception rather than the rule and this gave both Supermarines and the AOC Fighter Command, Sir Hugh Dowding, the breathing space they needed in order to build up a good supply of airframes, to develop refinements and improvements and to form new squadrons. Dowding's responsibility was the defence of the realm from the air and it became almost an obsession with him to guard the forces at his command zealously. On the

outbreak of War he had had to release four squadrons of Hurricanes and two squadrons of Gladiators for service in France and he was determined not to let any of his precious Spitfires go; he had good reason, as the condition of the French airfields meant they were no place for the rather dainty landing characteristics of the Spitfire.

Amongst the improvements already in hand for the Spitfire was the step from two-blade fixed-pitch propeller to three-blade two-position de Havilland propeller and thence to a three-blade de Havilland or Rotol constant-speed propeller, each improving the performance. As early as February 1939 it had been foreseen that the 0.303 machine-gun would be out-classed by German fighters and so the first aircraft had been test flown with 2x20mm cannon and 4x0.303 machine-guns. The original Mk I was powered by a 1,030hp Rolls-Royce Merlin II or III but by now a prototype designated Mk II was flying with the 1,175hp Merlin XII.

The Spitfire Mk I was well-established in service and already Dowding had realised that, of his two fighters — Hurricane and Spitfire — the latter had the higher performance but the former was more rugged. He knew, though, that as time went on it would increasingly be the Spitfire which would have the performance to cope with the Messerschmitt Bf 109 as it, too, developed. As 1940 came and one European nation fell after another, Dowding realised that very soon he would be facing the entire might of the *Luftwaffe* in the defence of Britain. He would need every fighter he possessed, and Spitfires more than most. But further calls came upon his aircraft. The Norwegian campaign needed air cover — what could he do? His answer was to send a squadron of Gladiators and another of Hurricanes, both of which proved ineffectual due to the almost total lack of suitable landing grounds. With the *Blitzkrieg* drive into Holland, Belgium and France the situation was more serious. The French allies

repeatedly appealed to Churchill for increased fighter support and Dowding's arm was twisted again and again. He could see clearly that in a month or two he would need every pilot and fighter to defend his own country and when pressed he sent Hurricane squadrons — Dowding was NOT going to lose any of his Spitfires.

It was at Dunkirk that the Spitfire next saw action. Flying from bases in South-East England some Spitfire squadrons joined with the Hurricanes, many of them already veterans, in providing beachhead cover for the British Army awaiting evacuation. Once again the Spitfires proved to be the fighters that the *Luftwaffe* feared. Most of their sorties were flown away from the beaches to intercept the enemy forces before they could bomb; a fine job was done but every aircraft lost or damaged and every pilot killed or wounded was one less for the battle ahead.

Whilst all this was happening, enterprising Sidney Cotton (of 'Sidcot' suit fame) had been using his wealth for a worthwhile cause. He had a business aircraft which he fitted with cameras and on his many European business trips he mapped much of Germany's defences. By the outbreak of War he had persuaded the Air Ministry to let him have a few Spitfires to add to his burgeoning Photo Reconnaissance organisation. These were fitted with cameras, had the armament replaced by extra fuel tanks and were painted in improbable pastel shades like pink and *eau-de-nil*. Flying from Heston, they kept a continual update on the German forces across the Channel. Thus was born the beginnings of the Photo Reconnaissance organisation which was a major feature of World War Two. For some time Cotton worked successfully with converted Spitfire Is but later the PR Mk IV was developed with features maximised for the task.

But the major task now was the defence of Great Britain. It was the beginning of July 1940 when the real Battle of Britain began.

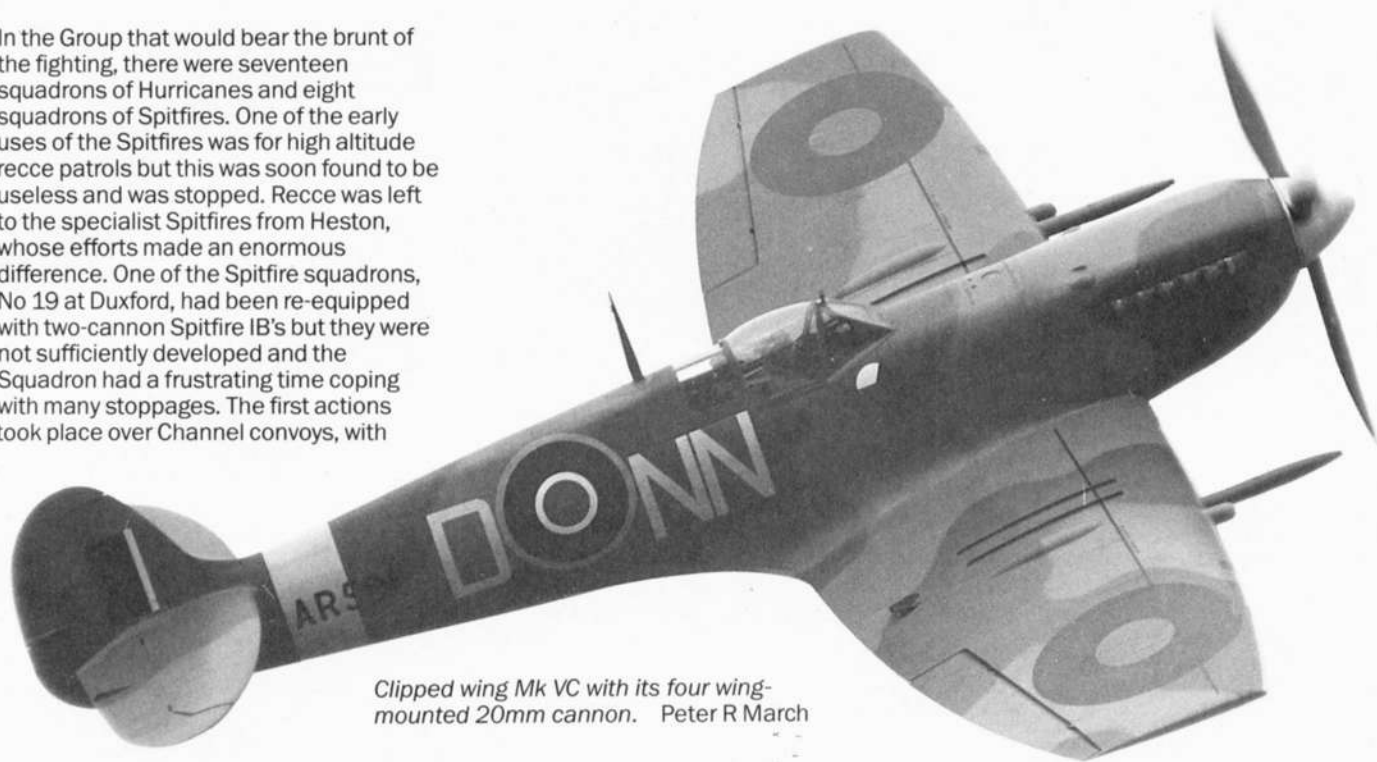


This landing Spitfire IA shows the type's narrow stalky undercarriage. Peter R. March



On the south-west dispersal at Biggin Hill, a pair of Mk VBs of B Flight, No 72 Squadron, with an aircraft from A Flight taxiing out.

In the Group that would bear the brunt of the fighting, there were seventeen squadrons of Hurricanes and eight squadrons of Spitfires. One of the early uses of the Spitfires was for high altitude recce patrols but this was soon found to be useless and was stopped. Recce was left to the specialist Spitfires from Heston, whose efforts made an enormous difference. One of the Spitfire squadrons, No 19 at Duxford, had been re-equipped with two-cannon Spitfire IB's but they were not sufficiently developed and the Squadron had a frustrating time coping with many stoppages. The first actions took place over Channel convoys, with



Clipped wing Mk VC with its four wing-mounted 20mm cannon. Peter R March

Fighter Command at a disadvantage and it was found that, on the whole, the Spitfire was a match for the Messerschmitt Bf 109E whereas the Hurricanes were better against the bombers. However, in the cut and thrust of battle no distinct line could be drawn.

With the attacks across the Channel it was obvious that one of the most worrying targets of German raids was the Supermarine works at Woolston (Southampton) where the Spitfires were being produced; if this could be put out of action it would damage Fighter Command heavily. Such a contingency had been foreseen and another factory built up the river at Itchen. Fortunately, a bolder plan was made for a larger factory at Castle Bromwich in 1939 as in September the Woolston factory was almost completely destroyed and the Itchen Works damaged. Castle Bromwich had come on line in the early summer and took over the immediate problems whilst the Woolston work was dispersed into small workshops all over the area with assembly airfields for the Salisbury works at High Post, for the Reading workshops at Henley and the Trowbridge workshops at Keevil. Spitfire production continued, despite the blitz.

As the Battle intensified so the Spitfires became more hard-pressed. On 15 August 1940, one of the heaviest day's fighting, 11 Group had only 45 Spitfires operational, a narrow margin indeed, and eight of those were lost that day. It became a battle for the factories and the training schools as to whether they could keep up the supply of replacement aircraft and pilots sufficient to cope with the losses in the Battle. Joe Smith, Supermarine's chief designer who had taken over after the Spitfire's creator, Reginald Mitchell, had so tragically died, had not been idle in developing improvements and the Mk II Spitfire had gone into production at the vast Castle Bromwich factory. The first aircraft began to reach the squadrons in August 1940 but did not play a significant part in the Battle

of Britain. The Mk II's extra performance proved beneficial towards the end of 1940 when the Luftwaffe started fighter-bomber raids against south coastal towns. It was with the Mk II that Spitfires were divided into types according to their wing armaments; there were two alternative type wings, the 'A' with eight machine-guns (0.303) and the 'B' with 2x20mm cannon and four 0.303 machine-guns.

Rushing into service as 1940 changed to 1941 the Mk II Spitfire inaugurated the next stage in Fighter Command's war—moving onto the offensive. This took two forms; firstly the fighter sweep in which three or more squadrons of Spitfires would roam over Northern France drawing the Messerschmitts up to fight; secondly groups of squadrons would escort Bomber Command's Blenheim IV squadrons making costly daylight bombing raids on coastal and nearby targets in France and the Low Countries. However, as it turned out the Spitfire IIA and IIB were really interim models as Rolls Royce had come up with the Merlin 45 engine of 1,440hp, increasing the speed of the aircraft another 20mph. On the production line many aircraft ordered as II's came out as this new Mk V version. Again, the variant could take either an A wing or a B wing and, later on, a universal wing was developed which could take either A or B armament or 4x20mm cannon; this was known as the Mk VC. This version became the definitive version, going into service in February 1941, initially with No 92 Squadron at Biggin Hill.

With fewer losses and increasing production, 1941 saw more and more squadrons forming and Fighter Command was able to build up its offensive force, sometimes with hundreds of aircraft taking part in a single operation over the near continent. Where bombs were dropped, the Photo Reconnaissance Spitfire IVs would then fly over at high altitude to photograph the results.

In 1940 the Spitfire had made a significant contribution to the defence of this country, capturing popular opinion and was hailed as the victor of the Battle of Britain. In 1941 it began to become the universal symbol of Fighter Command as the Mk IIs and Vs took the major part of activities in the UK. The Hurricane, even in its Mk II version, was no match for the later versions of the Messerschmitt Bf 109 coming into service and was increasingly becoming a fighter of many parts and places with operations into the Mediterranean and India as a fighter and fighter-bomber. In this latter role it took part in cross-Channel bombing operations and enabled the Spitfire to fly as high-speed escorts to fighter-bomber raids against point targets during late 1941. More Mk Vs were built than any other variant (6,479) and it was this version that took the Spitfire outside of Fighter Command.

By 1942 further developments had come out of the Supermarine works. An extra long-range tank had been developed, fitting snugly under the centre-section like an inverted aerofoil. This meant initially that bomber raids could be escorted further into France. But another idea had entered Air Ministry minds. At this time Malta was taking a real hammering from the Luftwaffe in Sicily and the Hurricane squadrons were becoming hard-pressed. Until then the Spitfire had been only considered suitable for UK-type airfields because of its narrow-track undercarriage but, early in 1942, several squadrons found themselves practising dummy landings on 'decks' marked out on their runways. Then in March 1942 fifteen Spitfire VBs were put on USS *Wasp* and flown off successfully to Malta, followed by forty-seven more in April and another sixty-four in May from *Wasp* and *Eagle*. The Spitfire had gone overseas at last. At the same time a Wing of three squadrons was



Carrier operations were always precarious — as shown by this 809 Squadron aircraft hitting the barrier on HMS Stalker. P.H.T. Green Collection

built up in Egypt to fight in the Western Desert. It was these Spitfire squadrons that first took advantage of experiments at home with the carriage of one 500lb bomb under the fuselage or two 250lb bombs under the wings. This was a great bonus for the Desert Air Force squadrons with the wide range of tasks required of them.

The next area of operations for the Spitfire was Algeria, with the North African invasion in November 1942. The Mk VC was the main version here, squadrons going ashore just as soon as airfields were captured and then having to cope with the muddy airfield conditions of the area. So the Spitfire had spread its wings in 1942, with the carrier trips to Malta foretelling the development of the Seafire for the Royal Navy, which is not really part of this story.

Although the type was developed and went into service on carriers in large numbers, the aircraft was not really suited to shipborne operations, its undercarriage not really being up to the rough life of a carrier's deck and the cost, in terms of damaged aircraft, was very high.

Whilst 1942 saw victorious overseas operations, the Spitfire had met with problems at home. One of these was the Junkers Ju 86P high-altitude reconnaissance aircraft which was operating freely over the United Kingdom. Resourcefully, Supermarines took the pressure-cabin equipment which had been pioneered in the Wellington bomber and adapted its principles to the Spitfire's cockpit. At the same time they extended the Spitfire's wingtips to 40ft 2in, resulting

in the Mk VI with a four-bladed propeller. Much more serious a threat was posed by the arrival in the *Luftwaffe* of the Focke-Wulf FW 190A fighter. Its fine performance enabled it to out-maneuvre the Spitfire Mk V, with which Fighter Command's interceptor squadrons were then equipped.

Fortunately, Rolls-Royce had been developing the Merlin 60 Series with a two-speed, two-stage supercharger giving 1,660hp. This required an intercooler radiator, thus providing the Spitfire's underwing profile with symmetry at last. This engine, together with a four-bladed propeller, gave the Spitfire the added performance it needed for a fighting chance with the FW 190A. An immediate production line was set up by Rolls-Royce at Hucknall, putting the new engines in as the aircraft came off the line, so great was the need. Because Mk VIIIs and VIIIs were already being developed this version was designated Mk IX and ultimately became the second biggest production run of all. Initially the Mk IXs flew along with the VBs over the Continent, their pilots single-mindedly taking care of the Focke-Wulfs. But soon whole squadrons were equipped and the situation was saved. The Spitfire IX could just about cope with the FW190.

There were two other versions of the Spitfire for which the Merlin 60 Series had been intended, the development of which had been going along at a more leisurely pace. The first of these was the Mk VII which was, in effect, a Mk VI replacement. With a pressure cabin and the new engine installed, the Mk VII retained the extended wingtips and had a retractable tailwheel and to cope with the extra power, a larger



Development aircraft N3297 here fitted with the Merlin 61 engine, and extended nose and retractable tailwheel, configured as a Mk VIII. Crown copyright



One of No 208 Squadron's Spitfire LF IXs in action. P.H.T. Green Collection

These Spitfire IXs of No 313 Squadron are fitted with long-range 'slipper tanks'. K Zouhar



rudder with a trim tab. This aircraft equalled the speed of the Mk IX at 416mph. It was produced in small numbers and led on to the Mk VIII which was, in effect, an unpressurized version of the Mk VII and was available in HF VIII (extended wingtips and altitude-rated Merlin), FVIII (normal wingtips and engine) and LF VIII (low altitude engine and clipped wingtips). This type was produced in quantity and, having fitments suitable for dust and sand, served mainly in the Middle East, Far East and Italy. Many were used by the Royal Australian Air Force.

These two versions, the VIII and the IX, then became the standard versions of the Spitfire which were produced in large numbers and served with great distinction to the end of the War. As part of their development there were low-level (LF) versions and high-level (HF) versions with clipped or extended wings. A development of the different forms of wings was the Type 'E' wing, first used on the Mk IX, which was a 'C' wing but with accommodation underneath for a bomb rack or rocket rails. The Mk VIIIs and Mk IXs now became the universal Spitfires — the former overseas, the latter in Europe. From these the PR XI with the Merlin 61 was developed, taking over in all the photo-recce squadrons. It became the main PR Spitfire for the rest of the war, flying epic high-altitude missions in all theatres.

The Spitfire was now the ubiquitous British fighter. In 1943 it was in action wherever the RAF was operating — in Europe bearing the brunt of the excursions over the Channel on 'Circus' and 'Roadstead' operations, flying escort to the increasingly heavy daylight raids in addition to its own sweeps and in North Africa, battling across the desert from both directions; then on to Sicily and the toe of Italy, flying as top cover, middle cover and fighter-bomber, as well as defence interceptor over Malta and the forward-marching armies. Surplus Mk VBs were to be seen on Middle East airfields with unfamiliar red stars en route to Russia, whilst in India Mk VIIIs were in combat with the Japanese over Burma. In Northern Australia the Mk VIIIs were an integral part of the RAAF's defence of Darwin and their ongoing expansion northwards.

Rolls-Royce, realising that there was little mileage left in the Merlin, had a new engine on the stocks. Its ancestry went back almost directly to the Type R which powered the successful Schneider Trophy seaplanes. The new powerplant emerged as the Griffon, which had a 36% greater displacement than the Merlin. At first there were some doubts about fitting such a massive engine in the somewhat dainty airframe of the Spitfire. It was tried in one of the development airframes which was designated alternately Mk III, Mk IV and Mk 20 and ended up in production as the Mk XII. This was optimised for low-level operation and equipped two Squadrons at Hawkinge to combat the low and fast sneak bomb raids flown over South-East England by Focke-Wulf FW190 fighter-bombers. The Mk XII was ideal for this, going into service in the spring of 1943 and being more than a match for the FW190 at low level.

The Mk XII's Griffon was optimised for 1,000ft but clearly there was a need for a version for more normal operating altitudes. This was the 2,050hp Griffon 65 engine, installed in the Spitfire XIV. To absorb all this power this variant had a five-bladed airscrew and more fin area was added to cope with the extra torque from the engine. It was on the Mk XIV that the well-known Spitfire contour was altered with the fitting of a bubble hood, although this was some way down the production line. Nearly one thousand Mk XIVs were built, a clipped-wing FR 14E becoming the ultimate version. With a top speed of 448mph the few squadrons already converted to XIVs were called into action in 1944 when the V1 menace started. First task for the new variant was to defend SE England from the flying bombs. As well as shooting them down the pilots adopted the tactic of forming on them and then tipping them over with their wingtips. The Mk XIV went on to serve with 2nd TAF squadrons during the invasion of France and the march through into Germany, both as a high-speed interceptor and as a fighter bomber, being able to carry 1,000lb of bombs under the fuselage and wings.

All this time, the Spitfire had remained a key type in the photo-reconnaissance role. The Merlin 60 Series engines had been a great boost enabling the Mk XI to fly higher and faster. This version became the standard PR Spitfire in 1942 and remained so until after the War. Its contribution to the total photo-reconnaissance scene in WWII was prodigious. Eventually a Griffon-engined replacement, the Mk XIX appeared, taking over just after the War ended. Throughout the last phases of the War the Spitfire was still playing a major

role in all theatres. In Northern Europe the Mk IXs and XIVs were performing as fighter-bombers, day-bomber escorts and interceptors over the Continent and the United Kingdom. In the Italian campaign the Mk VIIIs and Mk IXs were flown mainly in Army support on ground attack and bombing tasks as well as some bomber escorts. In the Burma campaign Spitfire VIIIs were providing fighter duties and bomber escorts and XIIs were busy photographing everything necessary within range. Spitfire VIIIs were also serving in the Pacific with the RAAF and in India with the RIAF.

Surprisingly, all the Griffon-engined versions then in service had been interim models, with the engine fitted into an existing airframe. The definitive airframe designed for the Griffon was the Mk XVIII with the 2,340hp Griffon 67 but this was only just coming off the production lines at the end of the War so production was curtailed to 300 aircraft, of which two-thirds appeared as FR XVIIIEs. The intention then in the RAF was to equip Fighter Command at home with jets, followed by the overseas fighter units. But this ideal was a few years ahead, leaving the Spitfire with work still to do. Naturally in





The Spitfire made a very big contribution to high-level photographic reconnaissance. This PR XI was the definitive version, entering service in 1942. RAAF Official



the UK jets came in relatively fast, together with new fighters such as the Tempest F2 and the Hornet F1.

Overseas though, the Spitfire was still vital. The Mk XIV was at the point of replacing the VIII when the War ended and this was speeded up. The Griffon version rapidly became standard in India, Malaya and Hong Kong. It played an initial part in the long and eventually successful campaign against the terrorists in Malaya. It was joined by the PR XIX and it was this type, in this area of operation, which flew the Spitfire's last operational sortie when No 81 Squadron used the Spitfire XIX for the last time on 1 April 1954. In the Middle East, too, the Spitfire continued to see action. Mk IXs and Mk XVIIIs served with the fighter squadrons in the Canal Zone and Palestine until the early 1950s. In fact

This Griffon powered Mk XIV of No 26 Squadron has the cut-away rear fuselage and bubble cockpit hood, with cameras installed just behind, making it an FR XIVe. P.H.T. Green Collection



one of the melancholy acts of 1948 was when some of No 208 Squadron's Spitfires were shot down by Spitfires acquired by the nascent Israeli Air Force over Egyptian territory. It was not until 1951 that the Spitfire was replaced at RAF bases in Cyprus and Egypt.

However, it was in the UK that there was a brief resurgence for the Spitfire post-war; this happened in two ways. Back in 1944 Supermarine's had initiated a fundamental redesign of the Spitfire to get the best out of the Griffon series of engines. This redesign emerged as the F21, 22 and F24 versions. The wing was given higher tensile spar booms with a redesign of the planform, the tip being semi-squared. The tail unit was reshaped and the undercarriage strengthened to cope with the extra weight. Finally, the wing fuel tank capacity was increased to boost the aircraft's range.

At the time that these marks were being readied for service the Auxiliary Air Force was being reformed. Initially most of these squadrons were equipped with Spitfires Mk XVI's. More importantly, though, some of the re-forming Auxiliary squadrons were given the new Spitfire F21s and in due course F22s, which differed in having a bubble hood. Apart from a few F22s serving with No 73 Squadron in the Middle East, these versions were used exclusively by the Auxiliary Air Force until replacement by jet aircraft in the early 1950s. The fully-developed F24 went into service with No 80 Squadron in Germany until moving out to Hong Kong where it provided this outpost's fighter defence until replaced by Hornets at the beginning of 1952.

Thus the Spitfire ended its service career with the Royal Air Force. Its classic lines, coupled with its performance, had always gripped the imagination of the public, an adoration which became world-wide. Its ability to accept so much development, and remain a potent fighter into the dawn of the jet age won Supermarine's aircraft an unforgettable place in aviation history. That it went on to serve with many other air forces re-building after World War 2 is outside the scope of this article, as is the

story of its escapades with the Royal Navy. However, it stands proud as the epitome of the piston-engined fighter for all time. The number of rebuilt Spitfires which are still flying today and the eagerness of today's public to witness their flights is probably the most authentic tribute there could be to the most classic of all World War 2 fighter aircraft and to the ability of Reginald J. Mitchell to produce such a tremendous design.



In service with the R Aux AF, a Spitfire F22 of No 607 (County of Durham) Squadron. Crown copyright



Spitfire XVI with underwing bombs, operated by No 74 'Tiger' Squadron in 1945.



Late production LF XVI's had increased range. Crown Copyright

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HISTORY on display

R Simpson,
Keeper of Aircraft and Exhibits, introduces
The Royal Air Force Museum and its aircraft



Vickers FB5 Peter R. March

On 15 November 1972 Her Majesty the Queen officially opened the RAF Museum at Hendon, bringing to fruition the dreams of so many who had worked and planned for over 55 years.

Towards the end of World War I a policy was introduced by the Air Council implementing an idea of Lord Rothermere, then Secretary of State for Air. This was to preserve an example of each British aircraft type used during the War. However, this idea soon fell by the wayside as storage became a great problem and it was left to the Imperial War Museum and private collectors to save a few examples of the era. It was to be another 40 years before the opportunity arose once more to contemplate a national museum; this time both ideals and monies were jointly available. The public answered appeals to raise the money needed to build a museum and in 1969 work began.

With the agreement of the Air Force Board the founding Director Dr John Tanner, with his small but dedicated team, began the mammoth task of turning a dream into reality. The first job was to find out just which aircraft were available and those that were not. Many of the earliest machines had been lost to the breakers and to time but fortunately the collection built up by R G J Nash over a number of years had been saved for the nation in 1953 by the Royal Aeronautical Society and in 1963 this collection was taken on loan by the Museum. To this collection of predominately First World War aircraft was added a wealth of machines from the RAF itself. Many had survived by the merest chance, but these two collections provided the basis of one of the most impressive displays of historic aircraft ever seen when many of them were brought together for the Queen's Review at RAF Abingdon in 1968.

Today the Royal Air Force Museum can rightly claim to have one of the world's most important aeronautical collections and at the core are its aircraft, which stand as silent tribute to the men who flew them, both in peace and war. The Museum also has a duty to remember the millions of men and women who helped to keep these machines serviceable and the aircrews fit and able to fly them, which it does in the numerous gallery displays covering many of the less well known aspects of service life and history.

Since 1972 two large display halls have been built and the number of aircraft on display has been increased by nearly 40%, with many more either going through the Museum workshops at this moment or awaiting restoration. During the past 16 years millions of visitors from this country and around the world have come to Hendon to see the aircraft and displays.

As visitors enter the Main Aircraft Hall they are flanked by the Bleriot XI and the Vickers FB5. The former came from the Nash Collection and although little is known of its early history it represents a type which achieved immortality when Louis Blériot made his historic cross-Channel flight on 25 July 1909. By the time war broke out the monoplane had lost favour in the eyes of the military and although the Bleriot XI formed part of the equipment of both the RFC and RNAS it saw little operational service, being quickly relegated to training duties. The debate continues to this day as to whether the monoplane — which this aircraft represents — received rough justice at the hands of the leaders of the Royal Flying Corps. It is nevertheless a fact that no large scale production took place during the war and, except for a short period when the triplane contested the crown, the biplane reigned supreme for many years.

Designed before the outbreak of World War I, the Vickers FB5 illustrates the early development of an armed reconnaissance and scouting machine. This particular example is a faithful replica built in 1965-66 at Weybridge. After a short flying career it was presented to the Museum. The aircraft, which was developed from some of the earliest ideas for a gun carrying aircraft, soon earned the nickname of 'Gunbus'. The FB5 equipped the first true fighter squadron, No 11 Squadron RFC, which went to France on 25 July 1915. It remained in operational service until early 1916 when it was relegated to training duties.

During the First World War the name of Sopwith was famous for a line of first class fighting machines and the Museum is



Sopwith Pup N5182 Peter R. March

proud to be able to display four aircraft from this famous company. The Sopwith Pup on show was built, making extensive use of original components, by Lt Cdr St Cyrien and was added to the collection in the mid-seventies, while the 1½-Strutter was built to original drawings by Viv Bellamy and flew for the first time in 1980, before being bought by the Museum. A considerable amount of work was then undertaken in the Museum's workshops before it was brought to Hendon to take its place in the Sopwith line-up. The Triplane represents a concept which had only the briefest of lives before being eclipsed by the new and more powerful biplane fighters on both sides. This authentic machine is complimented by another genuine classic — the Sopwith Camel, the preservation of which we have to thank the collecting talents and foresight of R G J Nash. The Camel represents perhaps the classic Sopwith fighter; either loved or

hated it always gained respect from its pilots and foes alike. Over 5,000 Camels were built but the type quickly disappeared after its replacement by the more powerful Snipe at the end of WW I.

As one moves further into the Hall it is possible to see an example of the SE5a which was considered by many pilots to be the best British single-seat fighter of the First World War. The type was used by 24 squadrons and was flown by some of the most famous British pilots. This particular machine saw no service with the Royal Air Force but managed to survive by being converted to a sky sign writer for Major J C Savage's famous firm.

Close by is a fine example of the craftsmanship of our technicians in the form of the rebuilt Bristol F2B. The bare airframe was rescued from Weston-on-the-Green and for many years formed the centre-piece of the First World War gallery display before being transferred to

Supermarine Stranraer 920 RAF Museum



Bristol Beaufighter TF10 RD253 RAF Museum



Hawker Tempest V NV778 Peter R. March



DH Vampire F3 VT812 Andrew March

Cardington for a complete rebuild. It has been reconstructed to represent the aircraft flown by Captain W F J Harvey and Captain D E Waight of No 22 Squadron from Agincourt in July 1918. Their aircraft was modified by the squadron and these changes have been faithfully copied on the Museum's aircraft.

Moving past such famous types as the Tiger Moth and the Spitfire we come to perhaps the ugly ducklings of our collection: the Lockheed Hudson, with its deep fuselage, forever shows its airliner ancestry. By no means a pretty aircraft, the Hudson was used extensively by Coastal Command during the early part of the Second World War. Over 2,000 Hudsons were ordered for the RAF, as was the one on display, but before it could be delivered it was diverted to the Royal Australian Air Force in whose markings it is displayed. Next to it stands the impressive Stranraer; designed by R J Mitchell, who

later created the Spitfire, this is believed to be the last surviving metal hull flying-boat of British design. This particular aircraft was built in Montreal by Canadian Vickers and was bought by the Museum in 1970. Its great size means that it cannot have the wheels of its beaching gear fitted otherwise it would not fit under the roof beams.

If the Stranraer appears to be an anachronism the same cannot be said for the Bristol Beaufighter. It stands silent now but one can almost feel the brute force of its engines and the formidable fire-power once available to its crew. One of the truly great strike fighters, this machine was brought back to this country from Portugal and was rebuilt at RAF St Athan. The Museum also has examples of two wartime rotorcraft in the Cierva Autogyro (Avro Rota) and the Sikorsky Hoverfly. Neither played a major part in the war but both allowed the RAF

to experiment with, and broaden its knowledge of, this new form of aircraft.

Perhaps it would be unwise to identify a personal favourite but the Hawker Tempest would certainly appear on any short list. The Tempest V acquired its fine reputation during the closing months of the war in Europe and was considered by many to be superior in performance to the latest German Messerschmitt Bf109G and Focke Wulf Fw190D aircraft. Finishing this brief tour round the main aircraft hall the opportunity is given to see four of Britain's post war fighters. The Gloster Meteor F8 and de Havilland Vampire F3 both show their early straight wing design while the Hunter F5 displays the classically clean lines available to this swept wing thoroughbred from the Hawker design team led by Sir Sydney Camm. Finally, the visitor has the opportunity to see a magnificent example of what is perhaps the last all-British fighter — the Lightning, a type which after 28 years in squadron service has just retired.

In this short tour of only a part of the complex I hope I have given an idea of some of the aircraft to look out for and the vast scope of the collection as a whole covering as it does all periods and aspects of military flying.

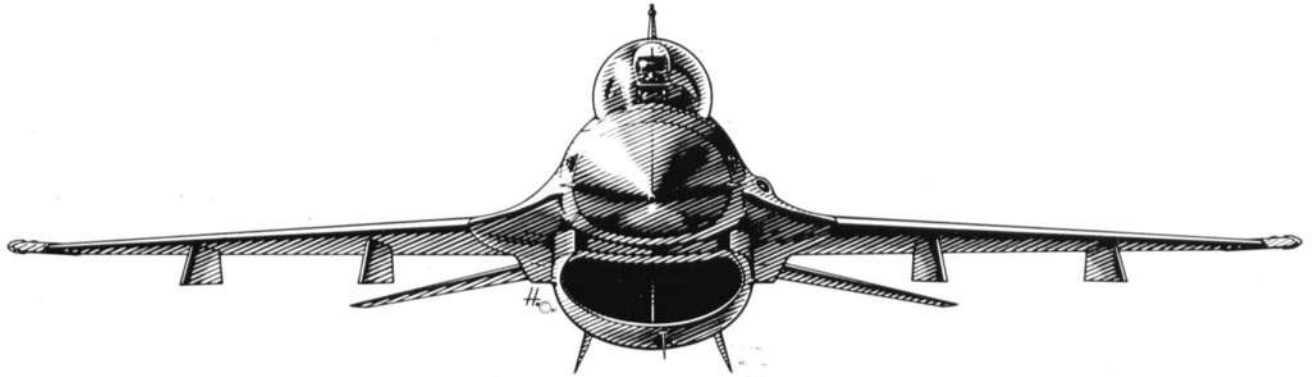
That then is the present, but what of the future? Under the leadership of the new director Mr M A Fopp the Museum intends to continue the acquisition of more historic aircraft and with changing display philosophy we intend to make many alterations to the aircraft and the displays. As the years go on we hope the visitor will truly be able to say they saw something new, possibly exciting but certainly interesting, every time they visited the Royal Air Force Museum at Hendon.



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The famous Hendon Air Pageant.



Aerial view of IAT.

Last year saw the closure of RAF Hendon. Latterly that venerable station was the hub of the RAF's supply computer network, and thousands of servicemen passed through Hendon when it was an assembly centre for overseas air trooping. For years the suburbs of London have remorselessly been engulfing the station and it has not been an active airfield since before the last war. But then it knows fame and glory — Hendon is best remembered probably for the celebrated Air Pageants mounted there between the wars.

Although the RAF station has closed, Hendon will continue to play a prominent role in the culture and life of the Service because the RAF Museum remains there — a mecca for all air minded people. And the spirit of those splendid Air Pageants lives and thrives in the RAF Benevolent Fund's International Air Tattoo. The Air Pageants were widely acknowledged to be the most prestigious and exciting air displays of their day — certainly in Europe and probably in the world; that is just how the International Air Tattoos, or IATs as they are known, have been described. IATs are presented every other year at RAF Fairford, Gloucestershire.

IAT is part of the Royal Air Force Benevolent Fund; it provides a much needed addition to the Fund's income, over £1 million since 1976, and it provides the public with what many aviation enthusiasts consider to be the world's finest air show in the calendar. They like it because of the large number and international variety of aircraft both in the air and on the ground, because of the very high standard of display flying, because of the carefully planned layout (a photographer's paradise), and because of the professional style of the organisation. It is enormously popular also with the general public; the sheer spectacle and volume of display flying is almost overwhelming — eight hour programmes including five or six national aerobatic display teams are typical.

A great deal of attention and effort is also devoted to the other aspects of a good day out both for the average band of dedicated aviation enthusiasts from around the world, and for the family. There is a huge static display of aircraft, a fairground, lots of specialist and general exhibitions, hundreds of trade stands, and an arena display that many believe would be worth a visit in its own right.

The organisation of all of these things and the multitude of specialist facilities that must be arranged — like aircraft participation and display programming, fuel and engineering, flight planning and air traffic control, safety services and security, advertising and press facilities . . . the list could go on — adds up to a huge and tremendously complex task. The management of it all while it is happening would be a daunting challenge to any organisation. Few members of the public and not many of the aviation enthusiasts realise that the whole business of mounting a Tattoo is carried out largely by volunteers working in their spare time.

This team started as a handful of enthusiasts who set out in the early seventies to run small airshows at North Weald — the Battle of Britain airfield just North of London. They planned on quite a modest scale, the aircrew buffet for participants for example consisted of a car-bootful of sandwich packs. Response from the public was larger than they had expected and the crews liked the character of the organisation, despite the sandwiches. With

each show the public response grew and various air arms were becoming eager to take part. The task threatened to overwhelm the small team so they started to expand gently, by persuading, cajoling and hoodwinking a few capable friends into sacrificing their weekends too.

Then the M11 was built right beside the airfield making it impossible to stage the growing air event there. By this stage the team had developed a strong identity, a growing expertise in running air shows with minimum resources, and a compulsion to go on doing so. It would have been tragic not to have utilised that momentum.

Paul Bowen and Tim Prince, original members of the team and both Air Traffic Control Officers with the Civil Aviation Authority, set out to find another venue. Eventually they were able to arrange with the Ministry of Defence and the USAF to mount a Tattoo at RAF Greenham Common near Newbury. It was an ideal site with many empty buildings in good repair and a good, long runway. It was maintained as a NATO standby base by the 7273rd Air Base Group whose commander and personnel were amazingly welcoming and helpful. Using their North Weald contacts they put together a very respectable air show in 1973.

The response for participation was excellent and public attendance was much larger than they had expected. The team were delighted and much relieved; the gate had been tremendous and everything had worked out — just. Behind the scenes the team and their planned operation had been stretched to the limit; the event seemed determined of its own volition, it seemed, to grow to fill its big new home.

The bug had bitten deeply and the team determined to accept the challenge and stage Tattoos annually at Greenham Common, but clearly they needed to gear up to cope with the scale that the show's reputation was generating. Team members inveigled friends and acquaintances whom they thought capable of being useful into 'helping out' in various capacities.

After several IATs at Greenham Common the team was beginning to get the hang of things; there was then about forty managers — each looking after a particular aspect of organisation and management — and hundreds of volunteer workers. Paul Bowen, Tim Prince and Army Officer Frank Windle were the Directors, trying to keep the whole thing together. These people all used their spare time for IAT. But the scale of the event had become too large for even the most gifted and dedicated part-timers to cope with every year, so Messrs Bowen and Prince left the Civil Aviation Authority to work for the RAF Benevolent Fund on IAT full time. From that point the event became biennial.



Air Traffic Control. Peter R. March

It seemed that the IAT team would welcome the change and enjoy having every other year off, not so. They were soon involved in staging smaller air shows elsewhere in the 'off' years — now they run the TVS Airshow South at Bournemouth International Airport, in years when there is not an International Air Tattoo. They were instrumental in establishing the Army Air Corps biennial International Air Show (IAS) at Middle Wallop and they staged the 13th World Aerobatic Championships at South Cerney in 1986. In addition they undertake the planning and execution of air displays at the famous Brands Hatch Motor Racing Circuit, stage the annual RAF Massed Bands Concert at the Royal Albert Hall, operate a Bell UH-1H Huey, the Skyhigh Mobile Shops and a Publishing Unit on behalf of the Fund.

When Greenham Common became a USAF Cruise Missile base the IAT was faced with new problems. The activities of the ladies of the 'peace' camp were the least of these: generally they could

not challenge the IAT's standing as a charitable enterprise and the fact that essentially it is an entertainment and certainly not a market place even for aviation products let alone for arms. They caused little disruption. The problems were mainly the availability of accommodation; as the missile wing built up so it occupied and used more of the buildings which had been unused and so available for IAT.

IAT tried to meet the problem initially by using large marquees to house many of the volunteer workers and military units attached for the event. This was very expensive both financially and in terms of organised effort, and — despite herculean efforts by the volunteers involved — it could not provide the standard of domestic support that such people deserve. The team accepted that IAT had to move again. This was a reluctant decision — they had built up friendly and effective relationships with the base staff and with many local organisations — and in the minds of many IAT and Greenham Common had become almost synonymous. At another venue IAT might have to establish its credentials all over again.

Several options were considered. Not too many airfields fitted the bill but negotiations with the MoD and then with the USAF finally resulted in agreement that IAT 85 could be staged at RAF Fairford.



The IAT Team in conference. Peter R. March

Immediately some of the team's fears about leaving Greenham Common were dispelled. The USAF base staff at Fairford were unstintingly helpful, local organisations responded warmly to overtures about involvement, and many old friends from the Newbury area were intent on continuing to help. Responses for participation were encouraging and, as soon as advance publicity was arranged, there was a surprising and growing volume of enquiries and requests for early booking. It seemed that IAT had developed a reputation and a following that had survived the move. And so it proved in the event; IAT 85 was highly successful and IAT 87 would have been more so, had the weather been kinder.

The IAT team comes from an interesting range of walks of life, naturally the aviation world and the Services are well represented, but there are also lawyers, policemen, teachers, housewives, writers and doctors. The variety of vocational backgrounds is undoubtedly one of the great strengths of the organisation.

Certain tasks in the IAT team have to be busmen's holidays — the medical team must be headed by qualified and practising doctors and the control tower must be staffed by current and licensed controllers. In most other cases volunteer managers pitch into jobs which are quite unlike their everyday occupations, and perhaps this gives a clue to the strange motivation that impels apparently sane men and women to sacrifice evenings and weekends, and to devote substantial parts of their annual holidays to what seems to be just very hard work under great pressure.

They are highly motivated people many of whom seem to have more energy and talent than their jobs absorb, and they find the contrast of organising and running major air shows, and all that it entails, stimulating and, perversely because it is an exhausting hobby, somewhat refreshing.

Certainly the rich diversity of characters and backgrounds gives the group's social existence a depth and liveliness which attracts and sustains its members. Such is the diversity that, although most members are keen on and interested in flying there are

some who vaguely regret that aeroplanes have to be involved at all for they are noisy and smelly, they need so much looking after and they take up so much room. For these members the challenge of the task and the ethos of the IAT team must be the prime incentives.

The challenge certainly is an unusual one and, although each Manager looks after a particular aspect of setting up and running the show, some of the aspects cover a large range of activities and, in any case, every department must plan and operate in close harmony with all of the others. Therefore, every manager is concerned with every aspect of the show. This adds another dimension of variety to the motivations — the great variety of the work involved; just looking after the public is a large and diverse undertaking. Not only must the people be entertained, but they must also be able to buy food and drink, to attend to the call of nature, to park their cars systematically, to find their way around, to get first aid if they need it, to dispose of their litter and to get in and out without undue delay.

The part of the airfield to be prepared for the public at a Tattoo is normally a vast featureless plain of grass and concrete where the USAF's KC-135 tankers sit when they are not airborne helping to refuel NATO aircraft. All of the resources and facilities necessary to entertain, feed, and otherwise support the public, and to keep them safe, must be brought in and put into operation in a very short time. This is because the USAF operations from RAF Fairford must continue throughout; the base staff and the tanker wing obligingly adjust their operational routine to work temporarily from other parts of the airfield, but they can do this effectively only for a week or so. Therefore, the bulk of the setting up for a Tattoo cannot be started until the weekend before the show. In any case few of the Managers and volunteer workers can arrange to be there much earlier.

The week before IAT the public area is scene of intense activity as grandstands, tents, portakabins, pavilions and miles of barrier are erected, as hundreds of lorries deliver exhibition sets, portable furniture, catering equipment, generators, and beer, as hundreds of aircraft fly in and are parked in the static display areas, and as rehearsals get under way.



Flight Safety Committee — Brian Trubshaw (nearest) and Duncan Simpson (centre). Peter. R. March

Rehearsals at IAT 87 — RAF Vulcan and Swedish Air Force C130. John Dunnell



The rehearsals are very important because, although the participating crews are all selected professionals — arguably the best in the world, there must be the highest possible standards of safety. For every IAT event there is a Flying Control Committee which is an independent panel of distinguished aviators who



The public area of IAT includes a Fairground. Peter R. March



Some of the large crowds at IAT 87. Andrew March

watch each display item in rehearsal and approve it, order changes and further rehearsal, or ground it. Not surprisingly the authority of such an august body is accepted without question.

Organisationally IAT 87 was a triumph, although the weather on the Sunday was appalling. In the planning process contingency plans are made for foreseeable problems and some of these allow for bad weather. They were largely effective and despite monsoon conditions for much of the Sunday, thousands of people had a good time. Members of the team did not think it such a good time, but even as they were putting their contingency plans into operation and coping with successive weather-induced crises as the elements tried to ruin the show entirely, the managers and volunteer staff were discussing their plans for IAT 89.

Admittedly in some individual cases those plans were to be somewhere else for IAT 89, but such visitations of sanity on IAT volunteers usually turn out to be brief. By the time of the wash-up conference soon after the show the addictive urge to run air shows had asserted itself once more and the volunteer managers, after a searching but concise autopsy on the last show threw themselves compulsively into eager discussion of what to do next time and how.

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1988 RED ARROWS

Paul Jackson interviews Britain's foremost aerobatic team at the opening of the 1988 season



Twenty-five summers ago, when five yellow-painted Folland Gnats of Valley-based No 4 Flying Training School were invited to perform at a handful of air displays during the show season, there were few indications that history was about to be made. However, for the following year, the team was increased to nine; 'ownership' was transferred to the Central Flying School; and the Gnats were given a new colour scheme. Today, the internationally renowned Red Arrows have been applauded in Austria and Abingdon; feted in France and Fairford; and celebrated in Canada and Coventry.



Forerunner of the Red Arrows — the yellow Gnats of the Yellowjacks. Peter R. March

Apart from the introduction of British Aerospace Hawks in 1980, little else has changed during the Team's 24 years of achievement. Instantly recognisable by the vast majority of the British public, the Red Arrows have continued their dual task of assuring the taxpayer that air force flying training is up to its traditionally high standards, whilst acting as aeronautical ambassadors for the RAF and UK aerospace industry when abroad. Truly, the Team is the glittering diamond in the RAF's showcase.

The polished performance which thrills the crowds at over 100 (actually 117 in 1987) aviation, sporting and charity events each year begins with the first small-scale practices above the Team's base at Scampton, north of Lincoln, over six months before the first public show. Such a long working-up period is necessary because there is always an interchange of personnel between seasons. Despite being an elite organisation in many ways, the Red Arrows is regarded by the RAF postings branch as just another squadron — and the normal tour of duty in most units is three years. With a nine-man team (and no spares), three members leave each year, and those who remain may take-up different positions in the formation — no 'new guys' are permitted to fly in the highly demanding Synchro pair and perform the precise cross-overs which invariably evoke gasps from the spectators.

A further disappointment for aspiring Team members from other units of the RAF is the fact that when a leader leaves, his place is taken by a former member recalled from other duties, so that only two new 'Arrows' are created that year. This season is the first in the position of 'Boss' for Sqdn Ldr Tim Miller, whose initial tour with the Team began in 1981.

In order not to disappoint their invariably appreciative public in 1988, the Red Arrows have had to put even more than normal into the punishing training schedule. The late and unplanned substitution of two extra new members as the result of accidents led to rumours that standards would have to fall this year. However, just before leaving for the final round of training on sunny Cyprus in April, the Team was back on its working-up schedule.

"The two pilots brought in at short notice have had to learn quicker than normal, and they have done particularly well" says Sqdn Ldr Miller. "We were fortunate with the mild weather during February, and if the climate in Cyprus is kind, we will start the season on time."

The result of that practice is now on public view. If some of the routines look familiar, it is merely because the repertoire of practical formations is finite, and many are carried forward from year to year with only minor variations. So, is there anything special to look for in 1988? "Watch the Synchro pair 'goosing' the main formation" advised Sqdn Ldr Miller. "In this move, the seven Hawks fly slowly in front of the crowd with their undercarriages down, whilst the other two perform a cross-over beneath them at high speed."

Seven plus two equals nine

Splitting the team into seven and two is one of the tricks of the formation aerobatic trade. As those who have seen the best on offer from certain other countries can attest, it is all too easy for formation displays in high-performance jets to become a series of fly-pasts interspersed with periods of inactivity. Having expended considerable effort in perfecting their display, the Red Arrows clearly believe that spectators should also have to put in a fair amount of work!

Heads turn this way and that as the crowd's attention alternates between the larger formation and the Pair, one group performing as the other prepares for its next piece. It is not difficult to find a parallel with a snooker game (apart from the obvious arrowhead of 'reds'), because of the forward planning involved. Just as the professional always seeks to place himself in position for the next shot, so the Team schedules its display sequence in order for each manoeuvre to flow naturally from the last.

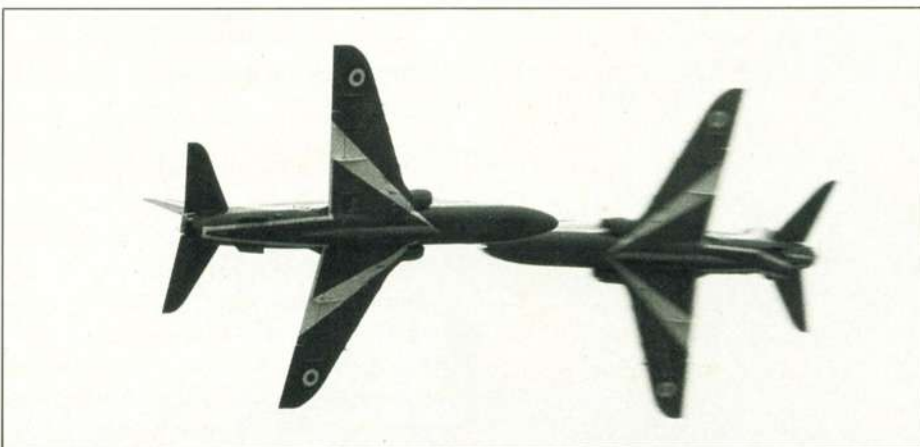
The nine members are individually designated according to their position in the standard 'diamond nine' formation. Red Leader is Sqdn Ldr Miller, and Red 2 to Red 9 comprise the remainder, of which Nos 6 and 7 are the Synchro Pair. The latter duo — this year Flt Lts Adrian Thurley and John Rands — fly their aircraft to the stressing limits of +7g and -3.5g whilst the rest of the formation is restricted to a 'mere' +5g (ie, subjecting their bodies to five times the force of gravity.)

It is the Team Manager's role to provide a commentary on the Red Arrows' display, ensuring that spectators necks are



Vixen break Peter R. March

Synchro Pair Peter R. March



stretched in the right direction at the right time and that they understand what is taking place. This demands more than learning a set piece, for the Team has three basic routines to suit different weather conditions, and is able to switch imperceptibly from one to another should a low cloud move in or out of the display area during the 20 minute performance. A cloud base over 4,500ft allows the 'Full' display to be given; above 3,000ft is enough for the 'Rolling' display; whilst a minimum of 1,000ft is needed for the 'Flat' show. Not only does keeping below cloud ensure that the Team is always in view, it also is a vital safety feature: flying nine aircraft six feet apart through cloud is definitely not recommended.

An ideal mount

The Red Arrows' mount is the Hawk — an advanced trainer used by the RAF both for flying instruction and giving trainee pilots initial experience of air-to-air combat and ground attack. First flown in 1974, the Hawk has proved popular in the export

market, gaining orders for some 480 in addition to the 176 covered by British contracts. The Hawk TMk 1 is the standard RAF training model, but 88 have been converted to Mk 1A configuration with provision for carrying two AIM-9L Sidewinder air-to-air missiles under the wings. Several Team aircraft are wired for 'Winders, and in the event of conflict they would be hastily repainted in grey

View from the cockpit Chris Allan



This view shows concentrated dye being injected into the jet pipe. Patrick Bunce



camouflage and join the four emergency air defence squadrons tasked with assisting the full-time interceptor force.

"The Hawk does its job very well" declares Sqdn Ldr Miller, "and is well suited to aerobatics." This is all the more remarkable when it is remembered that in a comparative sense, the Hawk is not an expensive aeroplane. The two United States teams (USAF 'Thunderbirds' and US Navy 'Blue Angels') operate some very highly-priced hardware which is equally costly to maintain and fly. With the Red Arrows, Britain gets Ritz-standard performance at YMCA prices.

As Sqdn Ldr Miller explains, "Compared with some team aircraft, the Hawk provides greater value. It's economical to operate, particularly the Adour engine, and it's not over-complicated, so it doesn't go wrong too often." Hard facts back up that assessment: during the Red Arrows' 1986 tour of the Far East, a total of 565 display flights was attempted by the nine aircraft, of which a mere three had to be cancelled because of unserviceability.

Possessing a useful speed range of between 109 and 659mph, the Hawk as used by the Red Arrows has a minor engine modification to permit faster response to the throttle, but is otherwise a standard aircraft. The one extra piece of equipment is the smoke generation unit. Smoke is produced by squirting Diesel fuel into the hot exhaust gases after they have left the aircraft.

Beneath the Hawk is a three-section pod based on that which houses a 30mm cannon on the weapon-training aircraft. The compartments contain 50 gallons of neat Diesel (which shows white), 10 gallons of red-dyed Diesel and a similar quantity of blue. Air bled from the engine pressurises the tanks, and further piping takes the Diesel to three nozzles overhanging the jet pipe at the extreme rear of the fuselage. A switch on the control column (normally used for releasing weapons) controls discharge of the Diesel and two sets of indicator lights above the instrument panel confirm the colour being displayed. During an aerobatic sortie, the Team will get through about 450 gallons of Diesel and 45 gallons of concentrated dye.



Caught at the top of a loop. Norman Peeling



First Line



Second Line

In support

Keeping the aircraft — and their pilots! — functioning properly is the behind-the-scenes support team at Scampton. The Manager, currently Sqdn Ldr Henry Ploszek, is responsible for far more than the commentary. Assisted by a Warrant Officer adjutant and four clerks, he receives and processes the numerous requests for appearances submitted each year and organises the deployment of aircraft to airfields at, or near the show venue. He also flies the spare aircraft (Red 10) which will be used by any pilot whose own Hawk goes 'u/s' at the last minute.

Ministering to the needs of the Hawk when it is away from base is the First Line servicing team of 25 men led by Flt Sgt Ben Roper under the command of Flt Lt John Williams, the Team Engineer. Nine lucky members of this group constitute the 'Circus' and fly in the back seat of the aircraft when it is being ferried to and from

the show airfield, accompanied by Flt Lt Williams in Red 10. Uniquely in the RAF, they are the only ground crew qualified to make the pre-flight, walk-round aircraft inspection normally carried out by pilots. The remainder of First Line, together with their 9 tons of equipment (including the Diesel tender) arrive by Hercules transport aircraft or by road.

If the display is within 80 miles of Scampton, the Red Arrows will operate from home, although First Line is still responsible for preparing aircraft. Sometimes, the Team is called upon to perform three displays in a day. If these are not geographically close together (and they usually aren't) the aircraft land to refuel and replenish Diesel between sorties. It takes about 1½ hours to 'turn round' the nine Hawks, but under pressure that can be reduced to 1¼.

Second Line comprises 32 servicing personnel who remain at Scampton to

undertake the larger tasks. Flt Lt John Abbott is in command, with Flt Sgt Ray Kennett as his right hand. During the winter, First and Second Line combine to prepare aircraft for the following season, three of them at a time being grounded for a thorough overhaul. Practice continues using three half-red/half-white Hawks borrowed from the flying school at Valley.

With all aircraft returned to pristine condition, the Red Arrows are ready for another season. Rigorous winter training schedules have been completed, and the generally fine weather in Cyprus gives ample opportunity for putting the final polish on another year's display routine. The Air Officer Commanding RAF Support Command inspects the performance, his approval signalling the end of rehearsals. It is now the last week of April; the curtain is raised on the 24th Red Arrows display season, and the audience awaits in eager expectation...

The Red Arrows Display Year 1988

The following dates and venues have been programmed for the Red Arrows this year. They are, of course, subject to change. Where an event is suffixed FP this indicates a flypast only. Please note that some of the displays will be given at private events and the public may not be admitted. These are denoted by an asterisk (*).

Date Event

JUNE

18	RAF Brize Norton Open Day
18/19	Biggin Hill International Air Fair
19	Royal Highland Show, Edinburgh
20	RAF Town Show, Aberdeen
25	Woodford 21st Annual Airshow
25	BAe Chester Families Day
25	Manchester Airport 50th Anniversary (FP)
26	Ailerichen Air Display, West Germany
26	Amberg Air Show, West Germany
30	RAF Town Show, Paignton
30	RAF Chaplin's School 25th Anniversary, Aldershot (FP)

JULY

1	RCDS Visit, RAF Marham (*)
2	75th Anniversary Military Aviation, Deelen, Netherlands
3	RAF Chicksands Open Day
3	Alnwick Castle Tournament, Northumberland
8	RAF Town Show, Blackpool
9	Armed Forces Week, Plymouth Hoe
9	RAF Wyton Families Day (*)
10	RAF Manston Open Day
10	Royal Tournament Flypast, Wandsworth
10	Duxford Spitfire Anniversary Air Display
15	RAF Town Show, Bournemouth
15	RAF Town Show, Lowestoft
16	Hastings Carnival
16/17	International Air Show 88, Middle Wallop
17	BAF Koksijde Airshow, Belgium
21	RAF Town Show, Bowness-on-Windermere
22	RAF Town Show, Ramsgate
23	Brighton 25th Anniversary Carnival
23	Prison Service Festival Of Sport, Rugby (FP)
23	Royal Marines Open Day, Lympstone
23	HMS Daedalus Open Day, Lee-on-Solent
24	Thomas Cook Gala, Peterborough (FP)
24	Eastern International Air Fair, Humberside
24	Norwich Air Fair
27	CIOR Congress, RMA Sandhurst
27	RAF Chivenor Open Day
27	RNAS Culdrose Air Day
28	Great Weston Air Day
28	RAF Brawdy Open Day
29	Lyme Regis Lifeboat Week
30	RNAS Yeovilton Air Day
30	A & AEE Boscombe Down, ETPS Families Day (*)
31	Swanage Regatta & Carnival
31	Shuttleworth Military Air Pageant, Old Warden

Date Event

AUGUST

4	RAF Town Show, Llandudno
5	RAF Town Show, Eastbourne
5	Isle of Wight Air Show, Sandown
6	Bournemouth Regatta & Carnival
6	Wings of Victory Airshow, Coventry
7	RAF Town Show, Skegness
7	Edinburgh International Air Fair
17	Weymouth Carnival, Dorset
17	Cromer Carnival
18	RAF Shawbury Families Day (*)
20	Yverdon-Les-Bains Airshow, Switzerland
21	Lubeck Air Show, West Germany
21	Breitscheid International Flying Display, West Germany
26	Port of Dartmouth Royal Regatta
26	Laser World Sailing Championship, Falmouth
27	Felixstowe Carnival
27	RAF Lakenheath Open Day
28	Leicester International Air Display
28	Cowes International Offshore Powerboat Race, IOW
29	Exeter Air 88
29	Great Warbirds Air Display, West Malling

SEPTEMBER

4	Roanne Flying Club Air Show, France
4	Ste Adresse International Air Show, France
5	RAF Town Show, Southport
7-11	Farnborough International 1988
12	NATO MC/CS Tour of UK, RAF Coningsby
15	Jersey Air Display
15	Guernsey Air Display
17	RAF Finningley B of B At Home Day
17	RAF Leuchars B of B At Home Day
18	Duxford Air Display
19	SAF Zaragoza, Spain
24	RAF Abingdon B of B At Home Day
24	RAF St Athan B of B At Home Day
24	Atlantic Wharf Scheme Launch, Cardiff (FP)
25	Aschendorf-Herbrum Airshow, West Germany
25	GAF Lechfeld Airshow, West Germany
28/29	Joint Service Days HMS Daedalus, Lee-on-Solent

OCTOBER

1	RAF Gibraltar Open Day
2	Aviano AFB, Italy



The Team in 1988

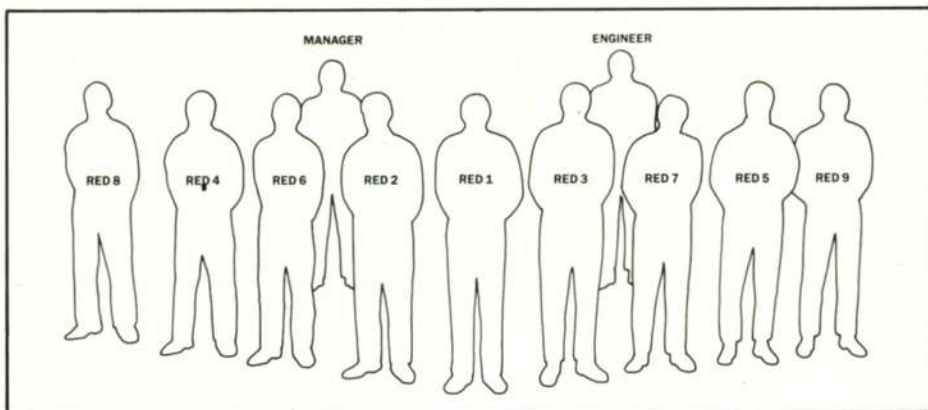


RED 1 – LEADER

Squadron Leader **TIM MILLER**, 35, was educated at Portora Royal School before joining the Royal Air Force in 1972. After training he flew Hunters with Nos 45 and 58 Squadrons; he then moved to the Harrier serving with No 3 Squadron in Germany where he was the 78/79 display pilot. On completion of a Weapons Instructor Course he was posted to No 1 Squadron prior to joining the Red Arrows in 1981. After three years with the Team he went back to the Harrier, this time as a flight commander on No 1 Squadron, before returning to the Red Arrows as Team Leader for the 1988 season. He now has more than 3100 hours. Tim, who is married with two small children, is a keen all-round sportsman but particularly enjoys skiing and golf.

RED 2

Flight Lieutenant **GUY BANCROFT-WILSON**, 30, is in his second season with the Team. He was born in Woodbridge, Suffolk and educated at Woodbridge School. He joined the RAF in 1977 and after training joined No 19 Squadron based at RAF Wildenrath, Germany, flying Phantoms. After a 4 month tour in the Falklands with No 23 Squadron, he was posted to No 63 Squadron at RAF Chivenor in Devon, and was a qualified Tactics and Weapons Instructor on the Hawk. In 1986 he was the Strike Command Hawk display pilot and has now accumulated nearly 1500 hours on the Hawk. Guy is married, has two bearded collies and enjoys skiing, windsurfing, tennis and motorcycling.



RED 3

Flight Lieutenant **DOM RILEY**, 29, was born in Stamford, Lincolnshire but grew up in Walton-on-Thames, Surrey and was educated at Strodes School, Egham. He joined the Royal Air Force in 1976 and after training flew Phantoms with No 92 Squadron in Germany. Then followed another tour on Phantoms with No 43 Squadron at RAF Leuchars during which time he was detached to the Falkland Islands for four months. He was then posted to No 63 Squadron at RAF Chivenor where he was a Tactics and Weapons Instructor. This is Dom's first season with the Team. He is single and off duty enjoys most sports; especially cricket, hockey, golf and skiing.

RED 4

Squadron Leader **PETE COLLINS**, 34, was born in Bristol and educated at St Thomas More School. He graduated from Southampton University in 1975 with an honours degree in Physics. His career has included two tours flying Harriers in Germany with Nos 3 and 4 Squadrons, and a short tour at RAF Chivenor flying the Hawk as a Tactics and Weapons Instructor. During the Falklands crisis he was sent on loan service to the Royal Navy and flew the Sea Harrier, with 809 Naval Air Squadron, from HMS Illustrious on Falkland Islands Air Defence. This is Pete's third season and he is this year's deputy leader. Pete is married, has two baby sons and enjoys all outdoor activities.

RED 5

Flight Lieutenant **STEVE JOHNSON**, 29, was born in Hastings, Sussex and educated at Fakenham Grammar School, Norfolk. He joined the Royal Air Force in 1978 and after completing flying training was posted to No 4 Squadron RAF Gütersloh in Germany flying the Harrier. He completed two tours on the Harrier on which he qualified as a Fighter Reconnaissance Instructor, also flying operational tours in the Falklands and Belize. In 1987 he finished his second tour in RAF Germany as the Harrier display pilot. He is single and a keen sportsman, with particular interests in skiing, soccer and tennis.

RED 6

Flight Lieutenant **ADRIAN THURLEY**, 33, was born in Newmarket. He was educated at The Grammar School for Boys in Cambridge and joined the Royal Air Force in 1975. After training on Jet Provosts, Gnats and Hunters he was posted to No 16 Squadron in Germany flying Buccaneers. His next tour was as a Tactics and Weapons Instructor with Nos 234 and 79 Squadrons based at RAF Brawdy in South Wales. He joined the Red Arrows in 1985. Adrian lives at RAF Scampton with his wife, two young daughters and his Doberman. He is a keen squash player and also plays golf. In his spare time he enjoys writing computer programs. This year he leads the Synchro Pair.

RED 7

Flight Lieutenant **JOHN RANDS**, 28, was born in Scunthorpe and educated at the John Leggott College. He learned to fly with the Air Training Corps and was a very keen glider pilot, becoming a member of staff on No 643 VGS at Lindholme. He joined the RAF in 1978 and after training spent the next five years flying Lightnings with No 5 Squadron at RAF Binbrook, including a four month tour of duty as an operations officer in the Falklands. During his time at Binbrook, John qualified as an Interceptor Weapons Instructor on the Lightning Training Flight. This is John's second season with the Team and this year he flies as the No 2 of the Synchro Pair. He is married, has a baby daughter and enjoys skiing and squash.

RED 8

Squadron Leader **JEFF GLOVER**, 34, was born in St Helens, Lancashire and educated there at Cowley School. He was awarded a Soccer Blue whilst at St Catherines College, Oxford, where he graduated in Engineering Science and was a member of the University Air Squadron. His first tour was as a Flying Instructor on the Hawk. He then converted to the Harrier and during the Falklands conflict he flew with No 1 Squadron from HMS Hermes. On his second operational sortie he was shot down by ground fire and taken prisoner. In 1986, after five and a half years on Harriers, he joined the Central Flying School where he has flown a variety of aircraft. This is Jeff's first season with the Team and he is married with two small boys. Off duty he enjoys squash and golf.

RED 9

Flight Lieutenant **MIKE CARTER**, 29, was born in Sunderland and educated at Bede School. He learned to fly when 17 through an Air Training Corps Flying Scholarship. Mike joined the Royal Air Force in 1976 and now has over 2700 flying hours. His first tour was as a Flying Instructor on the Hawk at RAF Valley. After conversion to the Harrier in 1983 he completed a tour with No 3 Squadron at RAF Gütersloh in Germany and a short tour with No 223 (Harrier) Operational Conversion Unit at RAF Wittering. Mike was the Support Command Solo Hawk display pilot in 1981 and during 1986 he displayed the Harrier. This is his last season with the Team; he is single and enjoys running and skiing.

MANAGER

Squadron Leader **HENRY PLOSZEK**, 52, born in Poland and educated at the Kings School, Chester, entered the RAF College Cranwell in 1955. Since 1958 he has flown Hunters with Nos 43 and 56 Squadrons, Lightnings with Nos 56 & 74 Squadrons, No 226 Operational Conversion Unit, No 56 Squadron (for the second time) and as a Unit Test Pilot at RAF Leconfield. He then flew Jaguars as a Unit Test Pilot at RAF Abingdon. In 1963, on his first tour with No 56 Squadron, he flew as No 3 in the 'Firebirds' Lightning Aerobatic Team. Now in his fourth season with the Team, Henry flies the spare aircraft as Red 10, organises the Team's itinerary and administrative support as well as giving the commentary for displays.

ENGINEER

Flight Lieutenant **JOHN WILLIAMS**, 29, is in his first season with the Team. He was born in Saltburn-by-the-Sea, Yorkshire and educated at Sir John Deanes' Grammar School, Cheshire. He then completed a four year course at Imperial College, London University gaining an honours degree in Mechanical Engineering. He joined the Royal Air Force in 1983 and after training completed a tour as the Junior Engineering Officer of No 5 Squadron operating Lightnings at RAF Binbrook. John is married and lives in Scampton. He is a Royal Air Force Offshore Yacht Racing skipper and last year captained the yacht to victory in the Inter-Services Championships. When not sailing he enjoys squash and playing the guitar.

The aircraft

Serial	Mark	Pilot	Remarks
XX227	Hawk T.Mk 1A	Fit Lt John Rands (Red 7)	Founder aircraft
XX237	Hawk T.Mk 1	Fit Lt Dom Riley (Red 3)	Replacement — first used in 1985 season
XX252	Hawk T.Mk 1A	Fit Lt Guy Bancroft-Wilson (Red 2)	Founder aircraft
XX253	Hawk T.Mk 1A	Fit Lt Adrian Thurley (Red 6)	Founder aircraft
XX260	Hawk T.Mk 1A	Sqdn Ldr Tim Miller (Red 1)	Founder aircraft
XX264	Hawk T.Mk 1A	Fit Lt Steve Johnson (Red 5)	Founder aircraft
XX304	Hawk T.Mk 1A	Sqdn Ldr Pete Collins (Red 4)	Originally 'smokeless' spare founder aircraft
XX306	Hawk T.Mk 1A	Sqdn Ldr Jeff Glover (Red 8)	Originally 'smokeless' spare founder aircraft
XX308	Hawk T.Mk 1	Fit Lt Mike Carter (Red 9)	Received as spare in 1985. Smoke modifications for 1988 season

Reserves

XX233	Hawk T.Mk 1	(Red 12)	Received from No 4 FTS for 1988 season. Non-smoking
XX266	Hawk T.Mk 1A	Sqdn Ldr Henry Ploszek	Founder aircraft — temporarily 'de-smoked'
XX294	Hawk T.Mk 1	(Red 11)	Received from No. 4 FTS for 1988 season. Non-smoking

Previous Team aircraft: XX243 (replacement received for 1985 season) crashed at Scampton, 22 January 1988; XX251 (founder) crashed during a display work-up in Cyprus, 21 March 1984; XX257 (founder) abandoned during a display off Sidmouth, 31 August 1984; XX259 (founder) collided with XX241 (on loan from No 4 FTS) near Scampton, 16 November 1987; XX262 (founder) collided with a yacht mast off Brighton, 17 May 1980; and XX297 ('smokeless' replacement received in 1984 season) abandoned during practice at Scampton, 3 November 1986.

The pilot's viewpoint Chris Allan





THE BATTLE OF BRITAIN MEMORIAL FLIGHT

Sue J. Bushell

The BBMF Lancaster PA474 in its new 1988 markings as PM-M² of No 103 Squadron. Richard Winslade

RAF Battle of Britain Memorial Flight — Displays 1988

The following programme details the dates and venues for the BBMF's Spitfires (S), Hurricanes (H) and Lancaster (L). Several single flypasts have been omitted, and any part of the programme might be changed. Please note that some of the displays where the BBMF aircraft are due to appear are not open to the public. This programme for 1988 might be subject to late alteration or cancellation.

Date Event

JUNE

- 18 RAF Halton Open Day (S/H/L)
- 18 RAF Brize Norton Open Day (S/H/L)
- 18 Clophill Fete, Bedford (S/H/L)
- 18 BAe Dunsfold Open Day (S/H/L)
- 18/19 Rotherham Tattoo (S/H)
- 18/19 Biggin Hill International Air Fair (S/H/L)
- 25 Woodford 21st Annual Airshow (S/H/L)
- 25 BAe Chester Families Day (S/H/L)
- 25 Manchester Airport 50th Anniversary (S/H/L)
- 25 Rolls-Royce Leavesden Families Day (S/H)

- 25 RAF Hullavington Families Day (S/H/L)
- 25 RAF Lyneham Families Day (S/H/L)
- 25 RAF Locking Flowerdown Fair (S/H/L)
- 26 Skelton & Brotton Carnival, Cleveland (S/H/L)
- 29 RAF Town Show, Nottingham (S/H)

JULY

- 1 RCDS Visit RAF Marham (S/H/L)
- 2 RAF Marham Families Day (S/H/L)
- 2 British Aerospace Hatfield Open Day (S/H/L)
- 1/2 75th Anniversary RNethAF, Deelen, Neth. (S/H/L)
- 2/3 PFA International Rally, Cranfield (S/H/L)
- 3 RAF Chicksands Open Day (S/H/L)
- 3 Wrexham Show (S/H)
- 9 RAF Wyton Families Day (S/H/L)
- 9 RAF Cosford Aerospace Museum Modelex (S/H/L)
- 9 RAF Alconbury (S/H)
- 10 RAF Manston Open Day (S/H/L)
- 10 Duxford Air Display (Sx4/H/L)
- 15/17 RAF Town Show, Bournemouth (S/H/L)
- 16/17 International Air Show, Middle Wallop (S/H/L)
- 17 RAF Town Show, Lowestoft (S/H)
- 17 RAF Town Show, Bowness-on-Windermere (S)
- 17 DH Museum, London Colney (S/H/L)
- 17 Corby Fun Day & Airshow (S/H)
- 20/21 Anglo Dutch Festival, Torbay (S/H)
- 23 Brighton 25th Anniversary Carnival (S/H)
- 23 Prison Service Festival of Sport, Rugby (S/H)

The Battle of Britain Memorial Flight enters its 31st year of existence with a full complement of five Spitfires (P7350, AB910, PM631, PS853 and PS915), two Hurricanes (LF363 and PZ865) and Lancaster PA474. During the winter months, a programme of servicing and repainting has been undertaken, with the result that some aircraft will be appearing in new colour schemes for the 1988 season.

Foremost among these is Lancaster PA474 which has carried the markings of No 101 Squadron for the past four years but has been repainted by West Country Air Services at Exeter and is now resplendent in the markings of No 103 Squadron based at Eisham Wolds with the type during World War 2. Code letters PM-M² are an indication of the number of Lancasters on charge to the unit.

PA474 also has a new pilot for the 1988



Spitfire PS915 in its first full season with the BBMF. Peter R. March

season in Squadron Leader Colin Paterson, who has taken over from Squadron Leader Tony Banfield as Flight Commander. As well as Sqn Ldr Banfield, three other members of the BBMF aircrew team are also moving on to pastures new – Flight Lieutenants Bob Kemble, Pete

Hole and John Innes. Flt Lt Eke, Sqn Ldr McKendrick and Master Air Engineer Mick Laity have replaced them as co-pilot, navigator and air engineer respectively on the Lancaster.

The Spitfire fleet has seen no changes over the winter months, its newest addition being PR19 PS915, 'reclaimed' from gate guard duties at RAF Brawdy and restored by apprentices at British Aerospace's Warton factory. Another of the BBMF's Spitfire PR19s, PS853 was delivered back to the BBMF in 1987 after a long period of modification, during which time its Rolls-Royce Griffon Mk 61 engine has been replaced by a Griffon Mk 58 of the type used by the Shackleton.

During the first half of 1988, the Flight was reduced to one Hurricane while PZ865 'The Last of the Many' underwent overhaul. Its return was eagerly expected during mid-June, repainted in the colours of one of the Polish Hurricane squadrons as a tribute to that country's war effort and following flight testing, it should rejoin the air show circuit in July.



Hurricane LF363 in action, May 1988. Richard Winslade

- 23 HMS Daedalus Open Day (S/H)
- 24 RNAS Portland Navy Day (S/H)
- 24 Thomas Cook Gala, Peterborough (S/H/L)
- 24 Eastern International Air Fair, Humberside (S/H/L)

AUGUST

- 3 RAF Town Show, Skegness (S/H/L)
- 5/6 RAF Town Show, Eastbourne (S/H/L)
- 5/6 Isle of Wight Air Show, Sandown (S/H/L)
- 6 Bexhill-on-Sea Air Display (S/H/L)
- 7 Wings of Victory Airshow, Coventry (S/H/L)
- 7 RAF Town Show, Skegness (S/H)
- 7 Edinburgh International Air Fair (S/H)
- 12 RAFA Mablethorpe Air/Sea Display (S)
- 13/14 RAF Alconbury USAF Open House (S/H/L)
- 14 RAF Town Show, Whitby (S/H)
- 14 Saltburn-by-the-Sea Festival (S/H)
- 14 Jurby Air Display, Isle of Man (S/H/L)
- 18 RAF Town Show, Billing, Northants (S/H)
- 18 RAF Shawbury Families Day (S/H)
- 21 RAF Bentwaters USAF Open House (S/H/L)
- 27 East Durham Show (S/H)
- 27/28 RAF Lakenheath USAF Open House (S/H)
- 27/28 Exeter Air 88 (S/H/L)
- 28 Shuttleworth Air Display, Old Warden (S/H/L)
- 28 Leicester International Air Display (S/H/L)
- 28 Hemsworth Spectacular (S/H)
- 28 Nottingham Air Show (S/H/L)

- 28/29 RAF Lakenheath Open Day (S/H)
- 29 RAF Town Show, Liverpool (S/H)
- 29 Great Warbirds Air Display, West Malling (S/H/L)
- 29 Chelmsford Centenary (S/H/L)
- 29 St Albans Carnival (S/H/L)
- 31 Glapwell Carnival, Chesterfield (S/H)

SEPTEMBER

- 3 RAF Neatishead Families Day (S/H)
- 4 Cranfield International Air Fair (S/H/L)
- 9 RAF Town Show, Southport (S)
- 9-11 Farnborough International Airshow 1988 (S/H/L)
- 10 Grimsby Tattoo (S/H)
- 10 RAF Leeming Re-opening (S/H)
- 12 Norwich Battle of Britain Week (S/H)
- 12 NATO MC/CS Tour of UK, Coningsby (S/H/L)
- 15 Jersey Air Display (S/H/L)
- 15 Guernsey Air Display (S/H/L)
- 17 Metropolitan Police Anniversary, Bushey (S/H)
- 17 RAF Finningley B of B At Home Day (S/H/L)
- 17 RAF Leuchars B of B At Home Day (S/H/L)
- 18 Duxford Air Display (S/H/L)
- 18 RAF Newton Families Day (S/H/L)
- 24 RAF Abingdon B of B At Home Day (S/H/L)
- 24 RAF St Athan B of B At Home Day (S/H/L)
- 25 Shuttleworth Pageant, Old Warden (S/H/L)



THE RAF FALCONS

Gordon Bucknall

The RAF Falcons, based at RAF Brize Norton in Oxfordshire, are the premier parachute display team of the British Armed Forces. The Display which they give is a spectacular demonstration of freefall parachuting and canopy handling. 1988 sees the 23rd year of RAF Falcons Displays and over the years, this team of Parachute Jumping Instructors from the Physical Education Branch of the Royal Air Force has established a reputation second to none for accuracy, precision and professionalism with which they provide a thrilling public spectacle.

The hallmark of a Falcons' performance is their ability to create a stack of 12 parachutes where each man, despite his close proximity to his team mates, maintains his exact position without touching the other parachutes and continues to do so until a very accurate landing is made. This feat is unique in the parachute world.

The Falcons jump from RAF Hercules aircraft, which provide not only an excellent jumping platform but also a fitting conclusion to each show with a low level fly past. Spectators are often

surprised by the noise and visual effect of such a large aircraft being flown with such precision.

The RAF Falcons have established a world wide reputation and have performed in front of many members of the Royal Family and heads of state. They have given displays in over 20 countries and regularly land in city centres on drop zones as small as 50 yards square. With their high level of team work, skill and fitness, team members personify the very best which the Royal Air Force has to offer.



The RAF Falcons

— on display 1988

The diary of venues and dates for the RAF's Parachute Display Team is as follows. It is subject to change and individual dates may be cancelled without prior warning.

Date Event

JUNE

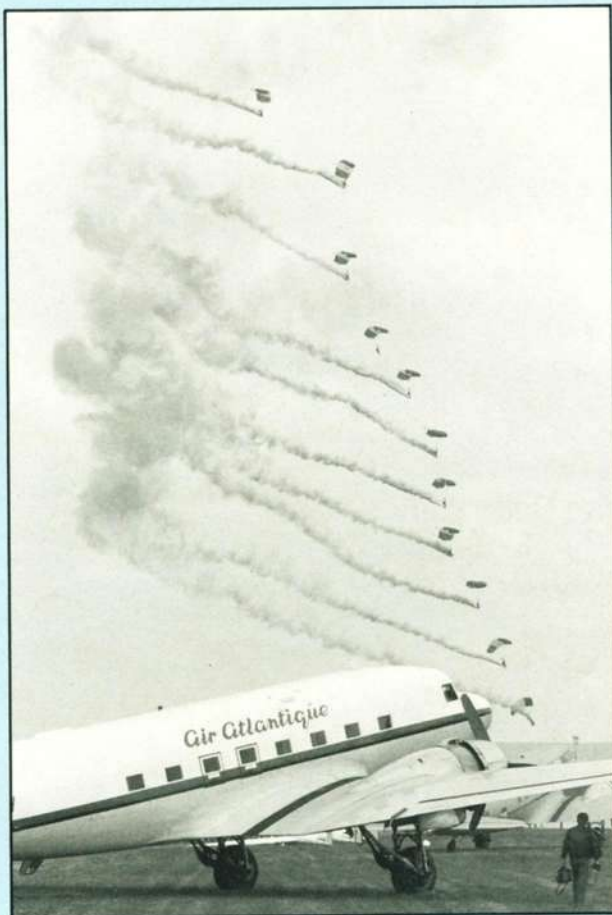
- 18/19 Biggin Hill International Air Fair
- 18 RAF Brize Norton Open Day
- 18 RAF Halton Open Day
- 22 RAF Town Show, Portsmouth
- 24 RAF Town Show, Livingston, Edinburgh
- 25 RAF Lyneham Families Day
- 25 RAF Hullavington Families Day
- 25 RAF Locking Flowerdown Fair
- 26 Gatow, West Germany
- 28-30 RAF Town Show, Paignton

JULY

- 1 RCDS RAF Marham
- 2 RAF Marham Families Day
- 2 Teeside Steel Air Day, Redcar
- 2 Newhaven Annual Fete, East Sussex
- 3 Alnwick Northumberland
- 4 Menwith Hill Open Day, Harrogate
- 8/9 RAF Town Show, Blackpool
- 9 RAF Town Show, Tamworth, Staffs
- 10 RAF Manston Open Day
- 10 Duxford Air Day, Cambs
- 16 Swindon County Ground
- 16/17 IAS 88 Middle Wallop
- 17 Weston Park Air Day
- 18 RAF Town Show, Lowestoft
- 19 Anglo-Dutch Festival, Torbay
- 20/21 RAF Town Show, Bowness-on-Windermere
- 23 Brighton Carnival
- 24 Eastern International Humberside
- 24 Badminton 10th Air Day, Avon
- 27 RAF Chivenor Open Day
- 28 RAF Odiham Families Day
- 28 RAF Brawdy Open Day
- 30 Lyme Regis Lifeboat Week
- 30 Boscombe Down Families Day
- 31 Pickering Traction Engines Event

AUGUST

- 6 Colchester Tattoo
- 7 Edinburgh International Air Fair
- 7 Sheringham Lifeboat Day
- 8 RAF Town Show, Eastbourne
- 12/13 RAF Town Show, Whitby
- 13 RAF Alconbury Air Show
- 14 Jurby Air Display, Isle of Man
- 14 Saltburn Festival, Cleveland
- 15 RAF Town Show, Cromer
- 17 Weymouth Carnival, Dorset
- 18 RAF Shawbury Open Day



Date Event

- 19/20 RAF Town Show, Stratford
- 20/21 Hartlepool Show
- 21 West Park Family Fun Day, Macclesfield
- 21 RAF Bentwaters Air Day
- 24&26 RAF Town Show, Liverpool
- 27 Exeter Air Show
- 27 East Durham Show
- 28 Leicester International Air Display
- 28 Chelmsford Centenary
- 29 Hoylake Lifeboat Day
- 29 St Albans Carnival

SEPTEMBER

- 3 RAF Neatishead Families Day
- 4 Cranfield International Air Fair, Beds
- 10 RAF Leeming Airfield Re-opening
- 12 VIP Day, Coningsby
- 15 Jersey Air Display
- 17 RAF Leuchars B of B Day
- 18 Duxford Air Day
- 18 Lydd Air Show
- 24 RAF Abingdon B of B Day
- 24 RAF St Athan B of B Day
- 24 Cheltenham Searchlight Tattoo

OCTOBER

- 1 RAF Gibraltar Open Day
- 8 Akrotiri Open Day, Cyprus
- 12-16 Australian Bicentennial Celebrations, Richmond



Flt Lt Jim Mardon begins his solo display in the specially painted 1987 display Hawk. Daniel March

DISPLAY FLYING

Peter R Foster looks at some of the RAF's individual aircraft displays

Turning through 45deg into a slow loop following a roller take-off, with a pull up speed of approximately 200kt from a height of about 100ft, looks relatively simple, yet even to a pilot of Flt Lt Jim Mardon's experience, with two successive display seasons behind him, it is still a difficult manoeuvre to perform. Very few jet aircraft can carry out a loop immediately after take off and it is further complicated by the relatively low speed and limited buffet margins during the pull-out.

Leaving the loop, the Hawk display aircraft accelerates to around 350kt during a maximum rate turn onto the display line and then slides neatly into a four point *Hesitation Roll* before entering an 8g turn back towards the crowd centre. 'Derrying' underneath, to position at the datum for a high g loop, Jim includes an *Aileron Roll* to assist with his positioning for the next item.

Running along the 45deg line he then flies a half-*Cuban 8*, leaving the aircraft again pointing towards the datum, before entering a hesitation *Derry Turn* and onto another tremendous 8g turn finding the other 45deg line. Rolling inverted into a push-up wing-over, with minus 3½g draining the blood from the pilot's socks towards his

head and bringing on red-out conditions, he eases the Hawk from around 50deg nose up into a *Slow Roll* along the crowd line at 350kt. Without appearing to pause a *Half-horizontal 8* is commenced using 8g before another maximum rate turn is initiated from a hesitation *Canadian Break* leaving the aircraft pointing directly at the crowd centre on the 90deg line. This is followed by a *Quarter Clover* on the display line before entering a second *Canadian Break* and an 8g turn through 180deg to position for a *Barrel Roll*.

On completion of the *Barrel Roll* Jim initiates a maximum rate turn back towards the crowd centre pulling up into a *Derry wing-over* on the outer 45deg line before returning with an 8-point *Hesitation Roll* with a maximum rate turn through 270deg leaving the aircraft pointing at the crowd centre departing in a vertical roll again pulling 8g at approximately 400kt before topping out at 10,000ft.

This display lasts all of six minutes yet leaves the pilot soaked in sweat and one wonders why the man is prepared to give up most of his free-time through a long season of air shows and demonstrations to entertain the public. The simple answer is that he enjoys it!

It is not the glamour nor is Jim Mardon any more an exceptional pilot than the vast majority of the RAF's fast jet pilots, but it is the challenge to be allowed to undertake low-level aerobatics — something definitely taboo unless specially authorised. Jim, now back in the front line on Harriers, was somewhat unusual in having two successive seasons as the Hawk solo display pilot. He was not chosen automatically for the 1987 season, he had to compete for the *Brabyn Trophy* at RAF Valley against strong opposition from within the Central Flying School and the three squadrons that go to make up No 4 Flying Training School. Obviously having had a season of low-level aerobatics behind him he was perhaps better placed to impress the very critical team of judges who aim to ensure that whoever is chosen is a worthy representative of the RAF and has a display that is well thought out, polished and above all safe.

In preparing for the fly-off and the *Brabyn Trophy* the pilots selected from what is surprisingly a large number of instructors, who are both able and prepared to devote their free time to awe the many thousands of spectators and would-be recruits, have to be able to put together a

routine that is made up of a series of manoeuvres that flow together and seem like one. The arrangement has to be such that it fits into a given time and can be performed well within sight of the crowd. When being judged marks are given for choice and quality of manoeuvres (50), composition and continuity (25) and positioning and ability to adjust (25).

In designing a display sequence it is relatively simple to impress with a fast jet as speed and high energy manoeuvres go a long way to keeping the public's attention and no doubt the pilot chosen to display the Hawk for the 1988 season will use this to his advantage. Similarly noise can also play a big part in a routine and the ability to 'turn and burn' will always be a turn on for the crowd. 1987 saw Flt Lt John Fiennes impressively putting the Lightning through its paces in what must be considered its swan song. His two jets, XP741 and XR716, were both Lightnings F3s and they were the last of this mark to remain on strength with the RAF. The aircraft were maintained on No 5 Squadron's establishment and were exclusively used for the display circuit although they were retired at the end of the season with XP741 being allocated to Manston and XR716 to Cottesmore for battle damage repair training. The 1988 airshow scene will sadly be without the Lightning as the final user, No 11 Squadron, formally relinquished the type on the 29th April leaving the RAF for the first time in its history with no single-seat fighter. However, several surplus Lightning F6s have been passed onto BAe at Watton for high speed chase and target duties and these are expected to remain airworthy until the early 1990s, so we may see the Lightning in the sky for a few years to come.

Replacing the Lightning, not only in policing the UK Air Defence Region but also on the display circuit is the new 'all singing, all dancing' Tornado F3. The 1988 sequence, which includes much in the way of turning and burning, is performed by Flt Lt Fred Grundy of No 65 Squadron, 229 Operational Conversion Unit at RAF Coningsby, who will be flying ZE210/AW as his principal mount.

In the fast jet world especially, the display pilots use one particular aircraft for several important reasons. In the older aircraft some of the airframes will perform certain manoeuvres better than others, the reason allegedly described as "being due to some being less bent than others!" Having said this certain airframes have their own characteristics; it provides a more polished display if the pilot is aware and used to the individual idiosyncrasies. Secondly designating certain individual airframes for display flying a lot depends on the particular aircraft's fatigue index rating and that it has sufficient 'FI' available for such stressful flying. In the case of the 1986/1987 display Hawks where a special paint scheme was used, then these jets have to be available for the entire season and not be scheduled for other tasks or major maintenance.

The painting of aircraft in special colours can be costly especially in man hours. With the Royal Air Force College Jet Provost T5 as flown by Flying Officer Sean Chiddentian during 1987, it was initially the intention to



Solo Lightning display at a very damp Binbrook, August 1987. John Dunnell



The 1987 Jet Provost T5 was flown by F/O Sean Chiddentian. Peter R. March

paint four JPs in the special colours, based on the old *Poachers* scheme, but this was later reduced to two on the grounds of cost. In fact Sean was seldom able to have both of his aircraft, XW323 and XW374 available at the same time due to fatigue problems and on at least one occasion actually had neither! This is a problem facing the Jet Provost at the present with the entire fleet facing fatigue restrictions. Towards the end of the season, XW374 became so restricted that it was deemed unacceptable for display flying.

Sean Chiddentian in representing the RAF on the Jet Provost was billed as the youngest flying instructor in the air force having been creamed off his course at Valley to become a QFI. To represent the air force in 1987 Sean was the winner of the *Wright Jubilee* Trophy held at Scampton in May of that year. In displaying the 'JP' the pilot is not blessed with the speed and sleekness of the fast jets so his sequence had to be passed on grace and poise.

For the 1987 display Chiddentian began his sequence with a run-in inverted at 250kt rolling through 270deg to a turn and into a *Quarter Clover*: rolling out left into a *Canadian Break*, turning 45deg to

starboard with a *Derry Wing-over*, ending with a 90deg turn to port and a *Noddy*. Another *Canadian Break* followed, passing the crowd inverted, (the JP can fly up to a maximum of 20 seconds inverted before fuel refused to flow), then a 45deg turn to port, a hesitation *Half Cuban*, 45deg turn to starboard and a 4-point hesitation roll. Turning through 270deg into a *Derry Turn*, then a *Butterfly Loop*, aileron roll, half horizontal 8 and single nod stall-turn, the display concluded with a vertical roll 180 deg pushover.

The display was very polished and what it lacked in power was gained in panache. In fact Sean enjoyed the display flying so much he requested to extend his instructing tour at Cranwell by two months to enable him to compete for the 1988 slot. However, even though he has the confidence and experience of 1987 behind him there are four other extremely competent pilots — from Church Fenton, Linton-on-Ouse, Finningley and Cranwell — who will be determined to see that they represent the RAF in the coveted slot.

Preparation for the Wright Jubilee competition begins at each of the Flying Training Schools early in the year and

No 1 FTS at Linton-on-Ouse is perhaps typical of them. Here they have their own competition to see who goes forward to the fly-off at the Central Flying School and also their own trophy. This is the *Jarvis* trophy which was presented to the station by Flt Lt P Jarvis, in the mid-60s.

The pilots, who are all QFIs, prepare a suitable routine which is performed at 5,000ft in the company of a senior instructor and from the many applicants the best four are authorised to proceed down to a level of 1,500ft. In working down to this level they give six performances at 5,000ft, six at 3,000ft and two at 1,500ft before the actual competition. The winner of the *Jarvis* Trophy is then cleared to display at 500ft in preparation for the *Wright Jubilee* Trophy which is held in early May each year.

At Linton-on-Ouse the four pilots who competed for the *Jarvis* Trophy in 1988 were Flt Lt Al Pease, Flt Lt Pete Watson, F/O Andy Offer and F/O Stu Evans. The eventual winner was Andy Offer who serves as an instructor on No 2 Squadron. In the package put together by Andy Offer is a manoeuvre known as a 'Whifferdill' which is a half stall-stop and then a push through 360deg and is designed to counter Sean Chiddentian. It is noteworthy that his mount for this routine is the *Jet Provost* T3A, a mark only seen once in the display circuit in the last few years. Since the T5 came into service in the early seventies all of the JP display teams the *Poachers*, *Red Pelicans* and *Gemini Pair* flew this later mark, only exception being the *Macaws* from the College of Air Warfare at Manby, who retained the T4 which, although similar to the T3, did have the more powerful engine of the T5.

Within the confines of an airfield boundary perhaps the most impressive display flying in recent years has been performed by the *RAF Gazelle*. Although not handicapped with the difficulties of synchronised manoeuvres similar to the Royal Navy's 'Sharks' team the solo *Gazelle* in the right hands seems to constantly defy the laws of aerodynamics. Again the pilots are drawn from CFS Instructors and the 1987 season saw a highly successful routine put together by Flt Lt Alex Nash and Lt John Boughton DSC. CFS(H) is a joint services unit and John Boughton, who gained his DSC at Bluff



Jet Provost T3 XM424 — the chosen mount of F/O Andy Offer for 1988. Peter R. Foster



The unmistakable shape of the *Vulcan*. Peter R. March



Gazelle display. Peter R. Foster



Shackleton AEW2 of No 8 Squadron. Peter R. March

Cove during the Falklands conflict has now returned to his naval duties. Alex Nash, who was once an RAF navigator, has now teamed up with Flt Lt John Streeter to carry this polished sequence into the 1988 season.

High 'G' turns in fast jets can look impressive particularly on a moist day but helicopter aerobatics can really get the adrenalin flowing. Running in along the display for an *Alcock Turn* at the datum and then quickly into a *Pedal Turn* before the pull up and spiral descent to a quick stop, then backing the *Gazelle* into a rearward climb for a sick making push-up dropping into a forward dive before entering the *Roller Coaster* and a 360deg climbing turn ending up at the datum to begin a backward diving 150deg turn into a figure of eight quick stops, finally entering a vertical spiral and a 90deg diving turn to depart low level, leaving what seemed to have been one continuous manoeuvre.

Obviously the beauty of displaying such a versatile helicopter is that not only can the whole sequence be performed entirely in front of an impressed public but can also be performed in conditions that prevent the fixed wing pilots from even

contemplating their rolling displays. The RAF's display line-up for 1988 exemplifies the professionalism of the Service as it celebrates its 70th anniversary: the *Red Arrows* (formation aerobatics going back to the *Hendon Air Pageants* four decades ago); the *Battle of Britain Memorial Flight* (reminding us of the wartime achievements of the *Spitfire*, *Hurricane* and *Lancaster*); the solo *Meteor* and *Vulcan* (marking the post-war advances with jet power); the *Falcons* Parachute Team demonstrating the important use of transport aircraft with airborne forces; the solo *Jet Provost*, *Hawk*, *Jetstream* and *Gazelle* illustrating the quality of flying training that provides crews for the front-line *Tornado*, *Phantom*, *Buccaneer* and *Jaguar*. Nor should we forget the venerable *Shackleton*, a type that has seen nearly 40 years of RAF service, which will be seen on display around the country this year.

While it is the aircraft that attract the public's attention it must be remembered that they could not be there without the crews who give their time so extensively, particularly at weekends. They are probably the best advertisement that the RAF could have as we approach the 1990s.

DO YOU KNOW YOUR RAF AIRCRAFT?

RECOGNITION COMPETITION

Six **Canon SURESHOT TELE** cameras are to be won in this RAF 70th Anniversary Recognition Competition. Simply identify the 12 historic aircraft that span the RAF's 70 year history pictured below by matching the letter on each photograph to the correct aircraft name on the entry form and you could win one of these fully automatic Canon compact cameras (worth approx. £170).

On the last day of each month from June to November 1988, the first all-correct entry opened will be awarded one of these superb compact cameras. The lucky winners' names will be announced in Britain's top airshow magazine **Air Display International**, published by Ian Allan on 27th August, November, February and May. Winners will also be notified individually.

How to enter

Correctly identify the 12 RAF aircraft, fill in your name and address, then cut out the official Canon entry coupon and send it to: **RAF Recognition Competition, P.O. Box 46, Westbury-on-Trym, Bristol BS9 1TF**. You may send as many entries as you like, but each entry must be made on the official Canon coupon. Photocopies and

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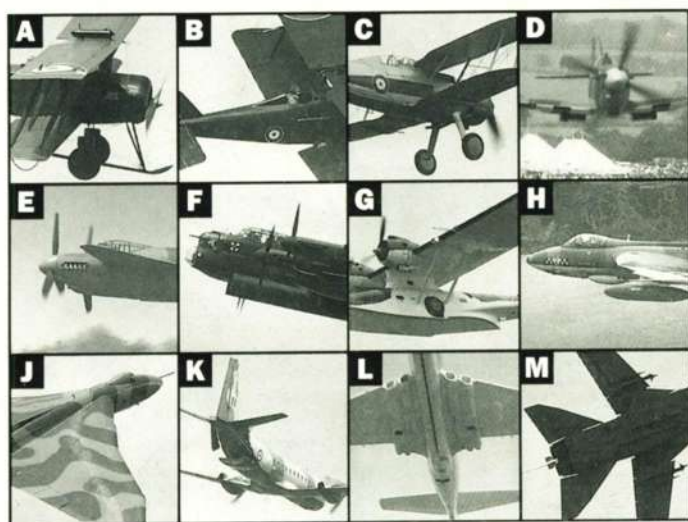


handwritten entries will NOT be accepted.

Rules

- 1 No responsibility can be accepted for loss of entries or damage to them, however caused.
- 2 No correspondence will be entered into.
- 3 Prizes are as stated — there can be no cash alternatives.

Final closing date is 25 November 1988.



RAF Anniversary Recognition Competition ENTRY COUPON

<input type="checkbox"/> Andover	<input type="checkbox"/> Gladiator	<input type="checkbox"/> Nimrod
<input type="checkbox"/> Avro 504	<input type="checkbox"/> Hart	<input type="checkbox"/> SE5A
<input type="checkbox"/> Blenheim	<input type="checkbox"/> Hunter	<input type="checkbox"/> Spitfire
<input type="checkbox"/> Catalina	<input type="checkbox"/> Lancaster	<input type="checkbox"/> Tornado
<input type="checkbox"/> Comet	<input type="checkbox"/> Mosquito	<input type="checkbox"/> Vulcan

Name _____

Address _____

Postcode _____

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Photographers — win one of the latest hi-tech **Canon EOS** autofocus SLR cameras with 35-105mm zoom, by entering your photographs (black & white print, colour print or colour transparency) showing any aspect of **The Royal Air Force In Action 1988**.

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- 1 Photographs **must** be related to this theme and taken in 1988
- 2 A maximum of **three** prints or transparencies per entry (prints no larger than 8x10 ins).
- 3 Entries must be made on the official Canon entry coupon. (Photocopies and handwritten entries will NOT be accepted).

All entries received by the closing date (30 September 1988) will be judged by a distinguished panel chaired by Air Chief Marshal Sir Alasdair Steedman, Controller of the Royal Air Force Benevolent Fund. The Canon EOS camera with 35-105mm EF zoom will be awarded to the photographer who submits the best **overall** RAF In Action 1988 photograph.

Runners-up prizes of a **Canon Sureshot** camera will also be awarded in each of the following categories: Black & white print, colour print and colour transparency.

Names of the winning photographers will be announced in **Air Display International** No 8, on sale 27 November 1988. Winners will also be notified individually.

Rules

- 1 Photographs submitted for this competition should be clearly marked with the photographer's name and address. They must also state where and when the photograph was taken.
- 2 If entries are to be returned after the competition they must be accompanied by a suitably sized stamped addressed envelope.
- 3 All photographs submitted as entries in this competition may be published by the RAF Benevolent Fund. Due acknowledgement will be made to the photographer.
- 4 No responsibility can be accepted for loss of entries or damage to them, however caused.
- 5 Decisions of the judges are final — no correspondence will be entered into.
- 6 Prizes are as stated — there can be no cash alternatives.

Send your photographs (together with the official Canon entry coupon) to: **RAF Photographic Competition, P.O. Box 46, Westbury-on-Trym, Bristol BS9 1TF**, to arrive no later than **30 September 1988**.

The RAF Photographic Competition ENTRY COUPON








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Postcode _____

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 	<p>ROYAL AIR FORCE YEARBOOK 1988 - The RAF 70th Anniversary Edition - Price £1.50. On sale at newsagents throughout the UK from 23 June. Available at Royal Air Force stations on 'At Home' days and at national and international air events during 1988 from the RAF Benevolent Fund's Skyhigh Shop. Also in the USA, Canada, Australia.</p>		<p>10th BRISTOL INTERNATIONAL BALLOON FIESTA Souvenir Programme - Price £2. 12 to 14 August. Available at newsagents in South Wales/Midlands/South of England or on sale at the event.</p>
	<p>TVS AIR SHOW SOUTH 88 Souvenir Programme - Price £2. Bournemouth International Airport, 4 and 5 June. On sale at TVS 88 only.</p>		<p>FARNBOROUGH INTERNATIONAL 88 Official Programme - Price £3. 4 to 11 September. Available at newsagents from 1 September throughout the country or on sale at the event.</p>
	<p>IAS INTERNATIONAL AIR SHOW 88 Souvenir Programme - Price £2. Middle Wallop, Nr Andover, Hants, 16 and 17 July. On sale at IAS 88 only.</p>		<p>MASSED BANDS OF THE ROYAL AIR FORCE at the Royal Albert Hall. 14 October. Souvenir Programme on sale on the evening of the performance only.</p>

In addition to organising a growing series of air displays and other events, the Royal Air Force Benevolent Fund's International Air Tattoo (IAT) has been expanding its publications. Responsible for the impressive range of titles shown above, IAT expects to produce 350,000 magazines/programmes in 1988 with an estimated readership of over two million.



All publications are sold in aid of the RAF Benevolent Fund. In 1988, it is estimated that the Fund will need more than £9 million to support over 15,000 beneficiaries.

For further information please contact: Claire Lock, IAT Publishing Unit, Building 1108, RAF Fairford, Glos GL7 4DL. Telephone: 0285 713300.

* DIARY NOTE:

**INTERNATIONAL AIR TATTOO 89
RAF FAIRFORD, GLOS. 22-23 JULY 1989.**

*There are many air shows.
There is only one International Air Tattoo.*

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AIR TATTOO**

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FAREWELL LIGHTNING WELCOME

TORNADO

To mark the retirement of the RAF's last single seat fighter, *Paul Jackson* appraises the Lightning and its replacement, the Tornado ADV

CAMEL, SE5, Grebe, Siskin, Fury, Gladiator, Hurricane, Spitfire, Meteor, Hunter, Lightning. Through seven decades, the roll-call of the RAF's single-seat fighters reads like a hall of fame — until 1988. Though the United Kingdom Air Defence Region (UKADR) has never been better protected, something is missing from Britain's skies today. For the first time since its formation in 1918, the RAF is without a one-man interceptor. When the last squadron of Lightnings stood-down from its NATO commitments on 30 April, the event not only marked the passing of that aeroplane, but also the consignment to history of a genus of fighting machine.

UKADR integrity is now entrusted to the American-built McDonnell Douglas Phantom and the new European-designed Panavia Tornado. Both have a second seat behind the pilot for what is traditionally known as a navigator, but is more correctly described by the American term, 'weapon system operator'. However, the major powers continue to build single-seat, as well as two-place interceptors — so has the RAF got it right? To answer that question, we must first look at the responsibilities of Britain's fighter force.

Stretching from beyond the South Coast almost to Iceland, the UKADR covers some 4 million square miles of land and sea,

The Lightning and its successor — the Tornado F3. Flt Lt Tony Paxton

which a hostile aircraft might penetrate at any height between a few hundred feet and 60,000ft (11 miles). In World War 2, Goering's bombers made frontal attacks at medium altitude, but that is not the way of the only logical modern adversary, the Warsaw Pact. Using a combination of low level and (if necessary) electronic jamming in an attempt to avoid radar detection, aircraft tasked against UK targets would use a variety of approach routes, some flying from Arctic bases to attack from the West. Having had air-launched nuclear cruise missiles for 20 years before 'Cruise' was deployed at Greenham Common, there is no need for the Soviet bomber to fly over land before releasing its deadly cargo and turning for home.

Straight up, straight down

In 1949, when the specification for the Lightning was being drawn-up, the RAF was looking for virtually a 'straight up, straight down' interceptor which could reach its operational height at great speed, shoot down the enemy and return to base. English Electric provided such an aircraft, and when it entered service in 1960 the Lightning represented such a leap forward that the earlier transition from biplane to Spitfire was put in the shade. Whereas the Hunter's maximum level speed was Mach 0.95, the Lightning could achieve Mach 1.7, and on top of that, the radar and heat-seeking Firestreak missiles carried by the two-seat Javelin all-weather fighter, were now all under the control of a single pilot.

Even before the Lightning achieved its apogee, with eight squadrons operational in 1972, the rules of the game had changed. Though agile single-seaters might still be needed to dogfight over a battlefield in Central Europe, the UKADR clearly demanded a different type of machine. The Lightning, like almost all its predecessors, was short on range, and the increasing sophistication of radar and other aircraft equipment was seen to be placing a heavy burden on the one man in the 'office'.

Phantoms — initially bought as stop-gap surface attack aircraft in the late-1960s — began replacing the Lightning during the mid-1970s. By 1977, only Nos 5 and 11 Squadrons at Binbrook, Lincolnshire, were



Pre-show line-up of Lightnings (No 5 Squadron) at Binbrook in July 1974. Peter R. March



Formation of No 56 Squadron Lightning F3s over Cyprus in 1969. Peter R. March

still operating the Lightning, being partnered by Phantoms at Leuchars, Fife (Nos 43 and 111 Squadrons); Coningsby, Lincs (No 29 Squadron and No 228 OCU); Wattisham, Suffolk (Nos 23 and 56 Squadrons); and Wildenrath, West Germany (Nos 19 and 92 Squadrons). The only change prior to the advent of the Tornado was the re-location of No 23 Squadron to the Falkland Islands and the creation of No 74 Squadron as a replacement at Wattisham.

From 260 Lightnings built for RAF service, only 63 remained at Binbrook early in 1987, comprising 37 F Mk 6s, 16

F Mk 3s and 10 two-seat T Mk 5 trainers. Only about half the force was operational at any one time with the two squadrons and the Lightning Training Flight, the remainder being in storage or on overhaul. The run-down thereafter was rapid, beginning with the disbandment of the LTF in April; withdrawal of the last F Mk 3s on 29 September; and standing-down of No 5 Squadron on 31 October 1987. That left just No 11 Squadron to keep the Lightning flying until it followed No 5 in converting to Tornados from May of this year.

A No 11 Squadron Lightning F6 with overwing tanks for Tornado radar trials with BAe. John Dunnell





The arrow-like shape of the Tornado is in marked contrast to the bulk of the Lightning. Ft Lt Tony Paxton

Thoroughbreds compared

How, then, should we remember the Lightning and, more importantly, how should its replacement be rated? The Tornado serves the RAF in two guises: strike/attack aircraft and interceptor. Developed by Britain, West Germany and Italy and sold additionally to Jordan, Oman and Saudi Arabia, the Tornado was originally designed for bombing and close support. To meet an RAF requirement for a new interceptor, the airframe was stripped of its attack-related avionics, the fuselage stretched by about 4½ feet and provision made for new radar in the nose and air-to-air missiles (AAMs) under the fuselage and wings. Painted light grey overall — instead of dark grey and green, as on the attack model — the Tornado interceptor first flew on 27 October 1979 and entered service in 1985. RAF orders cover 162 production aircraft, comprising 18 interim-standard F Mk 2s and 144 definitive F Mk 3s.

In terms of aircraft performance, there is no great chasm between the Lightning and Tornado. The former's climb and acceleration rates remained the envy of many a new interceptor up to the last, and at high altitude there was little to choose between maximum speeds. Manoeuvrability of both is good, although the Tornado's computerised flight control system allows the pilot to fly the aircraft up to its limits without any danger of exceeding them. One notable feature of the Tornado is its variable geometry (or 'swing wings') which can be swept for high speed performance, then outspread for a docile landing in one-third the length of an average runway — aided by a thrust-reversing system more normally seen on civilian airliners. At low level, where the main threat is now to be found, the Tornado has demonstrated a speed of 800kts (920mph). That is significant in being



No 29 Squadron Tornado F3s. Paul Jackson

some 100kts faster than the limiting speed at that height of most potential adversaries.

The Tornado also scores on range. 'Short-legged' Lightnings required the services of a tanker aircraft every 45 minutes on a prolonged mission, but the Tornado has shown that it can fly 375 miles from base; loiter there for 2 hours 40 minutes; and then return home with ample fuel reserves. The larger underwing fuel tanks with which the Tornado F Mk 3 is fitted will enable this to be further improved.

Having got itself to the vicinity of the enemy, the fighter must then identify and destroy its adversary. Advanced electronics play a significant role in this part of the mission, the best-known component of the system being radar. With its narrow, 40° forward-looking cone, the Lightning's AI

Mk 3D radar relied upon close collaboration with ground control, and because of its old design, it was unable to distinguish a target when looking down upon it as a result of confusing reflections from the earth's surface. AI3D was effective out to 20-25 miles at medium heights, and considerably less lower down.

AI24 Foxhunter radar in the Tornado has suffered development problems, although it is now generally agreed that it is well on the way to achieving its design specification. This is believed to include the ability to see out to 115 miles at height, distinguish targets from unwanted surface 'clutter', and keep track of between 12 and 20 enemy aircraft whilst still looking for more. A large, computer enhanced daylight-readable TV display in the rear cockpit informs the navigator of what the radar can 'see' and also adds information

gleaned from aerials carried on the aircraft which listen for radar transmissions from hostiles and so deduce their position. By contrast, the Lightning pilot's knowledge of the outside world was mainly obtained by looking down a rubber (light excluding) funnel at a 3-inch square, flickering radar picture, complete with unwanted echoes and interference.

Data Link

Information from the fighter controller continues to be relayed by word of mouth, but even that tradition will end soon. On the second of the two rear cockpit TV screens, JTIDS (Joint Technical Information Distribution System) will display, in small geographical sections at a time, the known positions of all friendly enemy aircraft and ships anywhere in the NATO area — updated second by second and transmitted to the aircraft with equal

speed. Back down this data link, the Tornado will send the findings of its own sensors for incorporation in the master picture, even signalling to the ground its fuel state and how many missiles and cannon shells it has remaining. Soon, Tornados will be able to join battle without a word being spoken.

Despite Firestreak being replaced by Red Top, the Lightning continued to suffer from too few air-to-air missiles (only two were carried), with too little range. Red Top possessed an effective range of 1½-2 miles above 15,000ft, or less below that height, and had to be fired in a tailchase unless the target was flying supersonically. (Being heat-seeking, it homed on the hot jet exhaust or the heat created above the wings by the aerodynamic effects of supersonic flight.) Tornado also carries heat-seeking AAMs, though in the form of four AIM-9L Sidewinders beneath the wing.

Sidewinder will reach out to 11 miles and is fitted with a more sensitive head for attacks from a greater variety of angles.

Another four missiles — this time Sky Flashes — nestle under the Tornado's belly. Sky Flash homes onto radar waves bounced off the target by the Tornado's own AI24 Foxhunter equipment, and is effective at night and in all weathers at ranges up to 31 miles. As AI24 can distinguish targets from ground echoes (that is to say it is a pulse-Doppler radar) Sky Flash can hit a low-flying aircraft when the Tornado is at medium altitude. Of course, the target will try to jam the signals, so Sky Flash has a built-in resistance to such electricricker. In some situations, close contact is necessary, so a single 27mm Mauser cannon is mounted in the Tornado's fuselage. Deletions of guns in later marks of Lightning was belatedly realised to have been a mistake, resulting in retrospective fitment to F Mk 6s of a pair of 30mm ADENs in the front of their prominent under-fuselage fuel tanks.

One of the perversities of progress is that 'cleverer' sensor systems do not make a fighter aircraft easier to operate. Greater capability means more information to be assessed, and whereas a Lightning was operated by a single human brain Mk 1, The Tornado pilot has the added services of a second brain in the back seat, plus a 128K computer and several smaller computers. Division of labour is thus: the pilot is responsible for flying the aircraft and operating the short-range armament (cannon and Sidewinders); the navigator assumes the tasks of mission planning, navigation, target acquisition, target priority assessment (which to go for first) and operation of the medium-range armament (Sky Flash missiles). In a close fight, the navigator is also a useful second set of eyes.



Unique formation photograph of No 5 Squadron Lightnings and Tornado F3s. Flt Lt Tony Paxton



Air defenders

Both Tornado and Lightning were assigned the same purpose: preserving the integrity of the UK Air Defence Region. That role is carried out unceasingly, 24 hours a day, 365 days a year, in fair weather or foul — and when deployment of the Tornado force is completed late in 1990, the major part of the responsibility will be carried on its broad shoulders. By that time, eight Tornado squadrons will be operational, including the training unit, No 229 OCU at Coningsby, which has an emergency role in the guise of No 65 Squadron. At Leuchars, north of Edinburgh, Nos 43 and 111 Squadrons will handle the majority of peacetime 'trade', as unannounced Soviet reconnaissance aircraft regularly transit the northern areas of the UKADR. Leeming, in North Yorkshire, will have three squadrons, comprising No 11 and two newly-formed units; and Coningsby, Lincolnshire, will also house Nos 5 and 29 Squadrons. Only Wattisham, Suffolk, will retain Phantoms (Nos 56 and 74 Squadrons), although F-4s will also serve overseas at Wildenrath, Germany (Nos 19 and 92) and Mount Pleasant, Falkland Islands (No 23).

Leeming, Coningsby and Wattisham take turns to provide the southern counterpart of Leuchars' QRA (Quick Reaction Alert) force. At each base on duty, two armed and fuelled aircraft stand ready for action, their crews no more than a few yards away and almost fully dressed in flying kit. Within moments, the interceptors can be winging their way towards an intruder — not in anger, but as part of the 'escort service' given to all Soviet military aircraft passing through British airspace.

There are some 200 such incursions each year, so the pilots of those Warsaw Pact reconnaissance aircraft will have plenty of opportunity to become familiar with the Tornado in future. They will find that it is able to stay on station longer without recourse to aerial refuelling; they will be able to monitor the long-distance acquisition performance of its radar; and they cannot fail to notice the missile



Final press call for No 11 Squadron — Lightning T5 and F6, April 1988. Paul Jackson



Tornado F3 ZE168 of 229 OCU/No 65 Squadron. John Dunnell

armament bristling beneath the wings and fuselage. Airmen being airmen, the word will rapidly pass along the Soviet Air Force grapevine that escape from the Tornado is virtually impossible — and for that reason alone, deterrence will be enhanced.

Even if tempted to bring along the new long-range fighters — Sukhoi Su-27 and Mikoyan MiG-29 — in time of conflict, the Soviet bomber will be far from safe. The highly realistic air combat simulator opened at Coningsby last December, plus regular 'real' practice with allied aircraft, ensures that Tornado crews are able to

employ their aircraft's manoeuvrability to the full when confronted by another fighter. Admittedly, the Tornado is unable to match the legendary agility of the single-seat American F-16 Fighting Falcon — but the F-16 cannot fly almost to Iceland, loiter for two hours and then shoot-down a bomber from 30 miles away whilst flying low-level at 800 kts at night in a snowstorm. Recent departure of the last single-seat fighter may be a break with tradition, but none can deny that the RAF *has got it right* and Britain's defences *are greatly strengthened* as a result.

Tornado F3s and Lightnings share the ramp for the last time — the scene at Binbrook in 1988. John Dunnell



LIGHTNING SQUADRONS PRODUCTION

No 5 Squadron Formed Binbrook 8 October 1964; Lightning F Mk 6; stood-down for Tornado conversion 31 October 1987.

No 11 Squadron Formed Leuchars 1 April 1967; Lightning F Mk 6; Binbrook 22 March 1972; stood down for Tornado conversion 30 April 1988.

No 19 Squadron Converted from Hunter F Mk 6 at Leconfield beginning 17 December 1962; Lightning F Mk 2; Gütersloh 23 September 1965; Lightning F Mk 2A; Lightning component disbanded 31 December 1976 (converted to Phantoms)

No 23 Squadron Converted at Leuchars from Javelin FAWMk 9s to Lightning F Mk 3s on 18 August 1964; later Lightning F Mk 6; Disbanded 31 October 1975.

No 29 Squadron Formed at Wattisham on 19 May 1967 with Lightning F Mk 3s; stood down on 19 July 1974 to begin Phantom FGR Mk 2 conversion.

No 56 Squadron Began conversion from Hunter F Mk 6s to Lightning F Mk 1As at Wattisham 14 December 1960; to Lightning F Mk 3; Akrotiri, Cyprus from 11 April 1967; Lightning F Mk 6; Wattisham January 1975. Began Phantom FGR Mk 2 conversion 22 March 1976.

No 74 Squadron Began conversion from Hunter F Mk 6 to Lightning F Mk 1 at Coltishall 29 June 1960; Leuchars 28 February 1964; to Lightning F Mk 3; to Lightning F Mk 6; Tengah, Singapore 11 June 1967; disbanded 31 August 1971.

No 92 Squadron Began conversion from Hunter F Mk 6s to Lightning F Mk 2s at Leconfield 26 March 1963; Geilenkirchen, Germany 29 December 1965, Gütersloh, Germany, 22 January 1968; to Lightning F Mk 2A; Lightning component disbanded 31 March 1977 (converted to Phantoms).

No 111 Squadron Began conversion from Hunter F Mk 6s to Lightning F Mk 1As at Wattisham on 30 March 1961; to Lightning Mk 3; began conversion to Phantom FGR Mk 2s on 1 July 1974.

No 226 Operational Conversion Unit formed at Middleton St George on 1 June 1963 (various marks, including T Mk 4 and T Mk 5); Coltishall 13 April 1964; disbanded 17 June 1974.

Lightning Training Flight Formed at Binbrook on 1 October 1975 mainly with Lightning F Mk 3 and T Mk 5; disbanded 16 April 1987.

English Electric P1A: two aircraft, serial numbers WG760 (first flight 4 August 1954) and WG763.



The forerunner of the Lightning — English Electric P1 WG760. Peter R. March

English Electric P1B: 23 aircraft, XA847, XA853 and XA856 were prototypes; XG307-313 and 325-337 pre-production.

Lightning F Mk 1: 19 aircraft, XM134-147, XM163-167.

Lightning F Mk 1A: 28 aircraft XM169-192, XM213-216.

Lightning F Mk 2: 42 aircraft, XN723-724, XN726-733, 735, 767-797.

Lightning F Mk 2A; converted from F Mk 2A-31 aircraft.

Lightning F Mk 3: 72 aircraft, XN725, XN734, XP693-708, 735-765.

Lightning T Mk 4: 21 aircraft, XL628-629, XM966, 968-974, 987-997.

Lightning T Mk 5: 23 aircraft, XM967, XS416-423, 449-460, XV328-329.

Lightning F Mk 6: 55 new aircraft, XR752-773, XS893-904, 918-938; plus XP693, XP697, XR723-728 and 747 converted from Mk 3.

Lightning F Mk 52: converted from F Mk 2 — five aircraft for Saudi Arabia.

Lightning F Mk 53: 34 aircraft for Saudi Arabia.

Lightning F Mk 53K: 12 aircraft for Kuwait.

Lightning T Mk 54: converted from T Mk 4 — two aircraft for Saudi Arabia.

Lightning T Mk 55: six aircraft for Saudi Arabia.

Lightning T Mk 55K: two aircraft for Kuwait.

(Total 339 new aircraft built)

TORNADO F Mk 2/3 SQUADRONS

No 5 Squadron: Re-formed (from Lightnings) at Coningsby, 1 May 1988; Tornado F Mk 3.

No 11 Squadron: To re-form (from Lightnings) at Leeming, 1 November 1988 with Tornado F Mk 3s.

No 29 Squadron: Re-formed (from Phantoms) at Coningsby, 1 November 1987; Tornado F Mk 3.

No 43 Squadron: To re-form (from Phantoms) at Leuchars, November 1989 with Tornado F Mk 3s.

No 65 Squadron: 'Shadow' identity for No 229 OCU (see below) assigned on 1 January 1987.

No 111 Squadron: To re-form (from Phantoms) at Leuchars, May 1990 with Tornado F Mk 3s.

No Squadron: To form at Leeming in May 1989 with Tornado F Mk 3s.

No Squadron: To form at Leeming in November 1990 with Tornado F Mk 3s.

No 229 Operational Conversion Unit formed at Coningsby 1 May 1985; Tornado F Mk 2; to Tornado Mk 3 from July 1986.

Tornado Operational Evaluation Unit formed at Coningsby, 1 April 1987; Tornado F Mk 3.

PRODUCTION

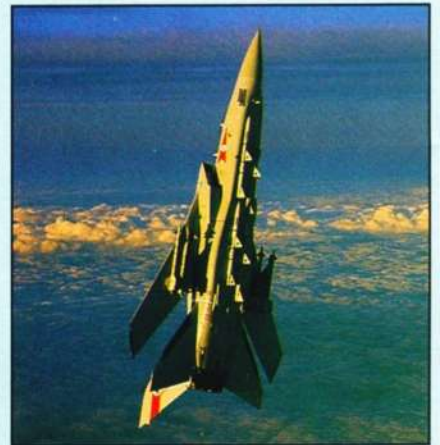
Tornado ADV: Prototypes ZA254, ZA267, ZA283

Tornado F Mk 2: 18 aircraft, ZD899-906, ZD932-941

Tornado F Mk 3: 144 aircraft, ZE154-168, ZE199-210, 250-258, 287-296, 338-343, ZE728-737, 755-764, 785-794, 808-812, ZE830-839, 858-862, 882-891, 905-914, ZE934-943, 960-969, 982-983. (Approx 80 delivered by mid-1988.)

Tornado: 24 aircraft for Saudi Arabia (not yet delivered.)

(Total 189 aircraft on order)



Tornado F3 Fit Lt Tony Paxton



Tornado F3 ZE167 John Dunnell



Lightning F6 of No 74 Squadron. Peter R. March



Lightning F6 of No 56 Squadron. Peter R. March



Lightning F3 of No 111 Squadron. Peter R. March



**All-weather strike ...
under the curtain**

Tornado

- low radar signature, ground-hugging low-level capability;
- total all-weather, day and night, Mach 2 combat capability;
- maximum weapon options and exceptional ECCM capability;
- two-crew, twin-engine survivability, plus ability to operate from and recover to 3,000 ft runways;
- in quantity service with front-line units of the Royal Air Force, German Air Force and Navy, and Italian Air Force;
- backed by the combined industrial strength of the most powerful aerospace groups in Britain, West Germany and Italy;
- chosen for the Royal Saudi Air Force.



Tornado Air Defence Variant in service with the RAF and chosen for The Royal Saudi Air Force and the Sultan of Oman's Air Force



PANAVIA

Panavia Aircraft GmbH, München, Arabellastrasse 16, Germany

**AERITALIA
BRITISH AEROSPACE
MESSERSCHMITT-BOLKOW-BLOHM**

ONE of the world's most enduring aircraft, the Lockheed C-130 Hercules is about to enter its 21st year of service with the Royal Air Force. During that time it has acquired an impressive safety record — of the 66 examples delivered, only four have been written off so far, the last of these back in September 1973. It seems destined to see out the next 21 years with ease, as no replacement is currently being sought.

With the solitary exception of the W2 XV208, which is based at Farnborough with the Royal Aircraft Establishment, Lyneham is the UK home of the Hercules. Three aircraft are detached to the Falkland Islands to form No 1312 Flight at Mount Pleasant, while the remaining 58 come under the auspices of the Lyneham

Transport Wing, which acts as the 'parent' unit and from which aircraft are allocated to four squadrons and No 242 Operational Conversion Unit as required. No individual unit markings are currently applied to the fleet, examples of which are drawn for use according to their suitability for the task in hand.



The strange looking RAE Hercules W2. John Dunnell

Royal Air Force Lyneham has been a Hercules base since 1967 and looks set to continue as such well into the next century. All but the most major servicing is performed at the base, and the Hercules are divided between two line servicing squadrons, 'A' and 'B'. Marshall of Cambridge performs other servicing as required, and has also been responsible for the major modifications performed on many of the fleet.

Since 1967, the RAF's C-130K Hercules have undergone marked changes. All were delivered as C1s to Air Support Command, but several modifications have been performed, the most noticeable being the C3 conversion carried out by Marshalls on a total of 29 aircraft (XV223 being the pattern conversion performed by Lockheed at its Marietta factory in the United States). This involved 'stretching' the fuselage by the addition of plugs measuring 8ft 4in and 6ft 8in respectively fore and aft of the wing and has resulted in a Hercules equal in size to that of the L-100-30 commercial variant. Comparatively the C3 has 37 per cent more capacity; it holds 128 troops as opposed to the C1's 92, and 7 cargo pallets compared with 5. The increase in the carrying capacity is the equivalent of adding an extra nine C1s to the fleet. The conversion programme took place over a period of six years, beginning in 1979 and ending on 25 November 1985 with the re-delivery of XV299.

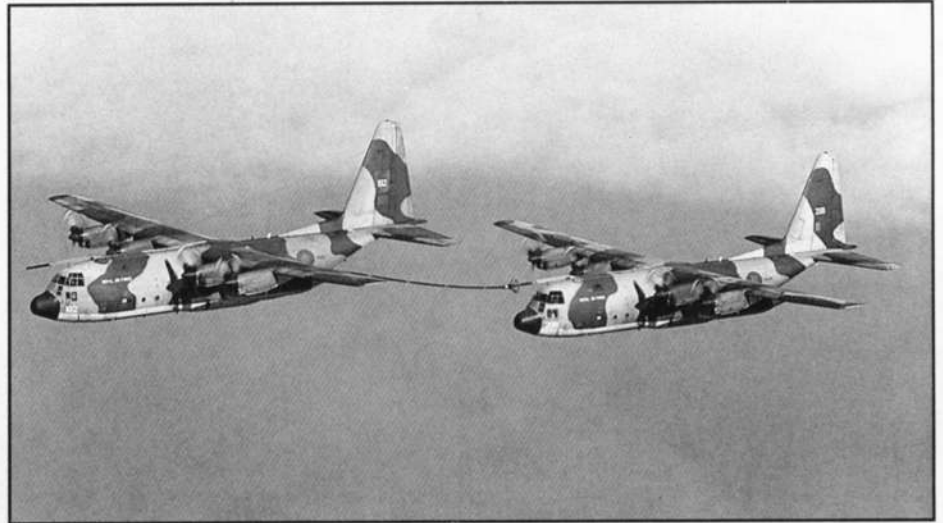
Sue J. Bushell

HERCULES MISSION

As well as increasing the cargo capacity of the Hercules, air-to-air refuelling capability has been introduced to some of the fleet by the addition of refuelling probes above the cockpit, with the result that 16 C1P and 5 C3P aircraft are currently on strength. This modification was a direct outcome of Britain's involvement in the Falkland Islands War of 1982. The Hercules was found incapable of operating over the 3,400 mile flight from Ascension Island to the Falklands, and Marshalls were asked to produce a modification to overcome this problem. The first aircraft was completed within a fortnight and was in service within a month.

Another major modification which resulted from lessons learned during the Falklands conflict was the C1K aerial tanker variant, of which there are now six in service. These were unfortunately too late to participate actively during the conflict, coming into full operational service in August 1982. Fuel tanks have been fitted into the fuselage with the FR Mk 17 drogue unit mounted onto the cargo ramp at the rear of the aircraft.

All four of the current Hercules squadrons — Nos 24, 30, 47 and 70 — plus No 242 OCU and No 1312 Flight come under the control of No 1 Group, which has its headquarters at RAF Upavon, Wilts. All four operational squadrons have a long history of transport duties, operating Hastings (No 24), Beverleys (Nos 30, 47) and Argosies (No 70) before they standardised



C1K Hercules tanker refuelling a C1P.

on the Hercules, while the OCU operated all three types concurrently. All the squadrons were formed during the First World War and have flown a variety of types in different roles — for example No 47 Squadron has operated the Wellesley, Beaufort, Beaufighter, Mosquito, Halifax and Hastings since the outbreak of the Second World War.

No 47 Squadron is, along with No 70 Squadron, specifically tasked with Transport Support duties, and during the past 20 years has been engaged in such diverse activities as troop transportation, paratroop

dropping, re-supply duties, famine relief — in many areas of the world, including Ethiopia and Bangladesh, disaster aid throughout the world, and acting as support for the RAF's *Red Arrows* and *Falcons* teams. In addition, it has accompanied members of the Royal Family on tours around the world and competed with much success in competitions within NATO. A slightly more unusual assignment was to drop 'troops' for the opening sequences of the latest James Bond film, *'The Living Daylights'*.

The Hercules fleet is required to do all



Hercules C1P taking off on a damp day, producing an unusual effect from the propeller blades. John Dunnell



Low level tactical formation. Sue Bushell

the heavy lifting for the Army and Marines as well as the Air Force, and the 'jobs' are allocated in the LTW by headquarters. Training flights have to be slotted in around this schedule, with the result that many of the tasks have a dual purpose in providing a useful service to other branches of the UK armed forces and keeping crew members fully conversant with the skills and techniques required in such a demanding occupation. The flight which I was to accompany, although ostensibly a training exercise, was carefully designed to encompass low flying, such as would be needed for a flight during wartime conditions, supplying the ground forces in four positions along a battlefield.

Hercules training flights are anything but boring. No. 47 Squadron's trips regularly include tours of the West Indies and the United States, while its trip to accompany the Princess Royal in January and February of this year encompassed much of the Far East and Indian subcontinent.

I was fortunate enough to be able to accompany the squadron on a typical training flight of three aircraft, to see at first hand the type of work performed by the Hercules fleet. The exercise was planned to include station-keeping, an instrument approach, and two separate dummy re-supply drops — one performed singly and one in which all three aircraft participated. Half of the two-and-a-half-hour flight was to be performed at low level as would be needed for a flight during wartime operations, supplying the ground forces along a battlefield.

Station Keeping Equipment (SKE) has been fitted to selected examples of the Hercules fleet, and is designed to enable the leader to pass instructions to other members of his flight without the use of

radio. The unit consists of a small radar screen centred on the aircraft into which it is fitted, and a series of buttons and lights marked with arrows, etc. to enable instructions to be passed to other aircraft in the formation. Pressing a button results in that button being illuminated in the other aircraft, telling the pilot to climb, descend, and turn as required. With the radar screen, the pilots can all see what is happening in front and behind them, enabling them to close up or drop back to their station as required.

Flight planning is performed two hours before take-off, followed by a briefing one hour later, which is attended by the pilot, co-pilot and navigator of each aircraft. Emergency procedures are discussed, along with the requirements of the task about to be performed.

A problem in flight planning is that of noise. A Hercules, with its four Allison turboprops, can make a considerable impact on the peaceful countryside. Formations of aircraft at 2,000 feet apart (a normal station-keeping distance) in streams of upwards of half-a-dozen aircraft, can annoy quiet neighbourhoods intensely. There is a delicate balance between operational and environmental needs to be maintained!

The Hercules fleet is fitted with a variety of equipment to enable it to perform its tasks, and not all aircraft are fitted with SKE. A relatively recent addition is a cupola on the crew escape hatch on the roof of the cabin, while selected aircraft carry under-wingtip pods. This seemingly hotch-potch variety of equipment enables exactly the right aircraft to be chosen for each exacting task.

Whilst three of the flight crew were in flight planning, the flight engineer and air

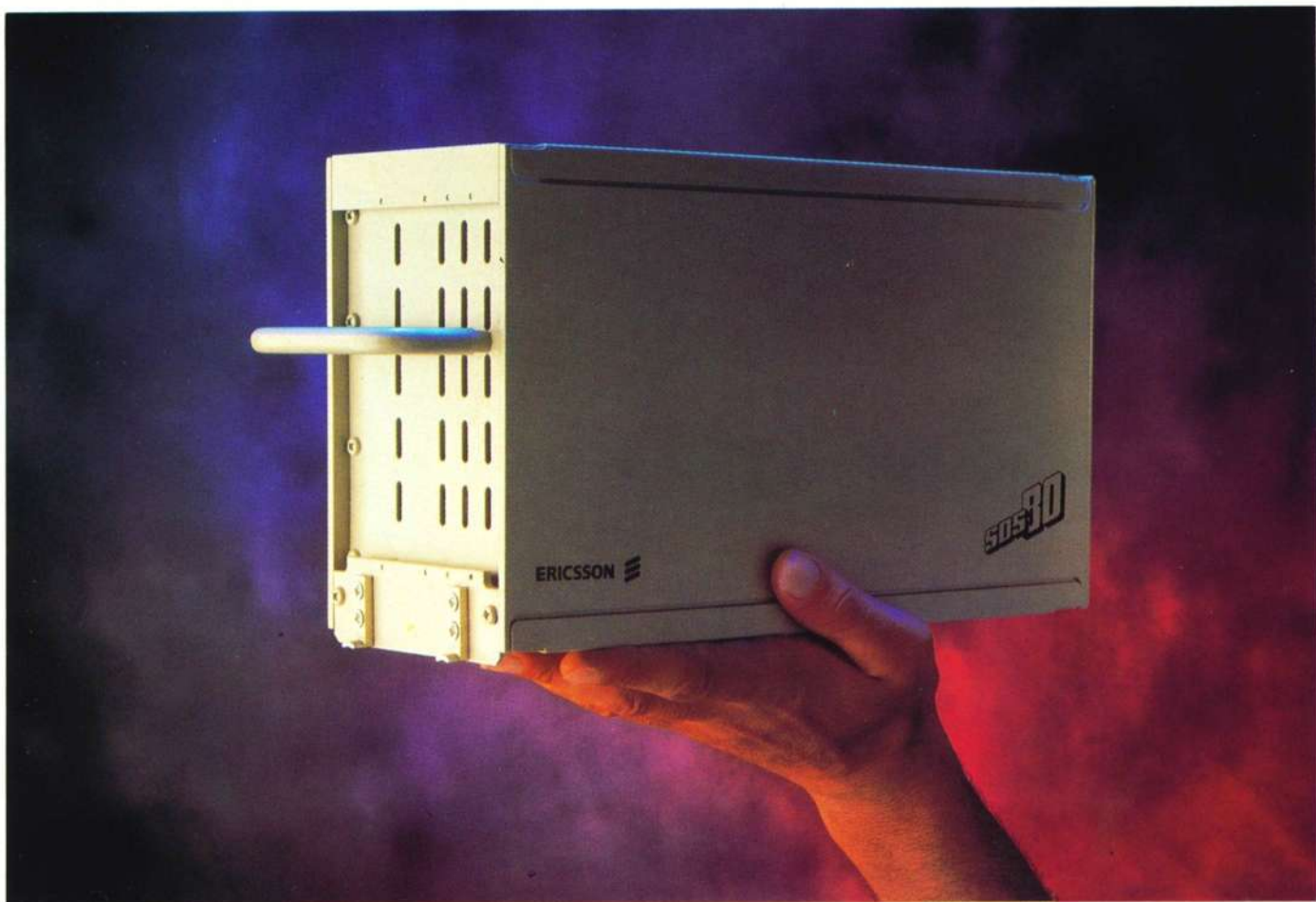
loadmaster prepare the aircraft for the sortie. The normal crew complement of the Hercules is five, although extra crew members are taken on long-distance flights, and on this occasion, two air despatchers were also taken for the re-supply drop we were to perform on Salisbury Plain. We were allocated Hercules C3 XV197, which was the first Marshall conversion to this standard and had flown a total of 14,000 hours. All three aircraft in the flight had been flown during the morning on an exercise by a different squadron. For this mission the flight name 'Mallard Formation' was allocated alongside the usual 'ASCOT' callsign. A remnant from the earliest days of Hercules operations, 'ASCOT' stands for Air Support Command Operational Transport. Call signs beginning with the number 4 are C1 aircraft, whilst those commencing with a 5 are allocated to C3s.

Once we had taken off from Lyneham, radio silence was maintained for the first half of the flight — although the leader was necessarily in touch with civilian radio units to advise them of the formation's presence — which was at various altitudes and followed an indirect course to RAF Shawbury, routing over Bristol, Cardiff and Swansea, before turning northwards to traverse Wales. Following an instrument landing approach at Shawbury, we dropped to low level to perform the first of the two simulated re-supply drops, parting company with the two other Hercules C3s as they peeled off to their own dropping zones. Accuracy at such a time is a stringent requirement, as we had to reach our dropping zone exactly on time so as not to miss our rendezvous with the other two aircraft following the drop. The navigator's role is particularly demanding at this time, as he is required to direct the pilot with 100 per cent accuracy towards the intended target. When flying at 200kts and less than 500ft, landmarks loom up rapidly, as do rather solid hills, which the aircraft must be guided around. At the same time, the 'nav' has to monitor the time to the target and make corrections. Targets chosen are not always glaringly obvious as, under battlefield conditions they would not be easy to locate. So for training missions, representative targets can be bridges, buildings, road junctions and the like.

Once reunited with XV304 and XV305 who had performed similar drops at two other sites, we continued at low level to the Bristol Channel, before turning to cross Somerset on our low approach to the second dropping zone, which was located on Salisbury Plain. Again we were on time to the second, but unfortunately were unable to solicit any reply by radio from the ground crew who were to receive the small pack. There was no provision for a second run in, so we climbed away to a sensible height for our approach to Lyneham.

The Lockheed Hercules, which has been in production since the mid-fifties, is set to continue for the next twenty years or more with the Royal Air Force. Still in production, a successor may never be found. Indeed, the old adage that 'the only replacement for a Dakota is another Dakota' may well prove equally true when applied to the Hercules.

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DUAL-ROLE

The marriage of Strategic Air Transport and Air-to-Air Refuelling

Wing Commander A E P Webb AFC RAF

It could be argued that Air Transport (AT) is the oldest role in aviation, since the first flight carried a pilot as its passenger and was intended to prove that transport could be achieved using the air as a medium. It is not uncommon to believe that Air-to-Air Refuelling (AAR) was a much later addition to the range of activities undertaken by aircraft; in fact the first realistic trials took place over 60 years ago, in 1923. Since then AAR has fluctuated in popularity having been limited both by the necessity to make significant technical advance, and by the reluctance of many aviators to grasp the possibilities that it offered.

Between the wars much scepticism was voiced about the usefulness of AAR, and the Royal Aircraft Establishment pronounced that it was a high-risk business requiring very skilled and experienced fliers. Despite these gloomy analyses, and a fair number of early failures, several enterprising people pressed ahead with the idea; in the van of this group was Sir Alan Cobham, the founder of Flight Refuelling Ltd. Against great odds he persuaded the Air Ministry

to fund development work, and plans for the commercial use of AAR were developed throughout the thirties.

On 5 August 1939 Imperial Airways introduced an experimental service using a Handley Page Harrow tanker refuelling a Short S30 'C' Class flying boat across the North Atlantic. With the outbreak of war this aerial refuelled service lasted only seven weeks. Thus were the earliest links established between 'AT' and 'AAR'.

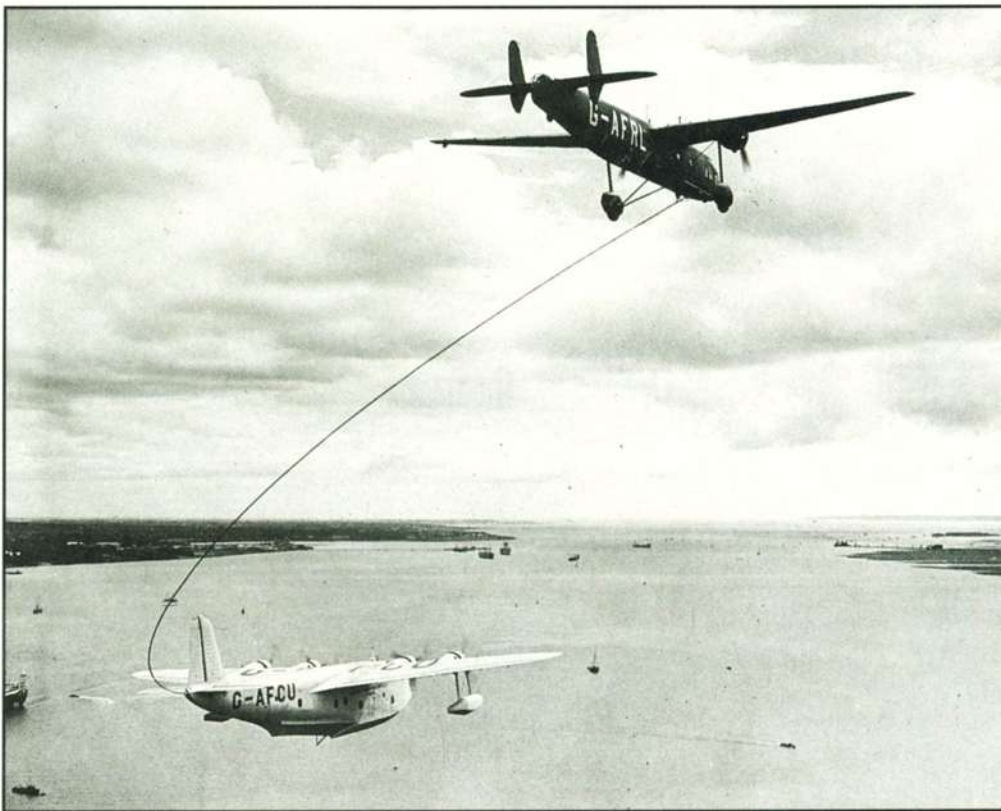
In parallel with these developments military planners were examining how AAR could prove useful in aerial warfare. As the shadow of war grew darker towards the end of the decade some bombers were converted to receive fuel in flight. In the event AAR was not used in WW2, although plans to send a vast force of Lancasters to support the war in the Far East were only abandoned when the war drew to its welcome close.

Some of the work which was done to provide this force of Lancasters was used after the war by British South American Airways as they forged ahead with plans to extend the range of commercial aircraft. Services were introduced to Bermuda,



Sir Alan Cobham — the father of AAR.
Flight Refuelling Ltd

Short 'C' Class flying boat being refuelled
by a Handley Page Harrow in August 1939.
Flight Refuelling Ltd



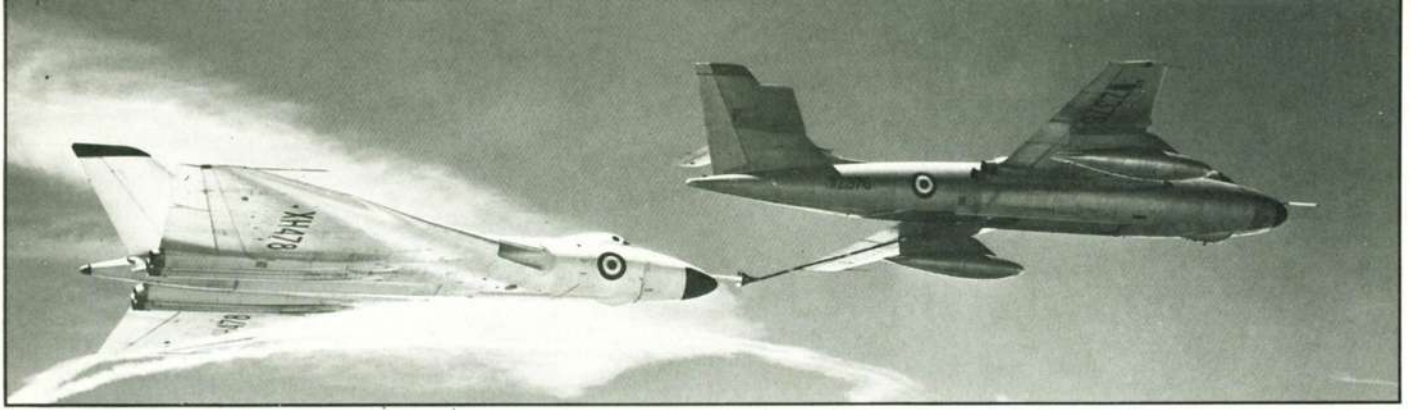


A VC10 K3 of No 101 Squadron refuelling a VC10 C1 of No 10 Squadron en route to the Falkland Islands. Cpl Wayne Palmer

BSAA Lancaster tanker and receiver en route to Bermuda. Flight Refuelling Ltd

and eventually all the way across the North Atlantic but they did not catch on; perhaps they lacked passenger appeal. Nevertheless another association was established between AT and AAR.

By the early 50s the RAF was again turning its attention to AAR, this time as a range enhancement for the V force. Valiant to Valiant refuelling trials were eventually conducted in 1957, and these led directly to the establishment of the first tanker squadron, No 214. Shortly afterwards a Vulcan demonstrated the potential of AAR by completing a non-stop 11,500 mile flight to Australia in 20 hrs and 4 mins. Although improved on by another Vulcan of No 101 Sqn in 1963, the then record was not broken until 1987 when a VC10 tanker (again of No 101 Sqn) flew the same trip in 16 hrs 1½ mins. However, it was in 1982 that the ability of AAR to project air power over vast distances was remarkably demonstrated when a Vulcan supported by 11 Victor



Valiant refuelling a Vulcan. Flight Refuelling Ltd



Tristar K1 tanker of No 216 Squadron. Rolls Royce

tankers completed a bombing run from Ascension to Port Stanley — the equivalent of a raid on China from Lincolnshire.

It was chiefly the experience of the Falklands which enabled the Air Staffs to look afresh at AAR and to use the success and effectiveness of its employment in the South Atlantic as a springboard for improving the RAF's overall capability. It had been clear for some time that the planned improvements in Air Defence of the UK (UKAD) lacked one essential component — adequate AAR support. Could it be that the legacy of the South Atlantic would prove to be a much larger tanker force?

At this point it is worth pausing to explain what benefits AAR provides for Air Defence. AD is all about denying a potential enemy free use of the airspace over friendly territory. AD fighters (currently the Phantom Force, Tornado F3s and the supplementing Hawks) can either wait on the ground to be scrambled to meet an incoming threat, or, more effectively, can loiter in the air on Combat Air Patrol (CAP).

The problem with CAPs is that fighter-type aircraft carry limited fuel, so they frequently have to land solely to refuel. To maintain a CAP of, say, 16 aircraft, many more than 16 are needed to ensure continuity; however, if the fighters can be refuelled in the air it is obvious that much greater continuity can be achieved using fewer aircraft. This is the concept that gave birth to the phrase 'force enablers/multipliers' to describe tankers. However, planners need to consider not only how much fuel tankers are required to carry, but how many hoses they can dispense it

through; queues of fighters at a single hose would be both inefficient and vulnerable.

By late 1982 it emerged that our commitment to the Falkland Islands was likely to be long-term, and that the re-supply of the islands would require considerable air effort to supplement the ships. At this stage the UK government was undecided whether or not to proceed with plans to build a new airfield; in the interim we would need to continue to provide AAR air bridge support. The burden on the ageing Victor Force was becoming unreasonable, so some other solution had to be found. This became one of the justifications for buying the Tristar; the underlying and, in the perception of many, far more important advantage would be to enhance the AAR capability in the jigsaw puzzle of UKAD. The outcome was the genesis of the dual AT/AAR roled Tristar.

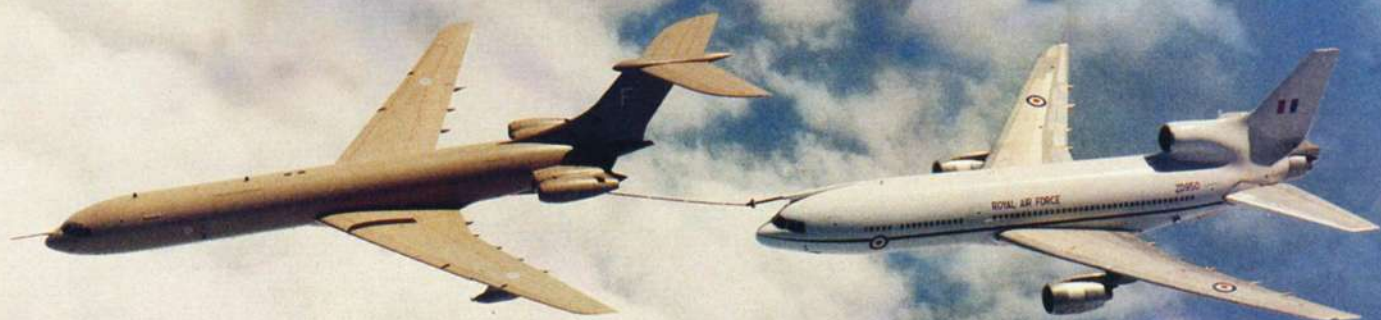
As the concept of dual-roling began to register amongst the traditionalists, so the possibility of dual-roled VC10s became increasingly attractive. The Tristar offered a very large fuel-offload capacity, and together with the VC10 tanker, more than satisfied the predicted requirements for UKAD alone. However, the Tristar would only have a single centre-line hose (albeit duplicated for redundancy) and the critical path now looked to be the number of hoses in the sky.

At the same time the Air Staffs were aware of the perennial problem of influences outside the MoD attempting to target the VC10 transport as an unnecessary element in a NATO-linked air force; arguments about wartime commitments and out-of-area deploy-

ments hold little emotional sway to those making comparisons between Defence Budgets and other major consumers of taxpayers' money. UKAD, on the other hand, is close to all our hearts; if transport could be linked to tanking, then military rationale to retain the VC10 transport would benefit from emotional support and we could simultaneously increase the numbers of hoses in the sky.

Several other factors added weight to the issue and combined to persuade the planners that an extensive review of AT and AAR assets was now essential. On offer was the possibility of a much enhanced AAR capability using existing assets and allowing an increase in flexibility which would earlier have seemed unattainable. In addition, all the assets involved were already co-located, so attendant spending on infrastructure should be minimal.

Although the precise way forward has yet to be decided, a combination of an increase in VC10K airframes, the fitting of wing refuelling pods to Tristars, and to most VC10 C1s, will ensure many more hoses in the sky; the recent introduction of two new VC10 dynamic simulators, incorporating full AAR training programmes, will enable the costs of the accompanying aircrew training programmes to be kept much lower than would otherwise be possible. In the current climate of tight budgets and justifiable insistence on value for money, these 'enhancements' will prove very worthwhile from almost any viewpoint. The marriage will be consummated and the progeny will sustain our Air Defence well into the next century.



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T E C H N O L O G Y Y O U C A N T R U S T

The RAF's Year 1987



Brian Strickland reviews some of the RAF's highlights of 1987

JANUARY

On 20 January the first production **Tucano** ZF135, the aircraft which will launch a new generation of RAF pilots to receive their basic training 'behind a propeller', was rolled out by Shorts at Belfast.



Operation Swift Sword (Saif Sareea), Oman. This British exercise saw the first air-to-air refuelling of a passenger aircraft – Tristar K1 of No 216 Squadron, Brize Norton and operational turn round of Tornados of No 617 Squadron and No 229 OCU on an out-of-area deployment.

A Nimrod won the **Fincastle Trophy** for anti-submarine prowess, beating competition from Australia, Canada and New Zealand.

Tornado GR1's of 9, 14 and 31 Squadrons at Brüggen and 15, 16 and 20 Squadrons at Laarbruch won the prestigious **Salmund Trophy**, a two week competition designed to test bombing and navigation skills.

Waddington was chosen as base for six **Boeing E-3A AWACS** now on order when they enter service with the RAF in 1991, following the decision to abandon the Nimrod AEW force in favour of the E-3A. The order was increased to seven aircraft in November 1987.

Both crew members of a **No 29 Squadron** Phantom from Coningsby passed the 5000 flying hours mark during a sortie.

RAF Halton received a gate guardian, Hunter F6 XF527, the last complete aircraft which Hawker produced for the RAF, first handed over in September 1956.

FEBRUARY

Debut of **Tornado F3**, the air defence variant, on the Aberporth Ranges producing outstanding performance in Sky Flash firing tests.

RAF Squadronnaires dance band, the RAF's swing band, was reformed with members drawn from the Central Band of the RAF. The original Squadronnaires had its origins in 1939.

Midland Radar, based at North Luffenham, celebrated its 21st birthday. It was established in the early part of 1966 out of the need to find something useful to do with the redundant Bloodhound missile tracking system.

MARCH

The RAF played a vital part in the massive air and sea rescue operation after the **Herald of Free Enterprise** capsized at Zeebrugge. A joint forces team of helicopters, divers and para medics were quickly scrambled.

Royal Air Force Germany welcomed a Mk 2 Andover which joined No 60 Squadron. XS793 was formerly with the Queen's Flight at Benson and joined Wildenrath as a replacement for the unit's Pembroke. Subsequent replacement Andovers were Mk 1's.

APRIL

Yorkshire University Air Squadron at Finningley claimed to be the first UAS to recruit girls and the first to send a girl solo in the Bulldog. With the second annual intake there are now 100 female UAS cadets undergoing flying training. Most of the girls wish to follow their 2 years with the UAS by entering the RAF for training as aircrew.

No 360 Squadron at Wyton took delivery of the first Canberra T17A in the new hemp/grey colour scheme. The Squadron celebrated its 21st birthday in April and has operated T17s since it was formed. The T17 is primarily distinguished by a bulbous nose with many bumps and protrusions while the T17A has new VHF/UHF radio aerials under both wings.



Sqn Ldr Eric Robinson retired after 46 years continuous flying with the RAF and RAFVR(T) in which he amassed 10500 hours and piloted more than 40 types.

Sqn Ldr Dave Bagshaw, currently with No 41 Squadron, became the world's first combat pilot to achieve 3000 flying hours on the Jaguar.

A **VC10** tanker of **No 101 Squadron** broke the record for non-stop flying time between the UK and Australia, completing the 9000 mile flight in 16 hrs 1½ mins. The previous record was set in 1963 by a Vulcan, (also of No 101 Squadron) which took 2 hrs 4½ mins longer than the VC-10.

In the House of Commons, George Younger, Secretary of State for Defence, announced an order worth over £300m for a further 41 military helicopters – 25 utility **EH101s** for delivery in the early 1990s and 16 **Lynx** for the support of air-mobile operations.

RAF Marham celebrated its 50th anniversary on its present site.

The Queen Mother asked especially to attend the farewell to **RAF Hendon**, one of the great cradles of aviation, on the occasion of its closure on 1 April.

Biggin Hill's Historic Gate Guardians, **Spitfires LA226** and **SL674**, left for Abingdon following the decision to commence an historic aircraft refurbishment programme.



MAY

Introducing the **Defence White Paper**, Defence Secretary George Younger said 508 aircraft had been ordered for the RAF since 1979 and in real terms the defence budget was more than 20% higher than in 1978/79. He said "The RAF is in the midst of a major modernisation programme. The Tornado programme alone is costing nearly £10 billion more than Trident and is part of a continuous programme that includes the Harrier GR5, the modernisation of the tanker fleet together with support helicopters and the acquisition of AWACS".

One of the RAF's greatest Second World War 'Aces', **Wing Commander Bob Stanford-Tuck** DSO DFC died at the age of 70.

The **Duke and Duchess of York** visited the Red Arrows at Scampton to witness the start of the team's 23rd season. The Duchess, having recently obtained her 'wings', used the occasion to pilot a Bulldog, under instruction, for a flight lasting 55 mins during which some aerobatics were performed including a loop.

No 228 Operational Conversion Unit's 18 Phantom FGR 2's moved from Coningsby to its new home at **Leuchars**.



JUNE

Aircraft from the UK and other NATO countries took part in Exercise **'Central Enterprise'**, a low flying exercise aimed at testing the UK air defences in an area including eastern Scotland and most of Northern and Eastern England.

An RAF two-seater Harrier on loan to **RAE Farnborough** was fitted with an integrated avionics package from Ferranti Defence Systems Ltd. The refit, under the MoD 'Nightbird' programme, complements the installed night vision system and makes this Harrier the world's first VSTOL night attack aircraft.

Swinderby, best known as the home of the School of Recruit Training, welcomed the transfer of command of Flying Selection Squadron from the Cranwell Flying Training School. Simultaneously FSS was renamed the Elementary Flying Training Squadron, the first such unit to be formed in the RAF since 21EFTS was disbanded at Booker in 1950. The Squadron is the largest single operator of the Chipmunk in the RAF, with 11 Chipmunk T 10s including WB550, the oldest Chipmunk still in RAF service and the second off the production line in 1949.



RAF fire tenders began reverting to a red paint scheme. In the early 70's all service vehicles, including fire tenders, had to meet 'tone down' requirements and were painted olive drab. The camouflage was so effective that on the airfield fire vehicles could not be easily seen so a yellow horizontal stripe was added to the vehicles' sides. This aided recognition very little and the situation has come full circle with the re-introduction of the popular 'fire-engine' red paint scheme.

Gütersloh celebrated 50 years of military aviation and welcomed 2000 local Germans as guests. Visiting aircraft included a Mosquito and Bf 109.

JULY

The RAF took delivery at Dunsfold of its first **Harrier GR 5 ZD324** when the aircraft's log book was formally accepted by Air Chief Marshal Sir Peter Harding, AOC-in-C Strike Command. The Harrier GR 5 can either double the payload or double the range of its predecessor. The RAF is to receive 62 GR 5's and initial crew training will take place at Naval Air Station Cherry Point, North Carolina, where the US Marine Corps AV-8B's are based.



No 101 Squadron celebrated its 70th anniversary. Formed at Farnborough in July 1917 with FE2b biplanes, it spent the remainder of WW1 in France. During WW2 the Squadron flew a variety of bomber aircraft ending the war at Ludford Magna with the Lancaster. In post war years No 101 flew Lincolns, Canberras and Vulcans and it was a Vulcan from No 101 which made the famous bombing raid on Port Stanley during the Falklands conflict. No 101 Squadron was re-formed at Brize Norton in May 1984 flying the newly converted VC10 tankers for in-flight refuelling.

The RAF played a key role in an historic trans-Atlantic flight by six Tornados of the **Italian Air Force**. In an example of co-operation among NATO allies, two No 101 Squadron **VC10** tanker aircraft refuelled the Tornados four times in mid-air over the Atlantic to enable them to make the non-stop flight.

No 1 (Fighter) Squadron, normally firmly land-based at Wittering, upped anchor and deployed to HMS Ark Royal on an exercise called '**Hardy Crab**'. Five Harriers, together with sixty-five personnel, spent a week on the Royal Navy's newest aircraft carrier, training for operations against land and sea-based targets from a ship.

A pair of **No 74 (Tiger) Squadron** Phantoms from Wattisham broke the world record flight time from London to Edinburgh on the 70th birthday of the Squadron's formation. They completed the record trip in 27 mins 3.75 secs for the 340-mile journey, travelling mostly over the sea off the east coast and reaching an equivalent ground speed of 1150mph.

July 1987 marked the 21st birthday of the **VC10 C Mk 1** in RAF service. Although the first VC10 C Mk 1 (XR806) made its maiden flight in November 1965, the first aircraft was not handed over to the RAF until 7 July 1966. The VC10 C Mk 1 is a hybrid version of the civil VC10 and Super VC10 and has operated in the passenger, freight and combined passenger/freight roles in the care of No 10 Squadron since its introduction.

AUGUST

For the second successive year **Fit Lt Jim Mardon** won the **Brabyn Trophy**, awarded to the best Hawk solo display pilot. He used an aircraft from the Central Flying School at Valley which had been given a smart patriotic finish with a Union Jack painted on the fin.

Lyneham won the prestigious Strike Command **George Stainforth Trophy** which is awarded annually to the station within the Command adjudged by the AOC-in-C to have achieved the best overall operational performance during the year.

On 1 August the last pair of **Lightnings** of No 5 Squadron's ten aircraft detachment took off into the clear skies over Akrotiri and headed for home at the end of the last Lightning armament practice camp (APC) in Cyprus. The Lightning has had a long and happy association with Cyprus over the last 21 years. No 5 Squadron re-equipped with the Tornado F 3 in January 1988.

The **Princess Royal**, the Honorary Air Commodore of Lyneham unveiled a plaque commemorating the return of Comet C Mk 2 XK699 'Sagittarius' as gate guardian.

SEPTEMBER

Operation Maralinga, a four-month detachment of Wessex helicopters from RAF Sek Kong, ended. The aircraft flew to Maralinga in Australia to take part in the radiological survey of the old atomic bomb test sites.

Tornado ZE155 from **Boscombe Down** was the first F 3 to make a transatlantic crossing, supported by a Tristar tanker of No 216 Squadron, Brize Norton.

Abingdon took on the task of servicing Buccaneer aircraft, previously handled by St Athan.

The first unrefuelled transatlantic crossing by a British fighter was made on 24 September. Returning to the UK after completing highly successful tropical trials in Arizona a **Tornado F 3** covered the 2200 nautical miles from Canada in 4 hours 45 mins.

OCTOBER

A symposium on the **Battle of Britain** was held at Uxbridge as part of the Station's 70th Anniversary celebrations. Uxbridge was the wartime Headquarters of 11 Group Fighter Command and the Station was therefore an appropriate venue for the symposium.

For the first time in its 35 year history the **Queen's Medal** for the RAF was won by a female officer. The award is made to the officer graduating from RAF College Cranwell assessed as the most outstanding officer cadet of the year and was presented to 23-year-old **Fg Off Susan Forbes** of the Engineering Branch, at the annual Queen's Review of the RAF College.

Meteor T7 WF791, built in 1951, was restored to flying condition after 7 years in storage and was seen at recent displays at Leuchars and Newton. It received a new lease of life after it was discovered from a search of old records that its flying hours had not been exhausted as previously believed and it now has a possible 30 year life ahead of it. It is now the only airworthy Meteor with the RAF following the crash of its Vintage Pair predecessor after a mid-air collision at Mildenhall in May 1986.



Marshall of the RAF **Sir William Dickson** died at the age of 88. He was the first Chief of Defence Staff.

NOVEMBER

Twenty thousand men took part in Britain's largest ever tri-Service exercise from 4 to 21 November. Code named **Purple Warrior**, it was predominantly an amphibious exercise but forty fixed-wing aircraft and fifty helicopters took part.

Declaration of the first front-line **Tornado F 3** Squadron to NATO. The F 3 will replace all the RAF Lightnings. Most of the Phantom squadrons will work up at Coningsby on the model already established by No 29 Squadron.



The **Victor** celebrated 30 years of operational service with the RAF on 28 November 1987. The first Victor B Mk 1 bomber entered service at Gaydon and 30 years later the type is still in front line service with No 55 Squadron at Marham, the last of the V-Bombers to remain operational.

DECEMBER

Worldwide attention focused momentarily on **RAF Brize Norton** as Prime Minister Margaret Thatcher met Mikhail Gorbachev for a stop-over summit. The Soviet leader, en route to Washington, was travelling in an Ilyushin 62 airliner.

A DAY IN THE LIFE OF A CHINOOK

Report and photographs — *Edwin A. Shackleton*



Troops rapidly emplane in Chinook 'Golf' using the rear ramp.

The Chinook has added a new dimension to the Royal Air Force's helicopter lifting capability since the first example arrived at Odiham in November 1980. Today the Chinook is much in evidence at this pre-war RAF station, with No. 240 Operational Conversion Unit, which was formed on 31 October 1980, providing the necessary training for Pilots, Navigators and Crewmen, and No 7 Squadron which was reformed as the first front-line Chinook unit on 1 September 1982. The Chinook also serves with No 18 Squadron at Gütersloh, RAF Germany and with No 78 Squadron, at Mount Pleasant in the Falkland Islands (the latter unit also operates Westland Sea Kings).

A day in the life of a Boeing Vertol Chinook HC 1 at Odiham starts immediately after midnight, with the maintenance nightshift in one of two large pre World War 2 hangars. Each helicopter is refuelled before being towed to the hangar at the end of its flying duties. The 'towing' is a misnomer as the Chinook is pushed by a tractor with a rigid link which is connected to the starboard aft wheel, which is also the power steered unit for taxiing.

Entering the hangar and positioning between other Chinooks is monitored by several ground crew to safeguard the 60ft diameter rotors. This operation is made delicate by the twin intermeshing rotors as the forward rotor may be turned to clear an obstacle as the rear rotor nears an obstruction. During the summer, with the long light evenings, it is possible that some helicopters may still be engaged on night flying but in the winter, all of the aircraft will usually be hangared before midnight. The Chinook captains making the final sortie complete the signing off and enter any flight snags which will be planned by the senior NCO into that night's work schedule.

Depending on the overnight flying requirements, the night shift is split if necessary to cover operational needs. Should there be any problem that require both engines to be run on any Chinook a flight crew is mustered so that they can carry out the necessary procedures as it requires the rotors to be turned. Routine inspections are made after intervals of 50, 100 and 200 hours flying time, and these are carried out by the operating squadron. However the 400 hour minor inspections are completed by the Aircraft Servicing Flight at Odiham (ie at 400, 800 and 1200hrs) with major servicing (at 1600hrs) being undertaken by the Royal Naval Aircraft Yard at Fleetlands in its tri-service support role.



Engine maintenance on a Chinook at RAF Odiham.

The Senior NCO in charge of the shift assesses the work priorities so that the Chinooks that are not on routine inspections (ie at the quoted hour multiples) will be ready to continue flying commitments the following morning. The day shift then takes over the serviceable aircraft and carries out a pre-flight inspection which includes checks on all oil levels and ensures that all hatches and access panels are secure. The hydraulic system is hand-pumped to working pressure so that the rear ramp can be raised to give access to the towing arm and the Chinooks are then taken to the operational apron ready for flying duties. All work is entered and authorised in the standard RAF Form 700. This is scheduled by the Engineering Officer to be completed one hour before the first take off. The Chinook captain signs acceptance of his allotted helicopter prior to take off.

The Chinook is a large machine with a fuselage length of 51ft and is quite complex with a range of high technology

equipment. Nevertheless it is designed for easy maintenance, with good access to the rotor heads and engines, with walkways and folding platforms. Engine or rotor blade removal is normally managed with the use of overhead lifting gear inside the hangar or with a crane lifting on the apron. Provision is made for the use of portable gear anchored to the structure for work at remote operating sites. Blade tracking is no longer a difficult ground task, having now been replaced by the 'Rotortuner' which uses accelerometers fixed at selected points.

Apparently bird impact is not terribly significant for this low flying helicopter, partly due to the heavy rotor downwash and the rear engine location, although the lower nose glazings have suffered damage. The composite construction rotor blades with their titanium leading edges are easy to inspect as they have a smooth even finish. The servicing/maintenance crew regard their Chinooks with some affection and it is surprising that they have not found

a friendly nickname although the name 'Wokka-Wokka' (from the thrashing rotor noise) was given in the Falklands campaign.

The flying duties of the Chinook are most varied but are primarily in support of the Army in logistic re-supply, re-deployment of troops, equipment, vehicles and artillery, casualty evacuation, recovery of vehicles and helicopters for repair and also air mobility operations, which include a parachute dropping role.

The capability of the Chinook was adequately demonstrated on a typical day on an Army exercise on Salisbury Plain which involved four machines. Pre-flight briefing was carried out at Royal Air Force Odiham in the presence of all crew members and gave details of the route, weather conditions, known hazards such as operative firing ranges, diversion airfields, emergency procedures, a broad outline of the duty role in Army re-supply work and designating a 'walk' time to meet precise taxi and take off schedules. Each

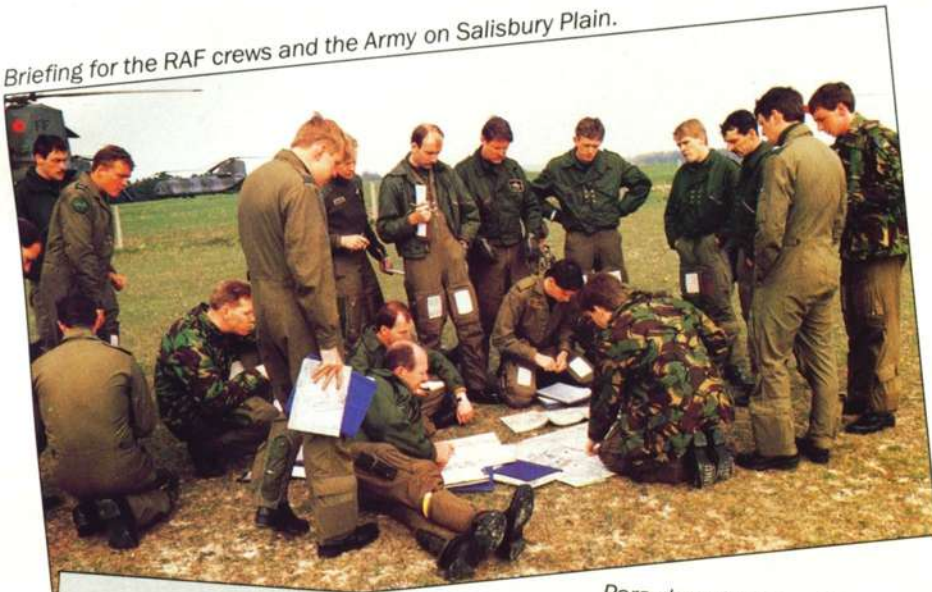


Chinook ZD982 'F1' over Salisbury Plain.



Chinook 'Golf' in a typical battlefield situation.

Briefing for the RAF crews and the Army on Salisbury Plain.



Para-dropping from Chinook 'FF'.



Land Rover and armament trailer are hooked up for rapid transit.

captain then prepared his flight details and confirmed his briefing to the duty officer and signed the 'Form 700' to accept his serviceable helicopter.

The crew comprises captain and either a pilot or navigator (in the left hand seat) and three cabin crew members; the latter are responsible to the pilot for start up procedures, general flight safety and look-out duties and in the important lifting,

loading and unloading tasks. Start up was commenced with forward door and aft ramp door open and the hydraulic system reservoirs fully charged which rotated the Solar T62 auxiliary power unit. This in turn started the Avco Lycoming T55 turbo-shafts. Pre-flight checks were completed before the Chinooks taxied from their apron and each lifted imperceptibly on their planned route which was taken over

open country to avoid the larger built up areas.

The opportunity was taken to practice close formation flying as the Chinooks approached the western edge of Salisbury Plain, where they landed in a football field adjacent to a small army camp. All crews assembled for a 'field' briefing to describe the 'battle' duties which required the Chinooks to uplift artillery, transport and men in an advancing situation across difficult terrain which were likely to be met in a war situation.

Chinook 'Golf' was first to take off and fly the short distance to the pick up point, where the troops of the Parachute and an Artillery Regiment had assembled in four groups with their separate lift loads. Army personnel are trained to sling the required vehicles, pallets, containers or netted loads but they all conform to the procedures that have been laid down by the Joint Helicopter Support Unit at Odiham (staffed by RAF and Army personnel).

The Chinook has three lift points; the fore and aft points each carry 20,000lb (8.9 tons) and the central points carry 28,000lb (12.5 tons). The latter is stowed between the floor and the fuselage bottom surface and it is necessary to lift a floor hatch and hinge back the lower panel to utilise the central hook. This provides a clear view for the crew to monitor the lifting procedures.

'Golf' was guided to its loading point by an Army marshaller. The Chinook crew then attached strops to the lifting points after which the marshaller directed the helicopter over the load and the RAF crewman indicated the reducing heights to the captain until attachment was complete. The other crew kept watch for obstructions and other helicopters in the vicinity. As the Chinook took the weight and moved off, the next machine was already approaching.

Lowering the load at the next site was accomplished in a similar manner and the smooth, controlled ascent/descent of the Chinook was particularly noticeable, with or without an external load and the lack of ground resonance problems is a great asset. Further lifts were made, some with troops who entered by the wide rear ramp — which is used for rapid operations. Maximum troop load is 44 although 80 were carried in battle on the Falklands.

Having completed the Army duties, the four Chinooks lifted off to form a battle formation on the return flight to Odiham. Normal cruise speed is 135kt (154mph). While the crews de-briefed, preparations were started to prepare the Chinooks for a new set of tasks on the following day.

Although the Chinook is an expensive machine to operate, its flexibility and capability of moving large loads quickly to vital battle areas, either in advance or tactical retreat, has proved itself to be an invaluable tool which could prove the balance between success and failure on the battlefield.

This brief look at a day in the life of an RAF Chinook clearly underlines its importance to the Army, Royal Air Force and NATO forces, as we go into the 1990s.

SQUADRONS OF THE RAF

Paul Jackson



The Royal Air Force: a directory of units and their aircraft

Through seven decades of endeavour, the Royal Air Force has varied considerably in size as threats to the United Kingdom's security have come and gone. In this anniversary year, the RAF finds itself nearing the end of a programme of comparatively modest expansion and upgrading, with both fighter and strike versions of the Tornado firmly established in squadron service, and the close support Harrier Mk 5 shortly to replace earlier models of the same aircraft. Three extra squadrons are in prospect: one based at Honington with reconnaissance Tornados and two at Leeming flying the Tornado F Mk 3 interceptor.

The 'number plates' to be worn by these units have yet to be announced — but not for reasons of secrecy. Though young by standards of the Navy and Army, the RAF has nevertheless established a proud tradition which is perpetuated by its individually numbered squadrons. On the rare occasions when one of these is to be re-born, the merits of many candidates are pressed with vigour before the decision is made. Eventually, the standard of the fortunate unit is removed from its place of honour at St Clement Danes church or RAF College Cranwell; stored silver and trophies are taken from their crates at a maintenance unit; and a dozen or so aircraft are adorned with the squadron's badge and colours, ready for service.

This directory lists the squadrons of the RAF operational in 1988. In addition, the necessarily very brief histories which follow each entry serve a double purpose. Individually, they summarise the aircraft, roles and theatres of bygone years; collectively, they give some indication of the service given by the RAF to its country, its allies and the former Empire over seven decades. Fighting in frail biplanes over the Western Front; policing recalcitrant tribesmen in the mandated territories of the Middle East; standing steadfast between Hitler and his dream of world domination; maintaining the *pax atomica* — the RAF has done them all, and much else besides.

Today, the RAF is organised in three major divisions. Principal of these is Strike Command (HQ: High Wycombe, Bucks), responsible for all combat and operational support roles in all theatres apart from Germany. Strike comprises three Groups, of which No 1 (HQ: Upavon, Wilts) has 20 squadrons, five OCUs and three individually-named units for strike/attack, reconnaissance, transport, army support and aerial refuelling. No 11 Group (HQ: Stanmore, Middx) controls the air defence organisation of interceptors, missiles and airborne early warning aircraft in 11 squadrons, two OCUs and two training units; whilst No 18 Group (HQ: Northwood, Middx) is the maritime patrol, rescue and

target facilities force of 12 squadrons, three OCUs and a photo-survey unit.

Additionally, four squadrons, three flights and two trials units are administered directly by Strike Command. By way of further explanation, a 'flight' approximates to a half-squadron operating independently; and an OCU is an Operational Conversion Unit, which has a peacetime training role but can quickly become a combat squadron when needed. The affiliation of squadrons to individual groups, where appropriate, is given in the listing which follows.

Royal Air Force Germany (RAFG) is the second major component, with its HQ at Rheindahlen, FRG. Having 15 squadrons — all but one of them combat-rated — and a single station flight, RAFG is Britain's main contribution to NATO forces defending the Central Front in Europe. Almost all RAF front-line units are dedicated to NATO, either for national defence or reinforcement of Europe's northern and southern flanks.

Finally, Support Command — HQ: Brampton, Cambs — handles aircrew training and the 1,001 other tasks so often taken for granted in keeping the 'sharp end' flying and fighting. Its main components are listed after those of Strike Command and RAF Germany, although space limitations preclude the inclusion of unit histories.

STRIKE COMMAND AND RAF GERMANY



The Harrier GR5 will equip No 1 Squadron in 1989. Jeremy Flack

No 1 Squadron (Str/1 Group), BAe Harrier GR Mk 3, Wittering, Cambs.

Most appropriately, the badge of a winged numeral '1' distinguishes the ground-attack Harriers of No 1 Squadron. When formed on 13 May 1912 the unit also had a vertical take-off capability, being equipped with balloons, airships and man-carrying kites. By the start of World War 1, No 1 Squadron had progressed to aeroplanes, and it spent the first half of the 1920s in India before returning home as a fighter squadron and participating in the Battles of both France and Britain. Later with fighter-bomber Typhoons and Spitfires, it finished the war as a bomber escort unit before converting to jets (Meteors) in 1946. Apart from deployment abroad during the 1956 Suez Campaign and 1982 Falklands War, No 1 has remained part of the UK's defences, making history again at Wittering in 1969 when it became the first unit in the world to fly an operational STOVL combat aircraft. It will convert to Harrier GR Mk 5s in 1989.

No 2 Squadron (RAFG), SEPECAT Jaguar GR Mk 1, Laarbruch, West Germany

Established on 13 May 1912, No 2 Squadron claims the distinction of being the oldest unit to fly aeroplanes. Deployed to France in 1914, it undertook reconnaissance and bombing tasks. Two of its pilots, Lt W. B. Rhodes-Moorhouse and 2 Lt A. A. McLeod, were awarded VCs for acts of gallantry. The unit takes the style, 'No 11 (AC) Squadron' which stems from *recce* and support operations with Army Co-operation Command during World War 2. It was equipped with Lysanders and then the more potent Tomahawk and Mustang (being the first in the RAF with the two last-mentioned types, 1941-42). No 2 accompanied the invading Allied armies in 1944, and thus became a component of the British Air Forces of Occupation, which is now RAF Germany. The basic role of *recce* and support is retained to this day, with specially equipped Tornado GR Mk 1s due to replace the Jaguar at the end of the year. Aircraft carry the badge of a Wake Knot, but are more readily identified by a white triangle on the fin.

No 3 Squadron (RAFG), BAe Harrier GR Mk 3, Gütersloh, West Germany

Fighter, *recce* and ground attack missions occupied No 3 Squadron in its early days, and after a brief existence in India during 1920, it became a home-based Fleet co-operation squadron, then, in 1924, transferred to air fighting. In 1929 it was the first in the RAF to fly Bristol Bulldogs. Temporarily in Abyssinia for the 1935-36 crisis, it fought with Hurricanes in the Battle of France and took up residence in Germany during April 1945. Tempests were supplanted by Vampires in 1948, whilst Sabres, Hunters and Javelins perpetuated the fighter tradition until Canberra interdictors arrived in 1961. Since 1972, the squadron has operated Harriers in close support of the army, these marked with the device of a cockatrice (dragon) upon a green bar. GR Mk 5 versions of the Harrier are in prospect for 1990.

No 4 Squadron (RAFG), BAe Harrier GR Mk 3, Gütersloh, West Germany

Sharing a base and equipment with its immediate predecessor, No 4 Squadron adorns its ground attack Harriers with insignia of a '4' upon a lightning flash, flanked by black and red diagonally-divided bars. One dissimilarity between the two units is that No 4 has a 40% tactical *recce* commitment, for which its aircraft are fitted with a centreline sensor pod. The unit has strong overseas connections, having operated in France in 1914-19, Turkey 1921-22, France 1939-40, and on the Continent since 1944, nearly always in the close support or *recce* role. Harriers — RAFG's first — arrived at Wildenrath in 1970, with No 4 transferring to its present station in 1977.

No 5 Squadron (Str/11 Group), BAe Tornado F Mk 3, Coningsby, Lincs

A *recce* squadron during World War 1, No 5 flew types such as the BE2, BE8 and Bristol Fighter on the Western Front, before a posting to the North-West Frontier as part of the British garrison in India. No 5 flew biplanes until late in 1941 when it became the first squadron with Mohawks, which it operated against the

Japanese. It disbanded as a Tempest squadron when India achieved independence in 1947. Briefly occupied with target-towing, No 5 subsequently served in Germany, latterly flying Meteor and Javelin all-weather fighters, until re-equipped with Lightnings at Binbrook in 1965. The squadron stood down on 31 October 1987 to begin Tornado conversion, moving at the same time to Coningsby where it was re-born on 1 May this year, still in the air defence business. Its aircraft wear the fin insignia of a green maple leaf flanked by red bars.

No 6 Squadron (Str/1 Group), SEPECAT Jaguar GR Mk 1, Coltishall, Norfolk

The unofficial badge of a flying tin-opener recalls the fact that this unit flew 'tank-busting' Hurricanes in the Western Desert during World War 2. After operating in France with BE and RE types in 1914-18, the 'tween-war years were spent in the Middle East in army co-operation and light bomber roles with Gordons, Harts, Demons, Hardys and Gauntlets. In 1949, whilst in Egypt, No 6 received Vampires as its first jets. Canberra light bombers served between 1957 and 1969, the latter year seeing the unit return home at last to become the first to fly Phantoms. The present Jaguars have been operated since 1974, and No 6 claims the distinction of having spent only four months in a state of disbandment since first formed on 31 January 1914. Squadron 'old boys' include Maj Lanoë G. Hawker, VC.

No 7 Squadron (Str/1 Group), Boeing-Vertol Chinook HC Mk 1, Odiham, Hants

Some squadrons operate in similar roles throughout their lives; No 7 is a notable exception. Assigned to *recce* and artillery spotting in World War 1, using BEs and REs, it became a 'heavy bomber unit' in 1923, employing Vimy, Virginia and Heyford biplanes, then the lighter Wellesley monoplane (designed by Barnes Wallis and Rex Pierson), Whitleys, Ansons and Hampdens. The Stirling was received in August 1949, No 7 being first with this earliest of the four-engined 'heavies.' Lancasters and Lincolns were followed in 1956 by the Valiant jet V-Bomber, the career of which was abruptly ended by fatigue problems in 1962. In 1970, No 7 was back with Canberras in the target facilities role, but 1982 witnessed a further dramatic change when it was re-formed as the home-based squadron of Chinook twin-rotor helicopters. Assigned to army support, these powerful heavy-lifters are adorned with the badge of the constellation Ursa Major ('Great Bear') on a dark blue disc.



Boeing-Vertol Chinook HC1; No 7 Squadron. Jeremy Flack

No 8 Squadron (Str/11 Group),
Avro Shackleton AEW Mk 2, Lossiemouth,
Moray

An Arabian dagger motif provides a clue to No 8's haunts until it formed in Scotland with its present equipment in 1972. After serving in France following its formation in January 1915, the squadron operated in Egypt, Iraq and Aden between 1920 and 1945. Its light bombing role during World War 2 included operations against Italian forces in Blenheims, Marylands and Hudsons, and it finished the conflict converting from Wellingtons to Liberators. Remaining in the same region with the coming of peace, No 8 transitioned to a fighter-bomber role, until disbanded with Hunters at Sharjah in 1971 (the RAF's last front-line Hunter Squadron). Its current role is airborne early warning of low-level threats to UK airspace. Delays with, and eventual cancellation of the Nimrod AEW Mk 3 have resulted in the venerable 'Shack' being retained long after its intended retirement date, giving No 8 the dubious distinction of being the last front-line RAF unit to operate propeller-driven aircraft. It is now intended that No 8 will receive Boeing E-3 Sentries (AWACS) at Waddington in 1991.

No 9 Squadron (RAFG), Panavia Tornado
GR Mk 1, Brüggen, West Germany

Wireless training and coastal defence duties occupied this unit during its early days in France, but it also undertook recce and light bomber missions after moving to France in 1915. Since 1924 it has been a bomber squadron, and on 4 September 1939 its aircraft joined those of No 149 Squadron in the first bombing raid on Germany. Distinction was gained in the latter part of World War 2 for precision attacks with Barnes Wallis' super-heavy bombs, which it used in the successful attack on the *Tirpitz* in 1944. On 1 January 1945, No 9 Squadron Lancaster radio operator, Flt Sgt George Thompson won the RAF's last VC, for assisting injured crew members despite his own mortal wounds. Lancasters gave way to Lincolns post war and No 9 converted to the Canberra light jet in 1952. Vulcans were flown from 1962 until 1982, when No 9 re-formed (on 1 June) at Honington, Suffolk, as the first operational Tornado squadron in the world. Since 1 October 1986, flying has been from Brüggen, where the unit is operational in the strike/attack role, its aircraft wearing a bat marking as a reminder of the earlier night bombing role.



Avro Shackleton AEW2; No 8 Squadron. Jeremy Flack

No 10 Squadron (Str/1 Group),
BAC VC10 C Mk 1, Brize Norton, Oxon

Though no longer unique as a military operator of the majestic VC10, No 10 can still claim to be the only user of the type in white and grey transport colours. Maintaining strategic communications throughout the globe, including operations on some scheduled routes, the unit received its present equipment in 1966, having formerly specialised in bombing. Aircraft types such as the Hyderabad, Virginia and Heyford served in the biplane era, followed by the Whitley (first in the RAF, 1937) and Halifax, but the coming of peace saw a change to transport and the use of Dakotas, which were employed on the Berlin Airlift. In later years, No. 10 returned to bombing and flew Canberras before becoming the first squadron to receive Victors, in April 1958.

No 11 Squadron (Str/11 Group),
BAe Tornado F Mk 3, Leeming, North Yorks
Formed in 1915 as a fighter unit, No 11 undertook army co-operation tasks in India between the wars, transferring to the Middle East in 1940, then to the Burma front with Blenheims and Hurricanes from 1943. In 1948 it moved to Germany, where it flew in a fighter bomber role before returning to all-weather

interception with Meteors and Javelins. No 11 received Lightnings at Leuchars in 1967 and moved to Binbrook in 1972, its aircraft wearing the markings of two eagles in flight, flanked by black and yellow bars. On 1 May 1988, the RAF's last Lightning squadron was stood-down for Tornado conversion and a 'new' No 11 began working up at Leeming, where it becomes operational on 1 November 1988.

No 12 Squadron (Str/18 Group)
Hawker-Siddeley Buccaneer S Mk 2B,
Lossiemouth, Moray

No 12 is one of two units (the other being No 208) assigned to maritime strike/attack with aircraft originally designed to a Royal Navy specification. The fox's mask unit badge recalls earlier use of the Fairey Fox, of which No 12 was the sole recipient, in 1926. It had progressed to Battles when sent to France in 1939, and sustained serious losses in the German advance of May 1940. Flt Off D. E. Garland and observer, Sgt T. Grey won a posthumous double VC during the historic attack on the Albert Canal bridges on 12 May. Heavier equipment, in the form of Wellington, Lancaster and Lincoln, followed until the unit became an early operator of the twin-jet Canberra in 1952. Between 1962 and 1967, No 12 flew Vulcans in the strategic role, reforming at Honington, Suffolk, in October 1969 as the RAF's first Buccaneer squadron. At 'Lossie' since 1980, it is having its aircraft updated by BAe for extended service well into the 1990s.

No 14 Squadron (RAFG), Panavia Tornado
GR Mk 1, Brüggen, West Germany

Formed in 1915, this unit was one of the first deployed to the Middle East, where it flew such aircraft as the Martinsyde S.1, BE2, DH2, Bristol Scout and RE8. A flight of the squadron at one time operated with the local guerilla forces led by Lawrence of Arabia. Remaining in-theatre after 1918 it was a garrison squadron in what are now Israel and Jordan and was involved in the Western Desert campaign of World War 2, operating Blenheims and, in August 1942, some of the RAF's first Marauders. Briefly a home-based maritime patrol squadron, No 14 moved to Germany in 1946, flying fighter-bomber Mosquitos, Vampires and Hunters, then tactical strike/attack Canberras, Phantoms and Jaguars. At Brüggen since 1970, the unit was re-equipped with Tornados on 1 October 1985, still tasked with delivery of nuclear or conventional weapons. The squadron markings are a blue cross on a winged white disc, flanked by blue diamonds.



BAC VC10 C1; No 10 Squadron. John Dunnell

No 15 Squadron (RAFG), Panavia Tornado GR Mk 1, Laarbruch, West Germany

As the sole adornment on this squadron's aircraft is the white characters 'XV', it is clear that the unofficial Roman numeral form of address is preferred by No 15. Formed for reconnaissance in World War 1, No XV was a component of the A & AEE trials unit from 1924 until 1934, when it turned to bombing. Blenheims were in use when No XV was part of the Advanced Air Striking Force attempting to stem the German invasion of France in 1940, but it progressed to heavier equipment (Wellington, then Stirling and Lancaster) before the war's end. Its final task of the conflict was to drop food to the starving Dutch people. Boeing B-29 Washingtons were flown as interim equipment pending the delivery of Canberras in 1953, whilst in 1958 the squadron converted to Victors. First in RAFG with Buccaneers, when transferred from the UK to Laarbruch in 1971, it was also the premier German-based RAF Tornado squadron when re-equipped on 31 October 1983.

No 16 Squadron (RAFG), Panavia Tornado GR Mk 1, Laarbruch, West Germany

No 16 has been a partner of No 15 since installed at its present base in 1972, although it did not officially convert from Buccaneers to strike/attack Tornados until 29 February 1984. Its aircraft are difficult to miss, as they wear the markings of black bars astride the nose roundel; crossed keys on the air intakes; and 'The Saint' on the fin. This harks back to St Omer, France, where the unit formed in 1915, flying a mixture of types until standardised on BE2s. In army-cooperation between the wars, it became the first Lysander squadron in June 1938, later receiving Mustangs, Tomahawks and Spitfires for the continued AC role. The squadron has been in Germany since 1946, and in June 1972 was stood-down as the RAF's last operational Canberra bomber squadron.

No 17 Squadron (RAFG), Panavia Tornado GR Mk 1, Brüggen, West Germany

Another Tornado-equipped RAFG strike/attack unit, No 17 spent its early days in Egypt, mainly for tactical recce. From 1924 until 1941 it was a home defence fighter squadron, flying Hurricanes in the Battle of Britain. Deployed then to Burma, it undertook offensive sweeps over the Arakan and finished the war equipped with Spitfires. No 17 was then one of the few RAF squadrons in the occupation force in Japan. Back in the UK during 1949-51 No 17 was assigned to target-towing, re-forming in Germany during 1956 with photo-recce Canberras. Strike/attack became the role in 1970 on receipt of Phantoms, these giving way to Jaguars in 1975 and Tornados ten years later. Markings are a black and white arrowhead on the nose and a red gauntlet on the fin as a reminder of the Gloster Gauntlet biplanes flown in 1936-39.



Westland Wessex HC2; No 22 Squadron. John Dunnell

No 18 Squadron (RAFG), Boeing-Vertol Chinook HC Mk 1, Gütersloh, West Germany

The red Pegasus badge is appropriate for a squadron responsible for tactical air transport of the army in Germany. No 18 has been equipped with the large Chinook helicopter since becoming the first squadron to operate the type, in February 1982. It has been at its present base since April 1983, but was also there in 1965-68 and 1970-80, having become the first Wessex squadron in 1964. Before that were four years with Valiants in the ECM role and almost five with the earlier Canberra. No 18's varied career had begun on the Vickers Gunbus in 1915, but it remained dormant from 1919 until re-formed with light bombers in 1931. It flew Blenheims and Bostons in World War 2, mainly in the Western Desert, Italy and Balkans. Dakota transports, the backbone of early post-war Transport Command, were operated from 1947 to 1950, these being employed in the historic Berlin Airlift.

No 19 Squadron (RAFG), McDonnell Douglas Phantom FGR Mk 2, Wildenrath, West Germany

After flying in France during World War 1 (and claiming 281 enemy aircraft), this famous fighter squadron re-formed in 1923 and flew the classic Snipe, Grebe, Siskin, Bulldog and Gauntlet biplanes until it became the first squadron equipped with the Spitfire, in August 1938. Following participation in the Battle of Britain, No 19 turned to long-range escort and close support missions (including the 1943 Dieppe Raid), latterly with Mustangs, adding another 145 enemy machines to its earlier score. De Havilland Hornets – the ultimate RAF twin-prop fighter – equipped the unit from 1946 until the arrival of Meteors in 1951. Next came Hunters (1956) and Lightnings (1962), with which No 19 moved to Germany in 1965 to police the East-West German border. The present Phantoms were received in 1976. In conjunction with its long-term companion No 92, the squadron maintains an interceptor at immediate readiness round the clock. Markings are a dolphin, plus blue and white checks.

No 20 Squadron (RAFG), Panavia Tornado GR Mk 1, Laarbruch, West Germany

Employed in the fighter-recce and army co-operation roles in France and India up to 1947, this squadron's tasks in World War 2 included support of Wingate's Chindits. In its next active period, 1949-51, No 20 provided target facilities with miscellaneous types, gaining a more glamorous role in 1952 on posting to Germany for fighter duties with Vampires, Sabres and Hunters. In Singapore from 1961 to 1970 the Hunter was again flown, this time for ground attack, and a forward air control flight of Pioneers was added in 1969. Back in Germany, the squadron re-formed with Harriers late in 1970, but traded-in these aircraft for Jaguars at Brüggen during 1977. On 29 June 1984, No 20 was re-assigned to Laarbruch, flying Tornados, marked with the badge of an eagle with wings outstretched.

No 22 Squadron (Str/Group), Westland Wessex HC Mk 2, Finningley, S Yorks, and detachments

The yellow-painted Wessex (and their Sea King companions within No 202 Squadron) are renowned for rescue operations undertaken in difficult – or seemingly impossible – circumstances, resulting in the award of several bravery medals to their crews. After service in France, No 22 was an experimental squadron of the A & AEE (like No XV) from 1923 to 1934, gaining a maritime flavour to its operations when re-equipped with Vildebeest torpedo-bombers. The RAF's first Beauforts arrived late in 1939, and they made Coastal Command's initial minelaying sortie on 7 May 1940. Flg Off K. Campbell won his posthumous VC flying such an aircraft, in June 1941. Beaufighters continued the work, adding rockets to their armoury after No 22 transferred to the Far East in 1942. Disbanded in 1946, the unit re-formed in 1955 as the first Whirlwind SAR (Search and Rescue) squadron, gradually converting to Wessex between 1976 and 1981. The HQ at Finningley supports operational components at Chivenor ('A' Flight), Leuchars ('B' Flight), Valley ('C' Flight), Leconfield ('D' Flight) and Coltishall ('E' Flight).



Panavia Tornado GR1; No 17 Squadron. Sgt Rick Brewell



McDonnell Douglas Phantom FGR2; No 23 Squadron Jeremy Flack

No 23 Squadron (Str/RAF Falkland Islands), McDonnell Douglas Phantom FGR Mk 2, Mount Pleasant, Falkland Islands

Deployed from Wattisham, Suffolk, to Port Stanley on 1 April 1983 as a replacement for the interim Phantom unit installed the previous October, No 23 has been flying from the new Mount Pleasant airport on air defence duties since 1 May 1986. Its insignia of a red eagle is now complemented by the Falkland Islands' shield. Well known in the fighter world, the unit has been in its present role since formed in 1915. After equipment with Gamecocks in 1926, it formed a two-aircraft aerobatic team, one of the pilots being Flg Pff Douglas S. Bader. During World War 2 it specialised in radar-equipped night intruder missions over enemy airfields, making the RAF's first such operation with a Blenheim on 21-22 December 1940, and after 1945 continued as a night fighter squadron with Mosquitos, Vampires and Venoms. All-weather Javelins and Lightnings were used until Phantoms arrived in 1975.

No 24 Squadron (Str/1 Group), Lockheed Hercules C Mk 1/3, Lyneham, Wilts

Though a fighter squadron in World War 1 (and the first in France with the highly-effective DH2), No 24 is traditionally associated with the communications and transport areas. Operating in the London area from 1920 to 1946, it was a VIP unit responsible for carrying numerous high-ranking officials and dignitaries — especially in World War 2. A remarkable diversity of equipment included wartime Prime Minister Mr. Winston Churchill's personal York, No 24 being the first to operate this type of aircraft. Later, the unit standardised on Lancastrians, then (1950) Hastings. Since 1968 all varieties of Hercules have been operated, these being taken from the Lyneham pool of unmarked aircraft as required on a daily basis. The squadron tends to specialise in route flying and aerial refuelling.

No 25 Squadron (Str/11 Group) BAC Bloodhound Mk 2 SAM, Wyton, Cambs. and detachments

This squadron is one of two equipped with Bloodhound surface-to-air missiles and assigned to the defence of the East Coast from Thames to Humber. (Nine other units — four of them in Germany — have the short-range BAe Rapier SAM for air base defence, but they are controlled by the RAF Regiment, which has a separate squadron numbering system.) No 25, which had a long career as a night, and all-weather fighter squadron, received Bloodhounds in 1963, using them to defend RAFG airfields in Germany from 1970 to 1982. HQ and 'B' Flight are now at Wyton, Cambs, whilst 'A' Flight resides at Barkston Heath, Lincs, and 'C' Flight at Wattisham, Suffolk.

No 27 Squadron (Str/1 Group), Panavia Tornado GR Mk 1, Marham, Norfolk

The badge of a green elephant on No 27's current mounts recalls the fact that its first equipment, in 1915, was the Martinsyde G.100 'Elephant.' In India, the squadron flew the famous DH9 for a decade before gaining Wapitis in 1930 and Harts on the eve of war. A brief tour of duty in Malaya ended with the Japanese invasion, but No 27 harassed the invaders with the first Beaufighters and the first Mosquitos deployed in the Far East theatre, until victory was achieved. After flying Dakota transports in 1947-50, it turned to Canberra bombers in 1953-56, then Vulcans from 1961 to 1982, including nine years in the maritime radar reconnaissance role. It became the third RAF Tornado strike unit on 12 August 1983.

No 28 Squadron (Str/direct reporting), Westland Wessex HC Mk 2, Sek Kong, Hong Kong

Charged with supporting the army garrison in Hong Kong and providing SAR cover, this squadron last saw Britain's shores in 1920. In fact, since formed in November 1915, it has spent three years in the UK, one in disbandment and the rest abroad. No 28 flew in France and Italy during World War 1, then in India from 1920, with Bristol Fighters and Wapitis. Hurricanes and Spitfires were used in Burma and Malaya; then the squadron took up residence in Hong Kong during 1949, receiving its first jets (Vampires) two years later. Ground attack Venoms and Hunters followed, but gave way to Whirlwind helicopters in 1968. Conversion to Wessex was undertaken in 1972.

No 29 Squadron (Str/11 Group) Panavia Tornado F Mk 3, Coningsby, Lincs

The RAF's first operational Tornado F Mk 3 interceptor squadron returned to the front line on 1 November 1987, having ceased flying Phantoms six months earlier. This famous fighter unit operated in France during World War 1 with the DH2, Nieuport Scout and SE5a and was prominent in home defence during the 1920s and 1930s. By 1940 it was using Blenheims equipped with some of the first airborne radars, progressing through Beaufighters (with which it flew the RAF's first patrol on the type, 17-18 September 1940) to Mosquitos before the end of the conflict. Jet-powered Meteor night fighters arrived in 1951, followed by Javelins and Lightnings. Phantom FGR Mk 2s took over at Coningsby in 1974, and apart from UK air defence these were committed to maritime air superiority and overseas deployment. Fin markings depict an eagle preying on a buzzard, but air intakes are also adorned with the unit's unofficial 'XXX' — the brewer's sign denoting 'extra strength.'

No 30 Squadron (Str/1 Group), Lockheed Hercules C Mk 1/3, Lyneham, Wilts

No 30 Squadron formed for service in Egypt during 1915 and was retained in the protectorate of Iraq after the war. With No 47 Squadron it was a pioneer of the Cairo to Baghdad mail service in the days when every such sortie was a potentially hazardous venture. Back in Egypt by August 1939, the unit flew its Blenheims as fighters against Italian forces. From 1942 to 1946 it operated in Ceylon (now Sri Lanka), Burma and India, but became a transport squadron in 1947 — in which role it remains. Lighter Dakotas and Valettas gave way to Beverleys in 1957 and Hercules in 1968, these specialising in route flying and air refuelling. No distinguishing unit markings are applied.

No 31 Squadron (RAFG), Panavia Tornado GR Mk 1, Bruggen, West Germany

A yellow star on the fin, plus a green and yellow arrowhead nose marking, identify the Tornado strike/attack aircraft of No 31 Squadron. This unit claims the honour of being the first RAF squadron in India (December 1915), where it operated with only short breaks until 1947. Transport was the prime role from 1939 onwards, and remained so when the squadron re-formed at Hendon in 1948. No 31 moved to Germany in 1955 to fly photo-recce Canberras, exchanging these for strike/attack Phantoms at Bruggen in 1971. It became a Tornado operator on 1 November 1984.



Westland Gazelle HT3; No 32 Squadron. John Dunnell

No 32 Squadron (Str/1 Group), HS Andover C Mk 1/CC Mk 2, BAe 125 C Mk 1/2/3, Westland Gazelle HT Mk 3/HC Mk 4, Northolt, Middx

DH2s, DH5s and SE5as equipped No 32 Squadron during its early years in France, and the fighter theme was perpetuated in home defence duties between the wars. In November 1937, a squadron Gauntlet became the first aircraft to intercept a target under ground radar control during trials of Britain's new and highly secret defensive screen. After flying Hurricanes in the Battle of Britain, the squadron moved to North Africa in 1942, supporting the 'Torch' landings. Later years were spent in the Middle East and Near East with Vampires (1949) and Canberras (1957). In 1969 the No 32 Squadron 'number plate' was transferred to what was formerly the Metropolitan Communications Squadron. Three types of aircraft are employed on the squadron's task of transporting high-ranking military and government officials. Insignia is a hunting horn.



Panavia Tornado F3; No 29 Squadron. John Dunnell



SEPECAT Jaguar GR1A; No 41 Squadron. John Dunnell

No 33 Squadron (Str/1 Group) Westland Puma HC Mk 1, Odiham Hants

Since June 1971, Puma helicopters have equipped No 33 Squadron for tactical support of the army, including short-notice overseas deployment. Previously it was a fighter unit, formed in January 1916, initially for fighter defence against airship raids. After disbandment from 1919 to 1929, day-bomber Horsleys were used, followed by the popular Hart – with which No 33 was the first, in 1930. In the Middle East from 1935, the unit flew in the Western Desert, Greece and Crete campaigns, then returned to the UK for D-Day. It was part of the German occupation force until transferred to Malaya for anti-guerilla operations with Tempests and Hornets. From 1955, night fighter Venoms, Meteors and Javelins were employed in defending the UK before No 33 became a Bloodhound SAM squadron in Malaysia from 1965 to 1970. Its Pumas wear the badge of a hart's head, recalling earlier equipment.

No 38 Squadron 'Shadow' for No 236 OCU
No aircraft markings applied.

No 41 Squadron (Str/1 Group), SEPECAT Jaguar GR Mk 1A, Coltishall, Norfolk

Assigned to tactical recce, with a secondary attack capability, this unit partners Nos 6 and 54 Squadron in the Coltishall wing, its aircraft wearing a double-armed cross flanked by red bars. It was operational in France during World War 1, then as a UK air defence Squadron from 1923. Its first monoplane (1939) was the Spitfire, which it flew until 1947, operating on the Continent in 1944-46. Jet-powered Meteors replaced Hornets in 1951 and were followed by Hunters, Javelins and Bloodhound SAMs. Phantoms were employed in the recce role at Coningsby until the present No 41 Squadron formed at Coltishall on 1 April 1977.

No 42 Squadron (Str/18 Group), BAe Nimrod MR Mk 2, St Mawgan, Cornwall

No 42's long history of maritime operations began with its reformation as a Vildebeest torpedo-bombing squadron in 1936, its former existence having been in France and Italy during 1916-19. Anti-ship missions were flown with Beauforts in the Mediterranean from 1942, but No 42 became a Blenheim bomber and Hurricane ground attack unit in Burma from early-1943. It ended the war flying Thunderbolts, then came back to the UK as a Beaufighter attack unit of Coastal Command until 1947. In 1952 Shackletons were issued to a re-formed No 42 Squadron for maritime reconnaissance. The 'Shack' was used as a bomber during the Oman rebellion of 1957. It was replaced by Nimrod MR Mk 1s in 1971. The more capable Mk 2 model was introduced in 1983.

No 43 Squadron (Str/11 Group), McDonnell Douglas Phantom FG Mk 1, Leuchars, Fife

Known as the 'Fighting Cocks' after its badge, No 43 Squadron is partnered by No 111 in its role of identifying all unannounced intruders in the northern half of the UK Air Defence Region, although it has an additional role of defence of the Fleet. The squadron formed in Scotland during 1916 for service in France, then spent 1926-39 as a fighter unit on the South Coast. It was first with Gamecocks, in 1926, then flew Siskins and the graceful Fury before receiving Hurricanes in 1938. After the occasional rest period in Scotland, it left for North Africa in 1942, seeing the end of the war whilst flying from Italy, where it stayed until 1947. No 43 arrived at Leuchars in 1950, a year after reformation, and flew Meteors and, from July 1954, the RAF's first Hunters, which it took to Cyprus and Aden from 1961 to 1967. A new No 43 formed at Leuchars on 1 September 1969, equipped with the former RN FG Mk 1 model of Phantom. Re-equipment with Tornado F Mk 3s is planned in 1989.

No 45 Squadron 'Shadow' for the Tornado Weapons Conversion Unit

Markings are a blue, winged camel flanked by blue bars containing red diamonds, plus the TWCU fin badge of a crown, sword and crossed arrows.

No 47 Squadron (Str/1 Group), Lockheed Hercules C Mk 1/3, Lyneham, Wilts

No 47 was deployed in Greece and Iraq during World War 1 before becoming a component of

the British force aiding White Russians against the Bolsheviks. It was re-constituted in Egypt in 1920, then operated in Sudan, using Fairey III floatplanes on the Nile for a time. Vincents and Wellesleys bombed Italian positions in what is now Ethiopia during 1940, the squadron turning to anti-shipping attack with Beauforts, Beaufighters and Mosquitos from 1942, operating in the far east in 1942-46. Halifax Mk A7/9s were the equipment when No 47 converted to transport roles in the UK during 1946, these giving way to Hastings and Beverleys (of which the squadron was the first operator) before the present Hercules arrived in 1968. The squadron flies its aircraft mainly in the tactical, or short-range transport role and includes a Flight assigned to support the SAS and other 'special forces.'

No 51 Squadron (Str/18 Group), BAe Nimrod R Mk 1, Wyton, Cambs

Equipped with a reconnaissance model of the Nimrod, which is officially assigned to calibration, No 51 Squadron applies the badge of a flying goose to its aircraft (which can be recognised, in any case, by the fact that they have an extended MAD tailboom). The squadron flew various types of fighter on anti-Zeppelin patrols in 1916-19, but did not reappear in the Order of Battle until formed as a light bomber squadron in 1937. It operated Whitleys and Halifaxes during World War 2, then became a transport squadron with Stirlings and Yorks until disbanded in 1950. In 1958, No 192 Squadron, an intelligence-gathering unit flying Comets and Canberras, was re-numbered '51', those aircraft giving way to Nimrods in 1974.

No 54 Squadron (Str/1 Group), SEPECAT Jaguar GR Mk 1A, Coltishall, Norfolk

Strike attack Jaguars marked with a rampant lion, plus a blue and yellow checkerboard, are operated by No 54 Squadron. This squadron flew Pups and Camels in France up to 1919, then re-formed in 1930 for home air defence. Spitfires were received in 1939 and took part in the Dunkirk evacuation and the Battle of Britain. As the threat of invasion receded, it joined in the fighter sweeps over France from 1941, but was posted to Australia for air defence from 1942 until 1945. Reborn in the UK with Tempests almost immediately, the squadron specialised in ground attack, later flying Vampires, Meteors, Hunters and Phantoms, until the present Jaguars arrived in 1974. Formally re-constituted at Lossiemouth on 29 March that year, No 54 took up station at Coltishall on 8 August 1974, and like co-resident Nos 6 and 54 Squadrons is available for rapid re-deployment to the NATO flanks in an emergency.



BAe Nimrod MR2s; No 42 Squadron. British Aerospace

No 55 Squadron (Str/1 Group),
Victor K Mk 2, Marham, Norfolk

Since 30 June 1986, when No 57 Squadron disbanded, this unit has been the sole operator of the Victor aerial refuelling tanker. The squadron formed in 1916 and became the first DH4 operator early the next year. In October, 1917 it was (with Nos 100 and 216 Squadrons) a founder member of Trenchard's Independent Force of strategic bombers. From 1920 to 1939 No 55 operated in Iraq, then took part in the Western Desert campaign and invasion of Italy, flying Baltimore and Boston light bombers. Disbanded in 1946, it did not re-form until 1 September 1960 when equipped with Victor strategic bombers. Tanker models of Victor took over from 1965, in which year No 55 moved from Honington to Marham. The squadron, which absorbed No 232 OCU on 4 April 1986, marks its aircraft with the insignia of a hand clutching a spear.



Victor K2; No 55 Squadron. John Dunnell

No 56 Squadron (Str/11 Group),
McDonnell Douglas Phantom FGR Mk 2
Wattisham, Suffolk

No 56 was one of World War 1's most notable fighter squadrons, its success beginning in March 1917 when it became the first RFC unit equipped with the SE5. Squadron pilots included two high-scoring VCs: Capt Albert Ball (40 victories) and Major J. T. B. McCudden (57 victories). After flying Hurricanes in the Battle of Britain, No 56 was the initial recipient of Typhoons, in September 1941, these aircraft proving the best counter then available to the FW 190, despite early problems. The squadron also pioneered with the Swift in 1954, similarly suffering difficulties which could not be rectified. The more successful Hunter and Lightning followed, and in March 1976 the present Phantoms were received for UK air defence duties. A Phoenix badge, plus red and white checks, are prominent on No 56's aircraft.

No 60 Squadron (RAFG), HS Andover
C Mk 1/CC Mk 2 and Hunting-Percival
Pembroke C(PR) Mk 1, Wildenrath,
West Germany

The RAF Germany Communications Squadron was given the No 60 'number plate' in February 1969 and this former fighter squadron began receiving Andovers in March 1987 as replacements for its ageing Pembroke C MK 1s in light transport and communications roles. The aircraft's fin badge is the head of the markhor's (Himalayan goat) in blue. Lt Col W. A. 'Billy' Bishop, VC (72 aerial victories) was an early CO whilst the squadron was operating in France during World War 1. From 1920 onwards it flew in India, participating in the Burma campaign with Blenheims and Hurricanes before taking up station in Singapore in 1945 for local air defence. It was a prime unit in the Indonesian confrontation of the 1960s, and has more 'lasts' than 'firsts' to its credit: final RAF first-line Meteors (September 1961); ditto Javelins (April 1968); and last with Pembrokes anywhere in the world. Most of the Pembrokes had been withdrawn by early-1988, but two photo-survey models were then still awaiting replacement by a modified Andover.



McDonnell Douglas Phantom F-4J (UK); No 74 Squadron.

No 63 Squadron 'Shadow' for
No 2 Tactical Weapons Unit

Aircraft markings are a black and yellow checkerboard.

No 64 Squadron 'Shadow' for
No 228 Operational Conversion Unit

Aircraft carry the fin markings of a scarab flanked by diamonds.

No 65 Squadron 'Shadow' for
No 229 Operational Conversion Unit

Markings are a lion upon white arrowhead containing eight red chevrons.

No 70 Squadron (Str/1 Group), Lockheed Hercules C Mk 1/3, Lyneham, Wiltshire
Bombers and transports have been in this squadron's inventory almost since it was formed. Although a fighter and ground attack unit in France between 1916 and 1918, being the first with the well-known Sopwith Camel (July 1917), it re-formed in Egypt during 1920, there to fly the classic large biplanes: Vimy, O/400, Vernon, Victoria and Valentia. For most of World War 2, it operated Wellington bombers against Italian and German targets in North Africa, but turned to transport in 1948. Hastings and Argosies were flown from Cyprus beginning in 1956, followed by Hercules from November 1970. In February 1975, No 70 joined the transport wing at Lyneham, its duties now including low-level cargo dropping and more general fetching and carrying, principally for the army.

No 72 Squadron (Str/1 Group), Westland Wessex HC Mk 2, Aldergrove, NI

The insignia of a swift flanked by blue bars identifies the transport helicopters of this unit. Formed for fighter and recon duties in Iraq during 1918, the squadron was dormant from 1919 until February 1937, when it re-formed for home defence as the first Gladiator unit. These aircraft gave way in April 1939 to Spitfires, which the squadron flew from Biggin Hill and Croydon in defence of London during the height of the Battle of Britain. A later transfer resulted in No 72 fighting on the North African and Italian fronts though it returned to the defensive role post-war with Vampires, Meteors and Javelins. In November 1961, Belvedere twin-rotor helicopters were received at Odiham, giving way to the present equipment from August 1964. The squadron moved to Aldergrove in 1981.

No 74 Squadron (Str/11 Group)

McDonnell Douglas Phantom F-4J(UK),
Wattisham, Suffolk

'The Tigers' are one of the RAF's best-known fighter squadrons, their past members including Maj Edward Mannock, VC, the top-scoring fighter pilot (73 victories) of World War 1. Disbanded in 1919, the squadron re-emerged in 1935 with Demon fighters on Malta during the Abyssinian crisis. Back in the UK from 1936, it flew Spitfires over the Dunkirk beaches and in the early stages of the Battle of Britain before mounting offensive sweeps over occupied France in 1941. Following a mid-war interlude in the Near East, No 74 supported the Invasion as a unit of the 2nd Tactical Air Force, ending its war based in the Netherlands. In June 1945, 'The Tigers' became only the third Meteor jet fighter squadron, operating from Colerne, and later, Horsham St Faith (now Norwich Airport). At nearby Coltishall, history was made in 1960 when the arrival of Lightnings made No 74 the RAF's first supersonic fighter squadron. After a spell in Singapore (1967-71), the squadron lay dormant until reformed in 1 July 1984 to fly 15 newly purchased, though second-hand Phantoms, appropriately decorated with a tiger's face and black/yellow bars.

No 78 Squadron (Str/Falkland Islands),
Boeing-Vertol Chinook HC Mk 1 and
Westland/Sea King HAR Mk 3,
Mount Pleasant

Formed in 1916 to intercept Zeppelins and the later Gotha aeroplanes raiding London, No 78 disbanded in 1919 and was not re-formed until 1936. In its second incarnation, the squadron was equipped with bombers, starting with the Heyford and progressing through Whitleys and Halifaxes. With the coming of peace in 1945, conversion to Dakotas saw No 78 in Transport Command and based in the Middle East. Valettas, used from 1950, gave way to Pioneers (1956), then Twin Pioneers (1958), before Wessex helicopters were adopted in 1965. The squadron disbanded in Oman during 1971, as Britain pulled-out of the Middle East, and did not re-appear until 22 May 1986 when it formed from the Chinooks of No 1310 Flight and Sea Kings of No 1564 Flight. Transport support of the army is the squadron's main role, the Sea Kings also performing rescue tasks.



Lockheed Hercules C3; No 70 Squadron.
John Dunnell

**No 79 Squadron 'Shadow' for
No 1 Tactical Weapons Unit**

Aircraft markings are a red arrow on a white bar each side of the fuselage roundel.

**No 84 Squadron (Str/AHQ Cyprus),
Westland Wessex HU Mk 5C, Akrotiri,
Cyprus**

Strong associations with the Near East are maintained to this day by No 84 Squadron, a unit which has been based abroad for all but seven non-operational months of its long career. After flying SE5s on fighter duties in France (during which Capt A. W. Beauchamp-Proctor gained a VC for sustained endeavour), the squadron took up station in Iraq during 1920 and remained there for 20 years. Its Blenheims flew in the Greek campaign of 1940-41 and were subsequently transferred to the Far East to combat Japanese invaders. In December 1942 it became one of only four units to fly the Vultee Vengeance dive-bomber operationally, although they were soon replaced by Mosquitos. After a brief return to Iraq post-war, No. 84 again re-deployed eastwards to fly its Brigands (the first of the type in RAF service) against Malayan communist guerrillas. Converted to transport (Valetta, Beverley and Andover), the squadron moved to Akrotiri in January 1972, initially with Whirlwind helicopters. Conversion to Wessex HC Mk 2s followed in March 1982, with ex-Navy Wessex HU 5s replacing them in 1985. 'A' Flight is assigned to search and rescue for the local RAF armament training base, whilst 'B' Flight provides light transport support for the UN peacekeeping forces in Cyprus. Squadron insignia is a scorpion, but each helicopter wears a different 'ace' or 'joker' playing card motif.



Westland Wessex HU5C; No 84 Squadron. Jeremy Flack

**No 92 Squadron (RAFG),
McDonnell Douglas Phantom FRG Mk 2,
Wildenrath, West Germany**

Briefly extant in World War 1, No 92 Squadron re-formed with Blenheim twin-engined fighters in November 1939, but soon became a Spitfire unit. In February 1941, it was the first to be equipped with cannon-armed Spitfire Vs. It deployed to Egypt in 1942 and during the Western Desert campaign supported Montgomery's 8th Army in its spectacular success against Rommel's forces at El Alamein. Involved in the invasion of Sicily and Italy, it finished the war with a claimed score of 317½ enemy aircraft destroyed: the RAF record. No 92 was reconstituted post-war as a home defence squadron, flying Meteors, Sabres and Hunters. In 1961-62 the 'Blue Diamonds' Hunter team was the RAF's premier aerobatic unit — and also the last Hunter air defence squadron. No 92 moved to Germany in December 1965, two years after receiving Lightnings, and converted to Phantoms at Wildenrath on 1 April 1977. Wearing a cobra badge, plus red and yellow checks, its aircraft joined with those of No 19 squadron in policing the border with Eastern Germany.

**No 100 Squadron (Str/18 Group),
English Electric Canberra B Mk 2, T Mk 4,
E Mk 15 and TT Mk 18, Wyton, Cambs**

No 100 Squadron was formed in February 1917 as the first specialised RFC night bomber squadron, and operated giant O/400s in the closing stages of World War 1. It was later a day-bomber, then a torpedo-bomber squadron, operating the RAF's first Vildebeests in Singapore until over-run by the Japanese in February 1942 — still operating its elderly biplanes! When re-formed in December 1942, No 100 had the redoubtable Lancaster, with which it participated in the bomber offensive against Germany. In April 1954, Lincolns gave way to Canberras, whilst Victors were employed from 1962 to 1968. When re-formed in 1972, No 100 had Canberras again, though this time for the provision of target facilities: towed for air and ground gunners, or 'silent' to test air and ground radar operators. The unit moved to Wyton in January 1982 and adorns its aircraft with a skull and crossbones on a blue and yellow checkerboard.

**No 101 Squadron (Str/1 Group) BAC
VC10 K Mk 2/3, Brize Norton, Oxon**

The tanker model of VC10 — identifiable by its hemp-coloured paint scheme — was selected as a partial replacement for the Victor, and conversions of former civil aircraft were undertaken for No 101 Squadron, which formed at Brize on 1 May 1984. Regularly tasked with supporting air defence fighters, as well as other types of aircraft on deployment overseas, the unit is no stranger to heavy equipment. It was in the bombing 'business' from 1917 until disbanded as a Vulcan unit in 1982 — but not before one of its aircraft had flown an epic sortie to launch the bombing assault on invading Argentines in the Falkland Islands. No 101 had formerly been sole operator of the ungainly Sidstrand (1929-36) and spent the latter part of World War 2 in the cloak-and-dagger world of electronic counter-measures, flying Lancasters. Another of its distinctions was gained in May 1951 when No 101 became the first Canberra jet bomber squadron.



BAC Bloodhound Mk 2 SAM;
No 85 Squadron. Peter R. March

**No 85 Squadron (Str/11 Group), BAC
Bloodhound Mk 2 SAM, West Raynham,
Norfolk, and detachments**

Sharing the responsibility of medium-range SAM defence of the East Coast with No 25 Squadron, this unit flew SE5s on the Western Front in 1918, but remained dormant after 1918 until re-activated as a fighter unit in 1938. Its Hurricanes were almost all lost in the retreat from France in May 1940, after which it turned to night fighting with Havocs and Mosquitos. Later, defence turned to offence, as No 85 harassed German night fighters in their own airspace. The night/all-weather role remained after conversion to jets (Meteor and Javelin), but in 1963 No 85 turned to the target facilities role, disbanding in 1975. On 12 December that year, it became a surface to air missile (SAM) unit with HQ, 'A' and 'D' Flights all at West Raynham, plus 'B' Flight at North Coates and 'C' Flight at Bawdsey.



BAC VC10 K3; No 101 Squadron.
Peter R. March



EE Canberra TT18, No 100 Squadron. John Dunnell



McDonnell Douglas Phantom FG1; No 111 Squadron. Jeremy Flack

No 111 Squadron (Str/11 Group),
McDonnell Phantom FG Mk 1, Leuchars, Fife

Universally known as 'Treble One', this squadron partners No 43 in the busy task of defending Britain's northern shores and investigating unannounced aircraft transiting the waters between the UK and Iceland. No 111 disbanded in Palestine with Brisfits in 1920, but re-formed for home defence duties four years later. Hurricanes arrived in January 1938, giving the squadron its place in history as the RAF's first unit to operate this legendary monoplane. These aircraft were flown in the Battles of both France and Britain, before Spitfires were taken out to North Africa in 1942. Disbanded as an occupation squadron in Austria during 1947, 'Treble One' re-emerged in Fighter Command in 1953, gaining renown for providing the spectacular Hunter mass formation aerobatic team, the 'Black Arrows'. After flying Lightnings, the squadron converted to Phantom FGR Mk 2s in 1974 and took up station at its present base on 3 November 1975. Ex-Navy Phantom FG Mk 1s gradually took over from 1977 onwards, but No 111 is eventually to fly Tornado F Mk 3s. Its markings include a black lightning flash through the nose roundel.

No 115 Squadron (Str/1 Group)
HS Andover E Mk 3/3A, Benson, Oxon

The 'high-viz' red and white Andovers of No 115 squadron perform a vital role in calibrating the navigation and landing aids at RAF bases here and overseas. The type has been in use since 1976 (the unit moved from Brize Norton to Benson on 7 January 1983), but No 115 began life in 1917 with O/400 bombers. After re-formation in 1937, it flew Harrows, Wellingtons, Lancasters, Lincolns, Washingtons and jet Canberras in the same role, exclusively from British bases. Its calibration task, assigned in 1958, was formerly undertaken by Varsities and, later, Argosies.

No 120 Squadron (Str/18 Group),
BAe Nimrod MR Mk 2, Kinloss, Moray

Cheated out of combat in World War 1 by the Armistice, this squadron did not re-form until June 1941, when it received Liberators for long-range maritime reconnaissance — the first in the RAF to operate the type. Today, the role is unaltered, although a progression through Lancaster GR Mk 3 and Shackleton has brought the vastly superior Nimrod to the unit. No 120 arrived at Kinloss on 1 April 1959, and received Nimrods from February 1971 onwards. Aircraft are pooled with Nos 201 and 206 Squadrons and thus wear only a small copy of the station badge on the forward fuselage.

No 151 Squadron 'Shadow' for
No 2 Tactical Weapons Unit

Aircraft markings are a St Andrew's cross (white on blue background) on each side of the fuselage roundel.

No 201 Squadron (Str/18 Group)
BAe Nimrod MR Mk 2, Kinloss, Moray

Like the ten squadrons which immediately follow it, No 201 was formed from a naval air unit on 1 April 1918 — the RAF's birthday. It re-established after a decade of inactivity in 1929 to fly Southampton and London flying boats, these giving way to the mighty Sunderland in 1940. Heavily involved in Coastal Command's unceasing war against the German U-Boat, the squadron and its many companions played a vital role in keeping Britain's essential supply lines open. Not until 1957 was the Sunderland traded-in for land-based Shackletons, again in the maritime recce role. No 201 moved to Kinloss in March 1965 and became the RAF's first Nimrod squadron there in October 1970. Its aircraft are pooled with those of Nos 120 and 206 Squadrons.



HS Andover E3; No 115 Squadron. Daniel March

No 202 Squadron (Str/18 Group)
Westland/Sikorsky Sea King, HAR Mk 3, Fingleton, South Yorks, and detachments
No 202 Squadron re-formed at Alexandria, Egypt, in 1929 after brief World War 1 service and flew Fairey III seaplanes until outfitted with Scapa flying boats in 1935. There followed Londons, Catalinas and Sunderlands, the two last-mentioned operating with the unit from Gibraltar against Axis submarines in the Atlantic and Mediterranean. The squadron re-constituted in October 1946 to perform the unromantic, but necessary task of meteorological recce, flying Halifaxes, then Hastings. In September 1964 it became a helicopter rescue squadron with Whirlwinds, these being supplanted by the long range Sea King from May 1978 onwards. 'A' Flight at Boulmer officially equipped with the new type on

the first day of 1979, followed by 'B' Flight at Brawdy, 'C' Flight at Manston, 'D' Flight at Lossiemouth and 'E' Flight at Leconfield.

No 206 Squadron (Str/18 Group)
BAe Nimrod MR Mk 2, Kinloss, Moray

The World War 2 history of No 206 Squadron began in June 1936 when the unit was resuscitated with the legendary Anson. Anti-submarine patrols and attacks on enemy shipping were continued with Hudsons from March 1940, and further American equipment was to follow in the shape of the Fortress and Liberator. Between 1947 and 1950, No 206 changed to a transport unit and flew Yorks in the Berlin Airlift. When re-formed in 1952, it was back on the old role of maritime recce, first with Shackletons, then Nimrods from November 1970. The squadron has been at Kinloss since July 1965, and with Nos 120 and 201 it shares a common pool of aircraft, including the MR Mk 2P model with its aerial refuelling receiver capability.

No 208 Squadron (Str/18 Group) HS
Buccaneer S Mk 2B, Lossiemouth, Moray

No 208 was an army co-operation squadron in Egypt between the wars, and undertook the same role in the Western Desert campaign with Lysanders and Hurricanes. After an Italian interlude with ground attack Spitfires, the unit moved to the Middle East with the coming of peace, remaining there, apart from short periods, until disbanded with Hunters at Bahrain in 1971. Re-formed with Buccaneers on 1 March 1974, No 208 moved to its present base in July 1983, partnering No 12 Squadron in the maritime strike/attack role.

No 216 Squadron (Str/1 Group) Lockheed
TriStar K Mk 1, Brize Norton, Oxon

'Two-Sixteen' Squadron spent the inter-war years in the bomber-transport role in Egypt, flying types such as the DH10 until equipped with Bombays in 1939. By 1942-43, transport had become the only duty, remaining so until recently. In 1956, the squadron became the sole RAF operator of the graceful Comet jet airliner, the last of which was withdrawn in 1975. Briefly equipped with Buccaneers in 1979-80, it re-emerged on 1 November 1984 to fly the TriStars bought to expand the RAF's tanker fleet, although unconverted, airline-standard transports were flown initially. The first K Mk 1 tanker was handed over to the RAF on 24 March 1986. In prospect are marginally different K Mk 2, plus the KC Mk 1 freighter-tanker conversion with a large cargo door.



Westland/Aérospatiale Puma HC1; No 230 Squadron. Jeremy Flack

No 230 Squadron (RAFG), Westland/Aérospatiale Puma HC Mk 1, Gütersloh, West Germany

Provider of transport helicopter support to the army in Germany, this squadron was raised in the closing months of World War 1 for coastal defence, but disbanded in 1922. After reforming in 1934, it operated the maritime reconnaissance Singapore biplane flying boat, changing to Sunderlands in 1938. Sunderlands evacuated troops from Crete and 537 wounded members of Wingate's Chindit force from behind Japanese lines; and carried 5,000 tons of food to Berlin in the 1948 airlift. Transferred to army support, No 230 flew Pioneers from 1958 (adding a few Twin Pioneers in 1960-61), but converted to rotating wings during 1962 with the arrival of Whirlwinds. Flying Pumas since 1971, it moved to Germany in October 1980.

No 234 Squadron 'Shadow' for No 1 Tactical Weapons Unit

Aircraft markings are red diamonds on a black background.

No 360 Squadron (Str/18 Group), English Electric Canberra T Mk 17A, Wyton, Cambs

The RAF's youngest squadron formed on 1 April 1966 to fly Canberras equipped with jamming equipment to test the skills of air defence radar operators on land, sea and air. The new number was chosen because No 360 has a 25% Royal Navy personnel content, and every fourth CO is a naval officer. This unique squadron has been at Wyton since June 1974, its aircraft marked with the insignia of a moth upon a trident, plus red bars and a yellow lightning flash on each side of the fuselage roundel.

No 617 Squadron (Str/1 Group), Panavia Tornado GR Mk 1, Marham, Norfolk

Forever remembered as the squadron which undertook the May 1943 raid on Ruhr dams, commanded by Wg Cdr Guy Gibson, this unit is now a key element in Britain's home-based strike force. No 617 specialised in precision attack and pathfinding during its wartime career, and was to employ the mighty 12,000lb (5 443kg) Tallboy and 22,000lb (9 979kg) Grand Slam bombs devised by Dr Barnes Wallis. Post-war it flew Lincolns, Canberras and Vulcans, spending 1958-81 at its original base of Scampton. It re-formed on 16 May 1983 – 40 years to the day after the first operation – marking its Tornados on the fin and nose with a red lightning flash on a black background.

Remaining units of Strike Command have a shorter pedigree than squadrons, although Operational Conversion Units (OCUs) sometimes enjoy a prolonged career – such as No 231, which has been in continuous operation since October 1951. These other formations are dealt with more briefly. In a situation which does not require a full squadron, Flights are deployed:

No 1312 Flight (Str/Falkland Islands), Lockheed Hercules C Mk 1P/1K, Mount Pleasant, Falkland Islands

Aerial refuelling and maritime surveillance on behalf of the local garrison.

No 1417 Flight (Str/direct reporting), BAe Harrier GR Mk 3, Belize City Airport, Belize

Close support and reconnaissance for the British element defending Belize (formerly British Honduras) against Guatemalan territorial claims.

No 1563 Flight (Str/direct reporting), Westland/Aérospatiale Puma HC Mk 1, Belize City Airport, Belize

Helicopter support for UK troops in this Central American protectorate.

OCUs convert pilots and other aircrew to their particular type of first-line aircraft. In time of conflict OCU equipment and instructors would have a role to play, either through adoption of their 'shadow' squadron numbers or assignment as reinforcements to other squadrons operating the same type. Units marked * do not 'own' aircraft, but borrow equipment from other squadrons or a communal pool as required. No 237 also operates specially-equipped Hunters, as no dual-control Buccaneers exist.



HS Buccaneer S2B; No 237 OCU. Peter R. March

No 226 OCU (Str/1 Group), SEPECAT Jaguar, GR Mk 1A/T Mk 2A, Lossiemouth, Moray.

No 228 OCU (Str/11 Group), McDonnell Douglas Phantom FGR Mk 2, Leuchars, Fife. Wears markings of No 64 Squadron.

No 229 OCU (Str/11 Group), Panavia Tornado F Mk 2/F Mk 3, Coningsby, Lincs. Wears markings of No 65 Squadron.

No 231 OCU (Str/18 Group), English Electric Canberra B Mk 2/T Mk 4, Wyton, Cambs.

No 233 OCU (Str/1 Group), BAe Harrier GR Mk 3, GR Mk 5 and T Mk 4/4A, Wittering, Cambs.

No 236 OCU* (Str/18 Group), BAe Nimrod MR Mk 2, St Mawgan, Cornwall. Allocated No 38 as a 'Shadow' Squadron.

No 237 OCU (Str/18 Group), HS Buccaneer Mk 2A/B (and Hawker Hunter T Mk 7/8), Lossiemouth, Moray.

No 240 OCU (Str/1 Group), Boeing Vertol Chinook HC Mk 1 and Westland/Aérospatiale Puma HC Mk 1, Odiham, Hants.

No 241 OCU* (Str/1 Group), Lockheed TriStar K Mk 1 and BAC VC10 C Mk 1/K Mk 2/3, Brize Norton, Oxon.

No 242 OCU* (Str/1 Group), Lockheed Hercules C Mk 1/3, Lyneham, Wilts.

Two Tactical Weapons Units (TWUs) provide newly-qualified pilots with experience of weapons usage before they join their first squadron. Hawks have an emergency air defence function and Jet Provosts are used for training forward air controllers.

No 1 TWU (Str/11 Group), BAe Hawk T Mk 1A and Hunting Jet Provost T Mk 4, Brawdy, Dyfed. Wear Nos 79 or 234 'Shadow' Squadron markings.

No 2 TWU (Str/11 Group), BAe Hawk T Mk 1A, Chivenor, Devon. Wear Nos 63 or 151 'Shadow' Squadron markings.

There are four further training units, of which the TTTE and TWCU act in combination as an OCU.

Andover Training Flight*, (Str/1 Group), HS Andover C Mk 1, Benson, Oxon

SAR Training Squadron*, (Str/18 Group), Westland Wessex HC Mk 2, Valley, Anglesey

Trinational Tornado Training Establishment (TTTE) (Str/1 Group), Panavia Tornado GR Mk 1, Cottesmore, Leics. (Also with German and Italian personnel and aircraft.)

Tornado Weapons Conversion Unit (TWCU) (Str/1 Group), Panavia Tornado GR Mk 1, Honington, Suffolk

Finally there are the following miscellaneous units:

Berlin Station Flight (RAFG), de Havilland Chipmunk T Mk 10, Gatow, Berlin.

Electronic Warfare & Avionic Unit* (Str/18 Group), HS Andover C1Mk 1, Wyton, Cambs

No 1 Photographic Reconnaissance Unit (Str/18 Group), English Electric Canberra PR Mk 9, Wyton, Cambs

The Queen's Flight (Str/1 Group), BAe 146 CC Mk 2, HS Andover CC Mk 2, Westland Wessex HCC Mk 4, Benson, Oxon

Strike/Attack Operational Evaluation Unit (Str/direct reporting), Panavia Tornado GR Mk 1, Boscombe Down, Wilts

Tornado Operational Evaluation Unit (Str/direct reporting), Panavia Tornado F Mk 3, Coningsby, Lincs

SUPPORT COMMAND

Responsibilities of Support Command include the training of aircrew, air traffic controllers and servicing personnel, as well as the provision of aircraft overhaul and repair specialists and services. Units and their functions are summarised hereunder.

Central Flying School Scampton, Lincs, and detachments

The CFS, responsible for training Qualified Flying Instructors (QFIs), is the world's oldest such establishment, formed in 1912. Its HQ is at Scampton, although some aircraft are based alongside other units operating the same type for ease of servicing. The renowned 'Red Arrows' aerobatic team is a component of the CFS.

Scampton: BAe Bulldog T Mk 1, BAC Jet Provost T Mk 3A/5A, BAe Hawk T Mk 1A ('Red Arrows') and (occasionally) de Havilland Chipmunk T Mk 10; Tucano T Mk 1 on test prior to service release.

Shawbury: Westland/Aérospatiale Gazelle HT Mk 3

Syerston—Slingsby Venture T Mk 2 and sailplanes

Valley: BAe Hawk T Mk 1

Royal Air Force College BAC Jet Provost T Mk 5A, Cranwell, Lincs

Provides jet flying training to university graduates intending to make the RAF their long-term career. A sailplane section operates from Cranwell North.

'Direct entry' officers receive instruction at a Flying Training School (FTS), instead of Cranwell. Those with less than 90 hours of previous flying experience first fly 63½ hours on Chipmunks with the EFTS at Swinderby. They then progress to No 1 or No 7 FTS for 77 hours on Jet Provost T Mk 3As, after which 'streaming' takes place. Those chosen for fast-jet flying receive a further 54 hours on Jet Provost T Mk 5As at the same FTS before going to No 4 FTS for 75 hours on Hawks. The multi-engine stream pilots take 27 hours on the JP5A and then transfer to No 6 FTS for 45 hours in eight weeks on Jetstreams. Helicopter students go straight from the JP3A to No 2 FTS for 75 hours on Gazelles and 50 on Wessex in 28 weeks. Later this year the Shorts Tucano T Mk 1 will begin replacing the JP at No 7 FTS, followed by No 1 and the RAF College. In addition, No 6 FTS provides all non-pilot aircrew training on Dominies and Jet Provosts, whilst No 1 FTS includes the Bulldog of the Royal Navy Elementary Flying Training School.

Elementary Flying Training Squadron

de Havilland Chipmunk T Mk 10, Swinderby, Lincs.

No 1 FTS, BAC Jet Provost T Mk 3A/5A, Linton-on-Ouse, North Yorks (and Bulldog T Mk 1, RNEFTS, Topcliffe, North Yorks)

No 2 FTS, Westland/Aérospatiale Gazelle HT Mk 3 and Westland Wessex HC Mk 2, Shawbury, Salop.

No 4 FTS, BAe Hawk T Mk 1, Valley, Anglesey.

No 6 FTS, BAe Dominie T Mk 1, BAe Jetstream T Mk 1, BAC Jet Provost T Mk 5A.

No 7 FTS, BAC Jet Provost T Mk 3A/5A, Church Fenton, North Yorks.

University Air Squadrons (UAS) provide around 100 hours of flying to RAF-sponsored students during their three-year period at university before attending Cranwell. Equipment is the BAe Bulldog T Mk 1 throughout.

Aberdeen & St Andrews UAS, Leuchars, Fife.

Birmingham UAS, Cosford, Salop.



BAC Jet Provost T5A; Royal Air Force College Cranwell. Jeremy Flack



The Shorts Tucano T1 will join the RAF in 1988. Shorts

Bristol UAS, Filton, Avon.

Cambridge UAS, Teversham, Cambs.

East Lowlands UAS, Turnhouse, West Lothian.

East Midlands UAS, Newton, Notts.

Glasgow & Strathclyde UAS, Abbotsinch, Strathclyde.

Liverpool UAS, Woodvale, Merseyside.

London UAS, Abingdon, Oxon.

Manchester UAS, Woodvale, Merseyside.

Northumbrian UAS, Leeming, North Yorks.

Oxford UAS, Abingdon, Oxon.

Queens UAS, Sydenham, NI.

Southampton UAS, Lee-on-Solent, Hants.

S Wales UAS, St Athan, South Glam.

Yorkshire UAS, Fingingley, South Yorks.

Realistic training situations for student air traffic controllers are provided by a small fleet of civilian-flown Jet Provosts:

Central Air Traffic Control School, Jet Provost T Mk 4, Shawbury, Salop.

Three popular historic flights are maintained by Support Command:

Battle of Britain Memorial Flight, Coningsby, Lincs. Avro Lancaster, Hawker Hurricane and Supermarine Spitfire (plus de Havilland Chipmunk T Mk 10 and de Havilland Devon C Mk 2 for support.) BBMF is open to the public from 10am to 4pm, Monday – Friday, throughout the year, apart from Bank Holidays.

Meteor Display Flight, Scampton, Lincs, Gloster Meteor T Mk 7

Vulcan Display Flight, Waddington, Lincs, HS Vulcan B Mk 2.



BAe Hawk T1; No 4 FTS. Jeremy Flack



BAe Bulldog T1; Cambridge UAS. Peter R. March



deHavilland Chipmunk T10; No 6 AEF.
Jeremy Flack

HQ Air Cadets is a component of Support Command with duties including the provision of flying experience to young men and women of the Air Training Corps youth movement and Combined Cadet Corps (RAF sections). It has at its disposal 13 Air Experience Flights (AEF) and 28 Volunteer Gliding Schools (VGS), principally staffed by part-time officers of the RAF Volunteer Reserve. The AEFs are equipped with the de Havilland Chipmunk T Mk 10 (No 5 also has a unique Beagle D5/180 Husky) apart from No 13, which has a Bulldog.

- No 1 AEF, Manston, Kent.
- No 2 AEF, Hurn, Dorset.
- No 2 AEF, Filton, Avon.
- No 4 AEF, Exeter, Devon.
- No 5 AEF, Teversham, Cambs.
- No 6 AEF, Abingdon, Oxon.
- No 7 AEF, Newton, Notts.
- No 8 AEF, Shawbury, Salop.
- No 9 AEF, Finningley, South Yorks.
- No 10 AEF, Woodvale, Merseyside.
- No 11 AEF, Leeming, North Yorks.
- No 12 AEF, Turnhouse, West Lothian.
- No 13 AEF, Sydenham, NI.

Gliding Schools operate either the powered Slingsby T.61 Venture T Mk 2 or the newly-delivered winch-launched sailplanes. Venture-equipped schools are:

- No 612 VGS, Benson, Oxon.
- No 613 VGS, Halton, Bucks.
- No 616 VGS, Henlow, Beds.
- No 624 VGS, Chivenor, Devon.
- No 632 VGS, Ternhill, Salop.
- No 633 VGS, Cosford, Salop.
- No 635 VGS, Samlesbury, Lancs.
- No 637 VGS, Little Rissington, Glos.
- No 642 VGS, Linton-on-Ouse, North Yorks.
- No 644 VGS, Syerston, Notts.
- No 663 VGS, Kinloss, Moray.
- No 664 VGS, Bishop's Court, NI.

Winch-launching schools operate mainly the Grob G.103 Viking T Mk 1, the exception being No 618 VGS with Schleicher ASK-21 Vanguard T Mk 1s.

- No 611 VGS, Swanton Morley, Norfolk.
- No 614 VGS, Wethersfield, Essex.
- No 615 VGS, Kenley, Kent.
- No 617 VGS, Manston, Kent.
- No 618 VGS, West Malling, Kent.
- No 621 VGS, Weston-super-Mare, Avon.
- No 622 VGS, Upavon, Wilts.
- No 625 VGS, South Cerney, Glos.

- No 626 VGS, Predannack, Cornwall.
- No 631 VGS, Sealand, Cheshire.
- No 634 VGS, St Athan, South Glam.
- No 636 VGS, Swansea, West Glam.
- No 643 VGS, Scampton, Lincs.
- No 645 VGS, Catterick, North Yorks.
- No 661 VGS, Kirknewton, Lothian.
- No 662 VGS, Arbroath, Tayside.

Gliding instructors are trained on all types in current service by the ACCGS. The unit also operates the Schleicher ASW-19 Valiant T Mk 1 and Schempp-Hirth Kestrel (Janus C) as advanced equipment for training and competition flying.

Air Cadet Central Gliding School, Syerston, Notts. (Kestrel, Valiant, Vanguard, Venture, Viking).

Miscellaneous units completing the Support Command structure are generally out of the scope of this guide. However, the following bases contain major installations.

RAF Abingdon, Oxon: Jaguar, Hawk and Buccaneer maintenance unit; accident recovery unit; RAF Exhibition Unit (static display airframes, replicas and cockpit sections.)

RAF Brüggen, West Germany: No 431 Maintenance Unit (aircraft overhaul and repair for RAFG.)

RAF Cosford, Salop: No 2 School of Technical Training (grounded airframes), plus Aerospace Museum.

RAF Halton, Bucks: No 1 School of Technical Training (grounded airframes), plus glider flight.

RAF Shawbury, Salop: aircraft long-term storage site.

RAF St Athan, West Glam: maintenance for most front-line aircraft.



Grob Viking TX 1; Air Cadets. Jeremy Flack

Cross-reference to aircraft and operators

Type	Operator		
Andover	32*, 60, 115 Sqdns; ATF, EWAU, TQF	Shackleton	8 Sqdn
BAe 125	32 Sqdn*	Tornado GR	9, 14, 15, 16, 17, 20, 27, 31, (45), 617 Sqdns; SAOEU, TTTE, TWCU
BAe 146	241 OCU*; TQF*	Tornado F	5, 11, 29, (65) Sqdns; 229 OCU, TOEU
Buccaneer	12, 208 Sqdns; 237 OCU*	TriStar	216 Sqdn; 241 OCU*
Bulldog	CFS*, 1 FTS*, UASs (x16) 13 AEF	Tucano	CFS
Canberra	100, 360 Sqdns; 231 OCU, PRU	VC10	10, 101 Sqdns; 241 OCU*
Chinook	7, 18, 78* Sqdns; 240 OCU*	Victor	55 Sqdn
Chipmunk	EFTS, 1-12 AEFs, Berlin SF, BBMF	Wessex	22, 28, 72, 84 Sqdns; SARTS, 2 FTS*, TQF*
Devon	BBMF*	Sailplanes (including powered gliders)	
Dominie	6 FTS*	Kestrel	ACCGS*
Gazelle	32 Sqdn*, CFS*, 2 FTS*	Valiant	ACCGS*
Harrier	1, 3, 4 Sqdns; 1417 Flt, 233 OCU (63), (79*), (151), (234)	Vanguard	618 VGS, ACCGS*
Hawk	Sqdns; 1 TWU*, 2 TWU, CFS*, 4 FTS	Venture	612, 613, 616, 624, 632, 633, 635, 637, 642, 644, 663, 664 VGSs; ACCGS*
Hercules	24, 30, 47, 70 Sqdns; 242 OCU, 1312 Flts	Viking	611, 614, 625, 617, 621, 622, 625, 626, 627, 634, 636, 643, 645, 646, 662, VGSs; ACCGS*
Hunter	237 OCU	Historic aircraft	
Husky	5 AEF*	Hurricane	BBMF*
Jaguar	2, 6, 41, 54 Sqdns; 226 OCU (79) Sqdn*; 1 TWU*, CATCS, CFS*, RAFC, 1 FTS*, 6 FTS*, 7 FTS	Lancaster	BBMF*
Jet Provost	6 FTS*	Meteor	MDF
Jetstream	6 FTS*	Spitfire	BBMF*
Nimrod	(38), 42, 51, 120, 201, 206 Sqdns; 236 OCU	Vulcan	VDF
Pembroke	60 Sqdn – withdrawing	SAMs	
Phantom	19, 23, 43, 56, (64), 74, 92, 111 Sqdns; 228 OCU	Bloodhound	25, 85 Sqdns
Puma	33, 230 Sqdns; 1563 Flt; 240 OCU*	"Shadow" squadrons are shown in parentheses	
Sea King	78*, 202 Sqdn	* Unit operates more than one type of aircraft.	

Training for the Front Line

Photographs: Peter R. March



Hunter T7 – No 237 OCU – RAF Lossiemouth



Hawk T1A – No 1 TWU/234 Squadron – RAF Brawdy



Tomado GR1 – TWCU/45 Squadron – RAF Honington



Harrier GR3 – No 233 OCU – RAF Wittering



Jaguar T2 – No 226 OCU –
RAF Lossiemouth

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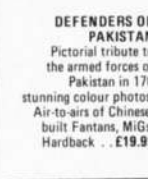
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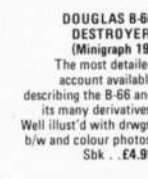
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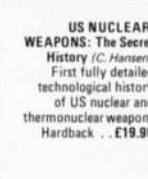
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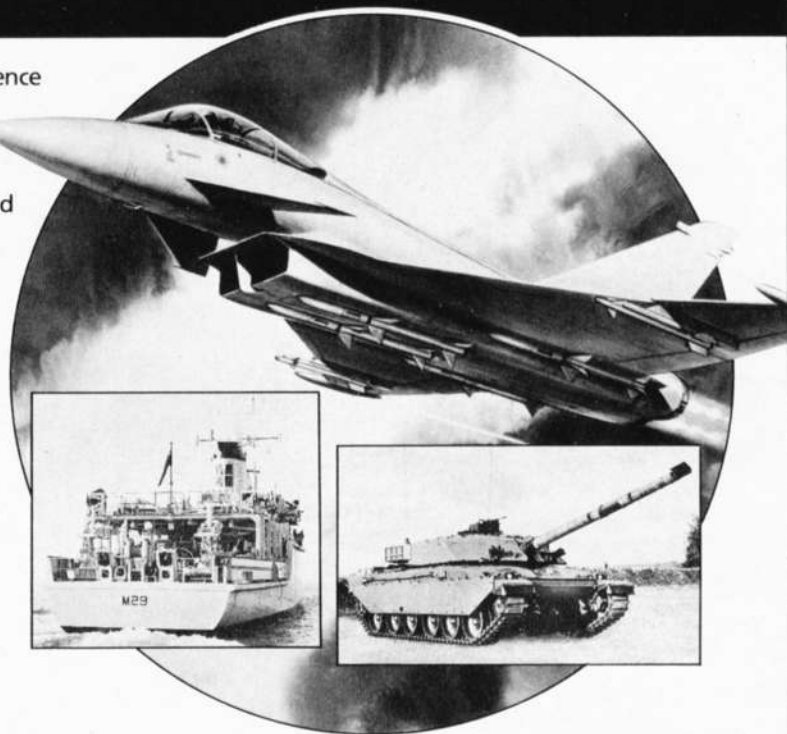
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