

AIR DISPLAY

R.A.F. COLERNE · 4th July, 1970

ROYAL AIR FORCES ASSOCIATION - CITY OF BRISTOL BRANCH

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Officer in Charge of Flying: Squadron Leader A. H. E. WELCH, D.F.C.

Members:

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Wing Commander W. J. L. SHEEHAN, D.F.C., A.F.R.Res.

Commentator:

Flight Lieutenant R. OSBORNE, R.A.F.

Senior Flying Control Officer:

Flight Lieutenant M. CYBULSKI

The City of Bristol Branch of the Royal Air Forces Association are indebted to:

The Ministry of Defence

British Aircraft Corporation

Rolls Royce Bristol Engine Division

and all who contributed to this programme and without whose help this Air Display would not have been possible.

All Proceeds from this display will be donated to

**The Royal Air Forces Association
City of Bristol Branch**

Royal Air Force Colerne

Foreword by Group Captain G. Young, O.B.E., the Officer Commanding Royal Air Force Colerne.

The Air Show being held at RAF Colerne today is in aid of the RAF Association—a worthy organisation devoted to the welfare of ex-members of the Royal Air Force.

This major air event is sponsored by the Bristol Branch of the Association who have arranged what promises to be an exciting flying programme in which many types of civil and military aircraft of several air forces are participating.

The Aviation Industry of the West Country has generously provided many interesting exhibits to add to your entertainment and there is also a static display of unique historic aircraft.

RAF Colerne is privileged to stage this show and it gives me great pleasure to welcome you here today. I hope you enjoy your visit and on behalf of the RAF Association thank you for your support.

A Short History of Royal Air Force Colerne

Instructions for building a new Fighter Command airfield, to be known as Royal Air Force Colerne, were given in September, 1940, and the first squadron of fighter aircraft moved into the airfield on 9th August, 1941.

During the war years that followed, squadrons of many nations serving with Fighter Command operated from this airfield both day and night, carrying out a variety of missions including day-fighter sweeps on Lorient and Brest and night-fighter interceptions over South-West England. In addition, Colerne was the base of many famous squadrons which after long periods of action over Northern France and the Low Countries, came here for short rest periods and to be re-equipped with more modern and faster types of aircraft. In fact, the first re-equipping of an RAF squadron with jet aircraft took place at Colerne.

On the other side of the airfield, No. 39 Maintenance Unit supplied fighter aircraft to the North African, Middle East and Far East theatres of war, and many hundreds of aircraft operating in those areas were ferried out from this airfield.

During the Allied invasion of Normandy, the beaches and landing area were patrolled continuously by night-fighters from Colerne; and later many support operations were flown from this airfield during the advance in Europe.

After the war, Colerne continued as a Fighter Command station until October, 1946, when it was handed over the Maintenance Command. There it remained until returning to Fighter Command in 1952. During this period Nos 39 and 49 Maintenance Units continued to carry out major servicing and repair operations.

In May, 1952, No. 238 Operational Conversion Unit of Fighter Command was formed at Colerne to train radar operators for the Night/All-Weather fighter forces.

On 1st January, 1957, RAF Colerne passed once again from Fighter Command, this time to join Transport Command, subsequently renamed Air Support Command. The first aircraft to arrive were the Hastings of No. 24 (Commonwealth) Squadron, shortly followed by those of No. 35 Squadron. They were joined in 1962 by No. 2 Squadron, Royal Air Force Regiment, the first RAF Regiment squadron to be parachute trained, and subsequently by No. 47 Air Despatch Squadron of the Royal Corps of Transport. This joint-Service team worked closely together in operations in Africa, the Middle East, the Caribbean and Europe until 1967, when the station again changed its role, as the Hastings were phased out of operational service.

Since 1968 RAF Colerne has been an engineering base for the Lockheed Hercules aircraft now in service with Royal Air Force Air Support Command.



The Royal Air Forces Association



What it is:

The Royal Air Forces Association is the largest association of serving and ex-service personnel, with a present membership of approximately 90,000. It has nearly 800 branches throughout the World. It is the only organisation officially recognised by the Air Council to maintain contact between serving and ex-service personnel and to safeguard the interests of R.A.F. service personnel on their return to civilian life.

It originated in 1931 as the Comrades of the Royal Air Forces Association. Ten years later it merged with the Old Comrades Association of the Women's Royal Air Force which had been formed in 1919. In 1943 its title was changed to The Royal Air Forces Association which was granted a Royal Charter of Incorporation by H.M. The Queen on December 4th, 1952.

Membership:

Its membership is open to anyone who has served not less than three months in the R.F.C., R.N.A.S. (Prior to 1918), R.A.F., W.R.A.F. their Auxiliaries or Reserves, the R.A.F. Nursing Service or a Dominion or Colonial Air Force.

Many Branches of the Association have their own Clubs, and Association Members travelling at home or overseas are assured of a warm welcome by fellow members where there is a R.A.F.A. Branch.

What it Does:

The R.A.F.A. deals with the pensions, legal, employment, sickness and other general welfare problems of all men and women who served in the Royal Air Forces, and their dependents, WHETHER OR NOT THEY ARE MEMBERS OF THE ASSOCIATION.

The Association has the advantage of the specialist knowledge and guidance of a number of eminent medical consultants and also has a Legal Panel to whom cases in which legal advice is required are referred.

The Association maintains a Convalescent Home at St. Annes-on-Sea, Lancashire and Sussex Downs, Sussex for ex-R.A.F. and W.R.A.F. personnel and their dependants. Priority is given to the disabled. Serving personnel and their dependants are also eligible for admission.

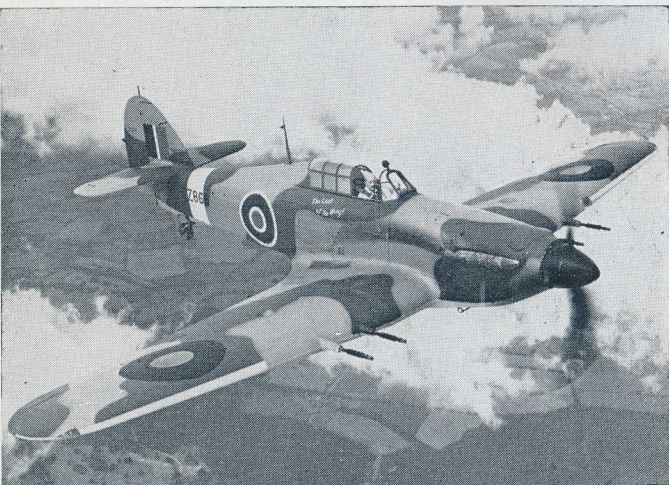


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Spitfire

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Hurricane

Famous fighter of the Battle of Britain, used extensively during the war in many roles. Appeared as a fighter-bomber, and also, when armed with 40 m.m. cannons, was used for ground attack.

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For further information why not visit one of the 15 units in the City, details of which can be obtained from our display stand in the static exhibition.

Or Write to:—

Headquarters, Bristol Wing A.T.C.

29 Victoria Square

Clifton

Bristol, 8.

Telephone Bristol 35708 (daily from 8.30 a.m. - 4.30 p.m.)

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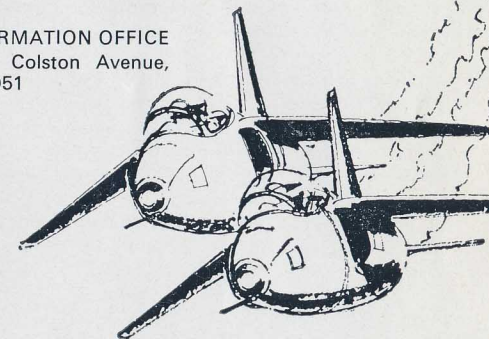
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The Royal Air Force Aerobatic Team - 1970

THE RED ARROWS

1. The Red Arrows were originally formed in 1965 and since that time have been the official Royal Air Force Aerobatic Team. For the first three years, the team operated on a year to year basis with personnel loaned from other Training Command units, but since 1969 the Red Arrows have been officially established as a full time unit. The team is based at R.A.F. Kemble in Gloucestershire, where it spends the winter months in intensive training prior to the air display season, which lasts from April until October.

2. The team flies the Hawker Siddeley Gnat advanced trainer, which is very suitable for display aerobatics being highly manoeuvrable with a good transonic performance. It is the smallest jet aircraft in service with the Royal Air Force, having a wing span of only 24 feet and it is powered by an Orpheus turbo-jet of 4,400 lbs thrust. The Red Arrows operate nine aircraft during their display although one spare aircraft normally accompanies the team.

3. The main characteristic of the Red Arrow's display sequence is that they are flown as tightly as possible, so as to remain close to the audience. Half way through the display, two aircraft split from the main formation to perform solo aerobatics and these aircraft synchronise with the main formation, thus keeping some action in front of the audience for the full duration of the show.

4. The full display sequence takes 17 minutes to complete, during which time the team carry out many formation changes, often when the aircraft are inverted. The most difficult formation to fly in swept-wing aircraft is 'Line Abreast', and this is demonstrated by the Red Arrows during their 'Wine-Glass' roll manoeuvre, when the aircraft maintain a wing tip separation of only six feet.

5. Since 1965, the team's red painted Gnats have given over 400 displays to many millions of people throughout Britain, Europe and the Middle East, appearing both live and on television.

6. The Personnel are as follows:

1. Sqn Ldr Dennis Hazell (*Leader*).
2. Flt Lt Euan Perreux.
3. Flt Lt Douglas Smith.
4. Flt Lt John Rust.
5. Flt Lt John Haddock.
6. Flt Lt Ian Dick (*Solo*).
7. Flt Lt Richard Duckett (*Solo*).
8. Flt Lt Douglas Marr.
9. Flt Lt William Lovegood.

Team Manager:

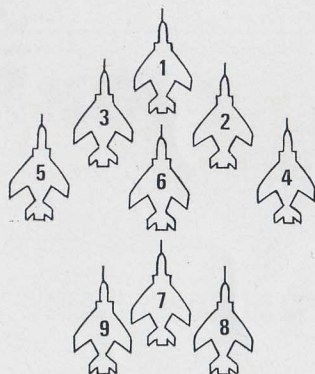
Flt Lt Peter Macintosh.

Team Engineer:

Flt Lt George White.

Team Adjutant:

Warrant Officer Leonard Ludlow.



If you have served in the R.F.C., R.N.A.S., R.A.F. or W.A.A.F.
or are serving in any of Her Majesty's Air Forces.
this should interest you.



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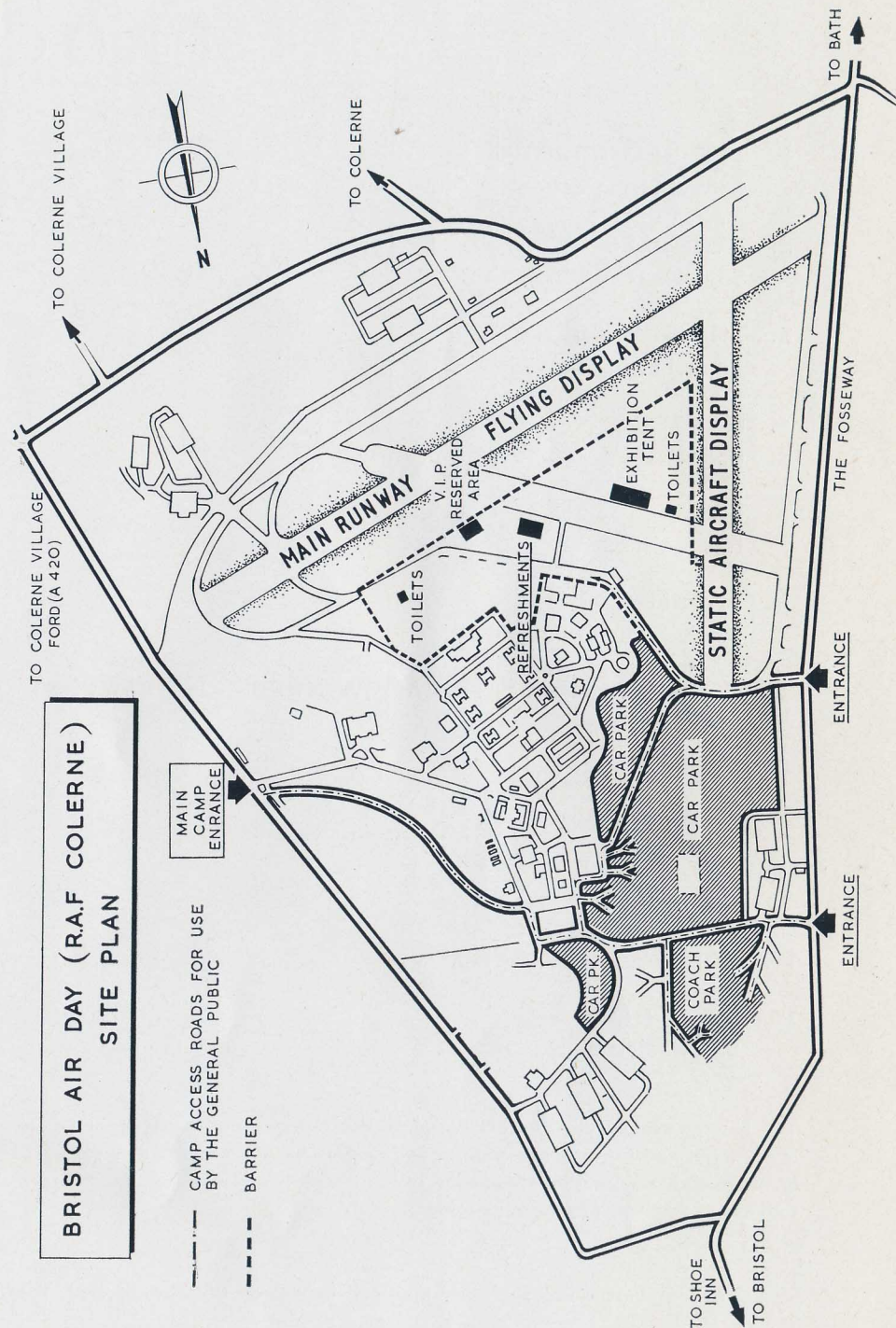
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PROGRAMME

1. **THE RED ARROWS**
Central Flying School
2. **HERCULES**
Support Command
3. **THE SKYLARKS**
Central Flying School
4. **HUNTER**
R.A.F. Valley
5. **GNAT**
R.A.F. Valley
6. **VARSIITY**
R.A.F. Strike Command
7. **WRIGHT JUBILEE TROPHY WINNER — JET PROVOST**
R.A.F. Training Command
8. **LADY ON WING**
The Tiger Club
9. **BETAS.**
The Tiger Club
10. **WALLIS AUTO GYRO**
11. **SOLO GLIDER**
621 Gliding Squadron

The appearance of the aircraft listed in the flying programme depends on operational and other commitments and cannot be guaranteed. Any changes in the programme will be announced over the public address system. Aircraft will not necessarily appear in numerical order.

12. **AVRO TUTOR**
Shuttleworth Trust
13. **SWORDFISH**
Royal Navy, Yeovilton
14. **SEA VIXEN**
Royal Navy, Yeovilton
15. **LANCASTER**
R.A.F., Strike Command
16. **H.S. 125**
Rolls Royce Bristol Engine Division
17. **SEA KING**
Rolls Royce Bristol Engine Division
18. **HARRIER**
Rolls Royce Bristol Engine Division
19. **SPITFIRE** **HURRICANE**
Rolls Royce, Derby Hawker Siddley
20. **CHIPMUNK**
Cambridge University Air Squadron
21. **S.A.S. FREE FALL PARACHUTE TEAM**
S.A.S., Hereford
22. **BA 4B**
Peter Philips

Neither the R.A.F.A. the R.A.F. or Ministry of Defence nor their respective officers accept any liability for personal injury or loss or damage to motor cars, motor cycles, cycles, aeroplanes etc., or any personal property what so ever resulting from or in consequence of the holding of this AIR DAY and admission to their airfield is at the risk of the individual.

Please use the litter bins and help keep the airfield Tidy. This event is all done by volunteers—we have to clear up afterwards. Thank you.

LS 326 — THE LAST OF THE SWORDFISH

By Lieutenant Commander Harold Lipscomb

Swordfish LS 326 was built by Blackburns at Sherburn in Elmet, Yorkshire in 1943. At the time all such aircraft were known as "Blackfish", and a common remark by the Fairey test pilots of the era was that they could tell the difference between a "Blackfish" and a "Swordfish" even blindfolded in the air—the bias obviously being towards the Fairey built aircraft.

Westland Aircraft took over the aviation interest of Faireys in 1960 and in September of that year Swordfish LS 326 was presented by them to the Royal Naval Air Station, Yeovilton.

So, fifteen years after being put up for disposal, the aircraft was back with the Fleet Air Arm. It's condition at this time was good and one could expect the engine to run for a further 400 hours. Keeping it flying however without a source of spares was another matter. The pattern of LS 326's usage was set early on—basically flying at big air displays throughout the United Kingdom and at Naval Air Days. In 1962 the Board of Admiralty decreed that the Swordfish may be kept as a flying exhibit on specially authorised occasions and for the necessary preliminary practice flights, and to be relegated to static display only when its serviceability or its appearance, renders it unfit or unsuitable as a flying exhibit. The retention however must involve no cost whatsoever to Navy estimates.

By December, 1967 the situation was very serious; a general conference was held at which a scheme was devised to build a spare engine. Bob Evans says: "It was a madcap idea—but we wrote off to all the Air Publications telling them we were looking for spare engines. We got dozens of replies, we were given the names of scrap yards in the Midlands, we heard from Museums, and were told of a Swordfish which had crashed in the Highlands. Next we received coverage from the National Press, which brought forth someone who had surveyed some unwanted engines in the Canal Zone. We also heard of some Swordfish out in Ontario in Canada. Finally one of our maintenance ratings happened to visit the Imperial War Museum and reported that there was a Stringbag there. The Museum also told us of another spare engine in their store. I negotiated to borrow the spare, removed bits and started rebuilding the crankcase; by then we also had a set of shafts and rods and two halves of the case and reduction gear.

"We knew that the engine in the Imperial War Museum was in fair condition but the authorities were rather loath to let us have it. However, eventually we talked them into exchanging their spare for it, having refurbished it so that the engine looked good externally".

"In summer 1969 I went down to the Museum with Chief Petty Officer Christopher Forbes and Leading Air Mechanic Steve Redwin to exchange the engine in the Swordfish. We arrived in the Imperial War Museum on a very hot day and found that there was no way of lifting the spare engine off the back of our lorry. We eventually decided to use one of the trees in the park, and swung the engine onto it, and then lowered it down. Getting the engine out of the Swordfish was another story; we had to lower the airframe off the stands, roll it forward and let the air out of the tyres to get the Swordfish as low as possible, unbutton the engine and put the jacks in place.

"Then it was a matter of hot, sweaty work with a lot of juggling and a great deal of swearing. It came out all right. When we looked closely at the removed engine we found it had hardly been used at all—luck was with us. Back at Yeovilton we stripped the engine down and used the nine cylinders and pistons, and along with the pieces we already had, started making up a new engine."

Outside assistance was given by Rolls Royce Bristol Engine Division. Mr. John Danes, their Piston Engine Chief Service Engineer who was brought up with Pegasus engines in his youth, is yet another key person in the survival of the LS 326. With his staff he rebuilt the crank shaft and con rod assembly and crank case, recertified the reduction gear supercharger, gave technical assistance and advice on modifying the sealing of the tappet rollers. They also manufactured new piston rings. One of the tools required to measure the angle of attack of the valve rocker arms, had to be made from the original drawings dated 1932.

Rolls Royce, and before them Bristol Siddeley, have been a continual source of advice and technical assistance. It is only through their help that the Swordfish still flies today.

Other firms have helped too. Dowtys of Cheltenham have made a complete set of engine seals. For this all the drawings had to be made up and specifications rewritten. Smith Industries have given plugs and instruments.

While work progressed on the new engine, LS 326 flew on until the 22nd July, 1969—then while being piloted by Captain 'Paddy' McKeown (the Chief Staff Officer to Flag Officer Naval Flying Training) the engine momentarily stalled while returning from a display at the BEA-BOAC sponsored High Wycombe Air Fair. Bob Evans and his team of maintenance checked the fuel system, hopefully thinking that the trouble might be a blocked carburettor jet or water in the fuel system. Unfortunately it was not the case; further inspection was needed, and on removing the cylinders the valve seats of nos. 5 and 8 were found to be cracked; the compression rings were also broken. Regrettably the Swordfish was grounded; and for the first time in many years the public attending RNAS Yeovilton's Air Day in September were without the familiar sight of the Stringbag lumbering by.

Throughout the winter Lt. Cdr. Martin Johnson, who relieved Bob Evans, Chief Petty Officer Forbes and Leading Air Mechanic Redwin, worked on the engine. Finally fitting it in the Swordfish after Christmas. On the 17th January, 1970 the new engine was test run on the ground in the presence of quite a few spectators; the engine serial number P38859 fired on the first crank.

In all, some 550 hours have been spent rebuilding this engine at Yeovilton, work which has involved many different people, all with one aim, simply to keep LS 326 flying. Now it is hoped to certify the new engine for a further 500 hours life; with an average use of 50 hours per annum the Swordfish has a new lease of life of ten further years. The airframe is still comparatively young and excluding mishaps could go on for anything up to 5,000 hours.

Plans are being made to start rebuilding another engine with the Imperial War Museum crankcase and the cylinders which have been acquired around the country.

LS 326, the last of the Swordfish, will fly for many years yet; perhaps those who see the aircraft flying at Yeovilton or at displays throughout the country will cast a backward glance at the achievements of the Swordfish—its legendary operations, its battles against adversity—for surely its survival is purely symbolic.

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Arrive early to avoid congestion and delays

The Royal Air Forces Association

CITY OF BRISTOL BRANCH



The Bristol Branch of the Association was inaugurated in December, 1934, the first meeting being held in the Grand Hotel. It continued its activities until 1939 and was instrumental in forming the local Air Defence Corps at Little John Street, which subsequently became the Air Training Corps.

With the outbreak of hostilities its scope was retarded but interest still continued and finally with the conclusion of the second World War became part of the National R.A.F.A.

With the return of peace the members decided to have its own club and premises. A Draw with the first prize a New Car was organised by the late Wing Commander Goldstone, this raised enough money to purchase the present Headquarters, Carlton Lodge, which was opened on 6th September, 1948, by Lord Tedder.

The Branch continues to flourish and last year a considerable sum was spent in improving the premises and adding to the amenities for the benefit of members.

R.A.F. SOLO AEROBATIC REPRESENTATIVE

Flying Officer Paul Dandeker

1. Born in Torquay, Devon in February, 1946, Flying Officer Dandeker was educated at St. Peter's Grammar School, Bournemouth. Later, having served two years in the Merchant Navy he joined the Royal Air Force and began flying training in the Chipmunk. He then went on to fly the Jet Provost and Gnat and finally when awarded his "Wings" was posted to the Central Flying School to train as a Flying Instructor.
2. From the Central Flying School he was sent to RAF Syerston in Nottingham for flying instructional duties, and whilst there, represented the station as the solo aerobatic display pilot. He was posted to No. 3 Flying Training School in 1970 where he is now serving as a Flying Instructor on No. 2 Squadron.

Flying Officer Dandeker is single and lives at 31 Station Road, Claygate, Surrey.

AIRCRAFT

The Jet Provost Mk 4 is a side by side—2 seat training aircraft. The aircraft is used in the RAF to train student pilots to wings standard at various Flying Training Schools throughout the United Kingdom.

The Mk 4 has a top speed of 400 mph and a service ceiling of 35,000 ft. and is fully aerobatic. It has a max T/O weight of 7520 lbs. and can carry 2100 lbs. of fuel, enough to keep it airborne at endurance speed for 2½ hours.

ENGINE

The JP 4 is powered by the Rolls Royce Viper 202 axial flow jet engine. This engine delivers 2450 lbs. thrust at max RPM. A later version of the Viper is now powering the BAC 167 (Strikemaster) at present being bought by many foreign countries.

N.B.—Flying Officer Dandeker was the winner of the Wright Jubilee Trophy which is presented by the Royal Air Forces Association on the 3rd June, 1970. This Trophy is competed for by QFI's from all Basic and Advanced Flying Training Schools and is awarded as a result of competition held at the Central Flying School RAF Little Rissington each year.

BRITISH AIRCRAFT CORPORATION.

GUIDED WEAPONS DIVISION ELECTRONIC AND SPACE SYSTEMS

When the aerospace activities of the Bristol Aeroplane Company, the English Electric Company and Vickers Limited were amalgamated to form British Aircraft Corporation in 1960, all the non-aircraft interests were consolidated into the Guided Weapons Division, with factories at Bristol and Stevenage.

In the field of Guided Weapons, the major systems developed have been the Bloodhound, Rapier and Thunderbird surface to air weapons, and the Vigilant and Swingfire anti-tank weapons. Developments are also continuing on naval weapons, such as Sea Wolf, Penguin and Terne.

During 1969, the Guided Weapons Division was further subdivided into Weapons Systems (mainly at Stevenage) and Electronic and Space Systems (mainly at Bristol).

Electronic and Space Systems effectively pursues all the non-weapons activities of the Division, and comprises four groups (Space Systems, Electronic Systems, Precision products and Reinforced and Microwave Plastics products).

Current activities comprise :-

Intelsat IV Communications satellites – for which Space Systems Group are major overseas contractor to Hughes Aircraft Company of America. To be launched from 1971 onwards, these are the fourth-generation of communications satellites, with a capacity for 6,000 two-way telephone channels or 12 colour television channels.

UK-4 Scientific satellite – successor to Ariel III, the highly successful scientific satellite launched in 1967, UK-4 is due for launch in 1971, carrying six experiments from various universities and scientific bodies. Space Systems Group are prime contractor and co-ordinating design authority.

Black Arrow X-3 Technological satellite – to be launched in 1971, Space Systems Group are prime contractor and co-ordinating design authority to the Ministry of Technology for this first satellite to be put into orbit by the all-British Black Arrow launcher system.

HEOS-A2 the second space probe for the European Space Research Organisation (ESRO) will be launched in 1972. Space Systems Group will provide attitude sensing and probe equipment, as provided for the predecessor, HEOS-A1. Attitude sensing is particularly vital to this spacecraft, since its orbit varies from 850 miles above the earth to some 180,000 miles into space.

Sounding rockets – Space Systems Group provide a complete service from design and manufacture of experiment payloads to launch and final data analysis. The major amount of work is in connection with Skylark, over 230 of which have been fired to date. In addition, work is undertaken on all types of sounding rockets, notably (in conjunction with Bristol Aerojet Ltd.) on the Skua and Petrel vehicles.

Data Recording Systems – Electronic Systems Group are manufacturing systems for Concorde, Phantom and Buccaneer aircraft; the Meteorological Office test aircraft; and for the Tracked Hovercraft prototypes. A new range of recording and monitoring system units for industrial applications is now available.

These are the current major areas of activity, models and graphic representations can be seen on the BAC Stand in the Exhibition tent.

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BRITISH AIRCRAFT CORPORATION

The British Aircraft Corporation was formed in 1960 by the amalgamation of the aircraft and guided weapons interests of the Bristol Aeroplane Company Limited, English Electric Limited and Vickers Limited.

Bristol Aircraft Limited, English Electric Aviation Limited and Vickers-Armstrongs (Aircraft) Limited—the aviation manufacturing subsidiaries of the three parent companies—became subsidiaries of the Corporation, which subsequently also acquired a controlling interest in Hunting Aircraft Limited.

Later, the Corporation was re-organised on a divisional basis around its main manufacturing centres. The extensive works area at Filton accommodates the Filton Division of the Corporation and also the Bristol Works of its Guided Weapons Division. Filton has been recognised as one of the main centres of aviation activity in this country since 1910, and, as the British design and manufacturing centre for the Concorde supersonic airliner, it is upholding this tradition.

The Corporation employs about 36,000 people and has extensive design, research and production facilities in its various factories. It also has at its command a vast fund of experience in the design and manufacture of civil and military aircraft, built up over the past 60 years.

Among the most notable achievements of the Corporation's member companies have been the Bristol Britannia, the world's first long-range turbo-prop airliner, the English Electric Canberra, which was the world's first jet bomber, the Lightning all-weather interceptor and the Viscount short-haul airliner, which was the first turbo-prop civil aircraft in the world.

More recently the BAC One-Eleven and VC 10 have provided further proof of the Corporation's extensive civil aircraft design "know-how". The short-haul One-Eleven is in service with airlines all over the world and is still selling steadily in its latest version, the "stretched" 500 Series. The long-range VC 10 and Super VC 10 are easily the most popular aircraft on the routes over which they operate and are now also in service with RAF Air Support Command.

The biggest and most challenging civil aircraft project currently under way in Europe is the Concorde supersonic airliner. British Aircraft Corporation and Aerospatiale, of France, are jointly designing, developing and producing this slender delta-winged aircraft, which will cruise at twice the speed of sound.

Concordes design, evolved after many years of research in Britain and France, is the result of a careful balancing of technical, commercial and operational factors. Its makers are confident that Concorde's performance and size are right for the first supersonic airliner and that it will have a long and profitable operational life.

It will carry up to 144 passengers over distances of 4,000 miles, cruising at a height of more than 60,000 ft. Its Mach 2+ cruise speed will enable it to cross the Atlantic in less than three-and-a-half hours, or under half the time taken by present-day jets.

A massive ground test and research programme has been going on in Britain and France for several years in order to guarantee Concorde's structural integrity and the safety and comfort of its passengers. Special laboratories have been built to test the aircraft's complicated systems and exhaustive structural tests will be carried out on full-scale test airframes at RAE, Farnborough, and at the French national aeronautical research centre in Toulouse.

Many of the world's leading airlines have for several years been taking a close interest in the project and have to date placed a total of 74 options on the aircraft. These companies have also been closely involved in the design of the aircraft and its systems, equipment and fittings.

Not the least important aspect of the Concorde project is the pattern it is setting for Anglo-French industrial collaboration. The principle has already been adopted for a number of other aerospace projects and the trend holds great promise for the future.

The British final assembly line for the Concorde is being set up at Filton, Bristol, with a similar French line at Toulouse. The first and second prototypes, one built in each centre, are now well advanced into their flight test programmes and many supersonic flights have been made. The Concorde is due to enter airline service in 1973.

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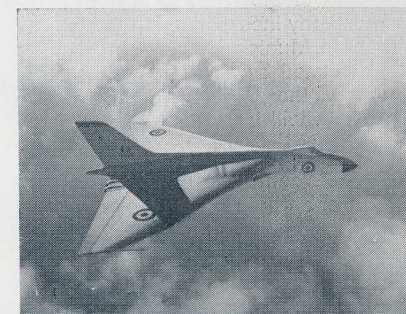
The Britannia

Adopted for R.A.F. transport duties, the Bristol Britannia (four Bristol Proteus turboprops) is flown by Nos. 99 and 511 Squadrons. It has a span of 142 ft. 3½ in. and can cruise at nearly 400 m.p.h. It can carry up to 115 troops.



Jet Provosts

The Jet Provost is the latest Training Aircraft now in service with the Royal Air Force. All pilots in the future will now commence training on these jet aircraft which eliminates the intermediate stage when Pilots were trained basically on Piston Engines.



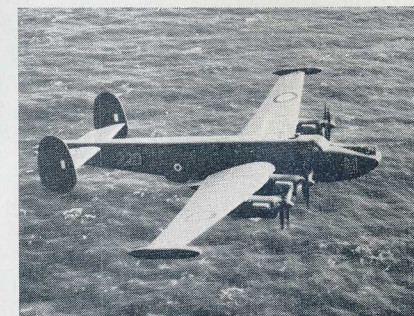
The Vulcan

The second of the R.A.F.'s V-bombers to enter service, the Avro Vulcan B.MK.1. delta-wing design has four Bristol Olympus turbojets. The wing span is 99 ft.



Swordfish

The only Swordfish still flying. Operated by The Royal Navy used extensively in World War II as a torpedo aircraft, was responsible for the final destruction of the Bismark.



The Shackleton

The Avro Shackleton MR.Mk.3 is in service with R.A.F. Coastal Command and does the work formerly the responsibility of flying-boat squadrons. It has four Rolls-Royce Griffon piston engines. The Shackleton has a span of 120 ft. 6½ in.



The Hercules

Wing span 132 ft. 7 in. Length 99 ft. 6 in. Height 38 ft. 5 in. Max weight 155,000 lbs. Max pay load 20 tons or 92 troops. Crew of 5.

ROLLS-ROYCE

Bristol Engine Division

The Bristol Engine Division of Rolls-Royce, with a workforce of more than 15,000 at the Patchway, Bristol works is playing an important part in the company's efforts to keep Britain in the forefront of technological advance and achievement.

Rolls-Royce ranks second to none in the aerospace field, with a product range covering the entire spectrum of aircraft and missile propulsion, and power units for use on land, sea and in the air.

Bristol's most important programme, in terms of size, is the development, with SNECMA in France, of the Olympus 593 turbojet engines powering the Concorde. To date, more than 10,000 hours' Olympus 593 testing have been completed, and in over a year of flying by the two Concorde prototype aircraft the engines have performed faultlessly.

Before Concorde carries her first fare-paying passengers, many more thousands of hours of exhaustive testing will have been completed, making the Olympus 593 engine be one of the most thoroughly tested aircraft engines ever to go into commercial service.

Another major Bristol Engine Division programme is the production of Pegasus vectored-thrust turbofan engines powering the Hawker Siddeley Harrier V/STOL strike aircraft now in service with the FAR, and on order for the U.S. Marine Corps. The Harrier derives its vertical take-off and landing capability from the Pegasus, which vectors the thrust through swivelling nozzles downwards for take-off or landing, or rearwards for conventional flight. The Pegasus engine, which is currently under further development, has provided today's air force with an unrivalled strike capability.

Bristol's links with the French aero industry are again strengthened by another joint development programme with SNECMA, on the M45 turbofan engine chosen to power the German VFW 614 short-haul feeder aircraft due to make its maiden flight next year.

A further programme of major international importance in which Bristol plays a leading part is the development of the RB 199 advanced military engine chosen to power the European multi-role combat aircraft.

Design, development, engineering and production of the RB 199 is the responsibility of Turbo-Union Limited, a new engine company incorporated in England and controlled jointly by Rolls-Royce Limited, MTU in Munich and Fiat, in Turin. Overall sharing of production engine work will be dictated by the sharing of total orders for the aircraft, which is planned for service with the British, West German and Italian air forces. The British share of engine work will be carried out by the Rolls-Royce Bristol Engine Division.

Lower down the power scale, the Viper turbojet series continues to make a name for itself in the export field as the power unit for trainer and civil executive aircraft. This engine is in service with the air forces of more than 22 different countries and powers the best-selling Hawker Siddeley HS 125 executive jet.

Latest in the Viper series is the Viper 600, chosen to power the new Beechcraft Hawker BH 600 aircraft, successor to the HS 125. Thrust of the Viper 600 has been increased to 3,750 lb. in the civil version and 4,000 lb. in the military. The Bristol Engine Division of Rolls-Royce and Fiat, of Italy, have agreed to jointly develop and produce the Viper 600 series—an important step forward in the furthering of international co-operation in the aircraft engine field.

Rolls-Royce the power in the air

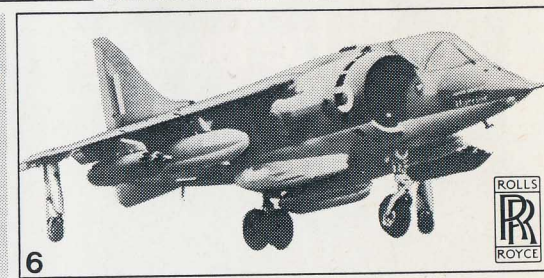
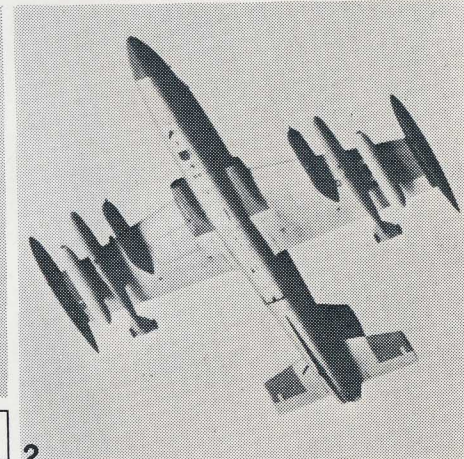
Aircraft powered by Rolls-Royce turbofan, turbojet, turboprop and turboshaft engines have been chosen by more than 200 airlines, 70 armed forces and nearly

400 corporate operators all over the world.

Some of these aircraft are shown below.

1. Concorde—Olympus 593

2. Air Macchi MB 326—Viper
3. HS 125—Viper
4. BAC 167—Viper
5. VFW 614—M45H
6. Hawker Siddeley Harrier V/STOL—Pegasus



Rolls-Royce Limited Bristol Engine Division, P.O. Box 3, Filton, Bristol, England.