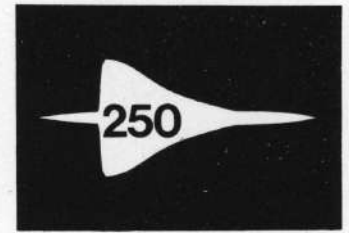


Air-Britain 25th Anniversary Souvenir

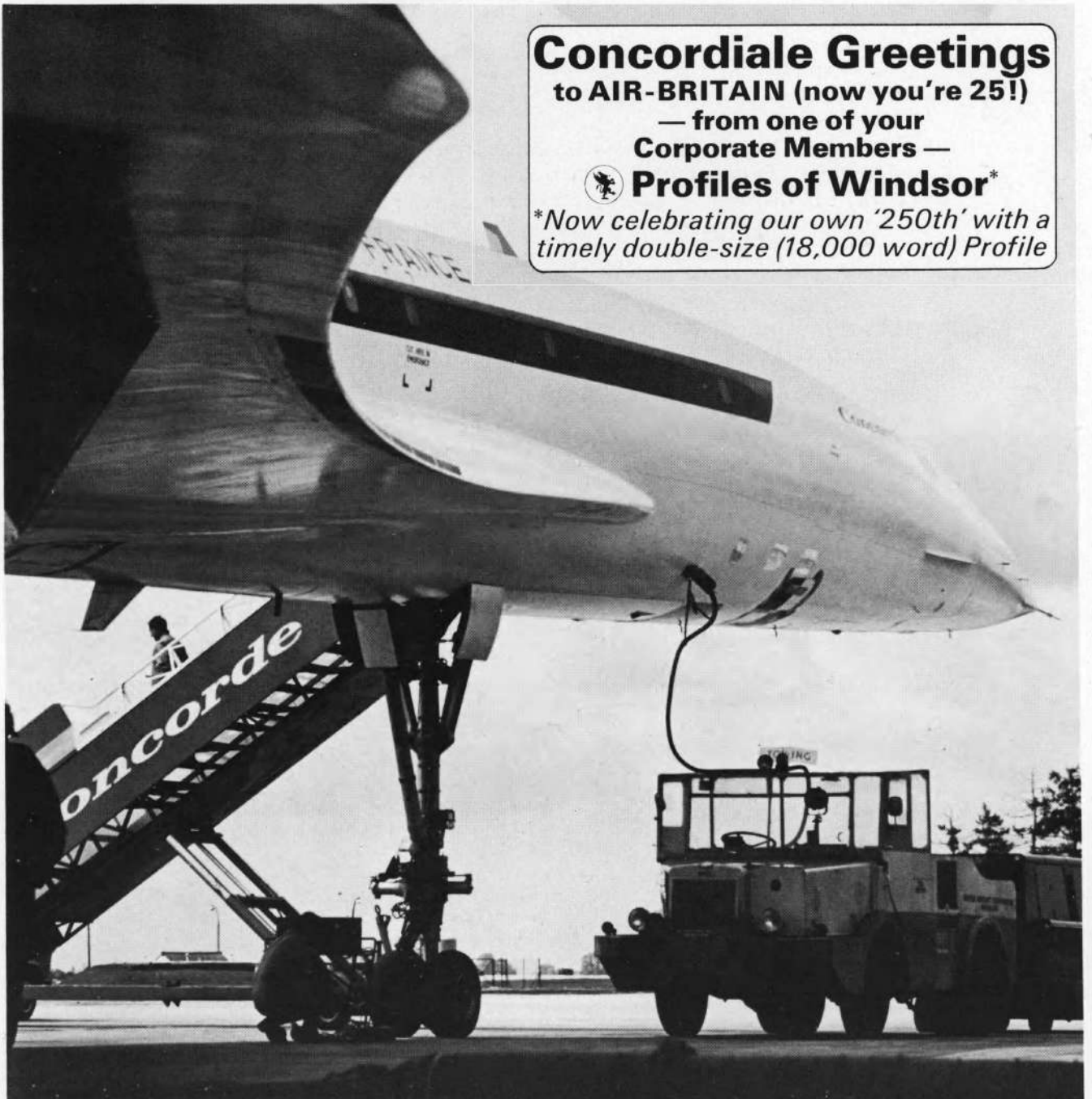


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**BUCKINGHAM PALACE**

It so often happens that history only gets written or compiled long after the event. It will obviously allow better history to be written if the relevant facts are systematically collected at the time for the use of future historians.

Air-Britain has done a splendid job during the last twenty-five years. It started operations in time to be able to tap a good deal of source material which would certainly have disappeared by now. It has also been the means of encouraging a lot of people interested in aviation to channel their interest into useful research and discussion.

I hope the twenty-fifth Anniversary Celebrations will have the success they deserve and give the Association a splendid send off into the next twenty-five years.

April 1973.



AIR-BRITAIN

AS ANNOUNCED in our previous issue, AIR-BRITAIN, the new national aviation enthusiasts' organisation, comes formerly into existence on July 1, 1948. Below will be found in broad outline the aims, organization and intended activities of AIR-BRITAIN. We recommend each of our readers to study carefully these details, and to note the advantages which are to be gained through membership: in particular, AIR-BRITAIN will serve to fill the gap which will be left for many of our readers when publication of THE AEROPLANE SPOTTER ceases with the July 10, 1948, issue.



AIR-BRITAIN has been created by air enthusiasts to cater for and take care of the interests and needs of the aviation enthusiast, irrespective of age or sex. The movement has come into being because the existing aeronautical bodies, by the very nature of their constitutions, aims and organization, cannot cope with the complex and highly developed interests, of the aviation enthusiast. AIR-BRITAIN hopes to succeed in nation-wide unity, where others have failed. A fair measure of this success depends on the whole-hearted co-operation of every member.

The aims of AIR-BRITAIN, which has for its motto "The Air is our concern," are as follows:—

- (1) To bring air enthusiasts together and into contact with practical aeronautics.
- (2) To encourage everyone to take an interest in world aviation.
- (3) To preserve a record of aeronautical development and history.
- (4) To assist and encourage the formation of local branches.
- (5) To assist every member to gain air experience.

Organization.—AIR-BRITAIN is administered by a full-time secretarial staff, with a general secretary at the London Headquarters who is directly responsible for organizing all activities of the movement. Serving behind the general secretary in an advisory capacity and also responsible for determining the policy and general activities of AIR-BRITAIN in general terms is the Advisory Committee, comprising a chairman and six members. Direct contact will be maintained between the general secretary and members or branches, avoiding the necessity of numerous regional committees, various sub-committees and other "top-heavy" organization engaged in purely executive matters.

Membership of AIR-BRITAIN can take two forms. Individuals may join a local branch of AIR-BRITAIN, thereby enjoying not only the advantages of individual membership but those also of club membership; alternatively, if no local branch exists in any individual applicant's area, he may join the AIR-BRITAIN Central Club direct. If, in this latter case, a local branch is subsequently formed in the area, individual members will be given the chance of becoming members of that club without additional charge. Annual membership fee, for individual or club members, is 7s. 6d. (alternatively payable in four quarterly instalments of 2s. each); in the case of club membership, a percentage of this will be returned to the club, obviating the need for any additional local payments.

Functions and Activities.—Membership of AIR-BRITAIN, whether individual or branch, entitles the member to receive a membership card and to wear the distinctive badge of the movement, illustrated at the top of the page. Also available to members will be the monthly air magazine of AIR-BRITAIN, the "Skywriter," containing up-to-the-minute articles of general interest and notes on current club activities. Any member of AIR-BRITAIN may attend as a guest any branch meeting, and may also attend without additional charge meetings of the Aircraft Recognition Society.

Woodley Aerodrome, five miles from Reading, is the Airfield Headquarters of AIR-BRITAIN, where the novel club-house, comprising a Junkers Ju 52/3m fuselage, is available to members at all times. At a limited number of aerodromes in this country, to be added to in due course, admittance may be gained by production of the AIR-BRITAIN membership card; at most civil airports special visits can normally be arranged for AIR-BRITAIN parties provided adequate notice is given. Similarly, special facilities will frequently be offered to AIR-BRITAIN members at air shows and displays, and organizers of such displays will be able to call upon AIR-BRITAIN members for assistance at these events.

Branches of AIR-BRITAIN will carry on normal club activities, special guidance and assistance being available from Headquarters if required. Basic, Intermediate, and Master Aircraft Recognition tests will be supplied to branches and certificates awarded to members successfully passing these tests. In addition to these general activities, however, AIR-BRITAIN is providing a completely new service which will be of especial interest to the enthusiast, no matter what his particular speciality. This scheme is outlined below:—

Specialist Sections.—The Specialist Sections to be formed by AIR-BRITAIN in the near future include the following:—

1. Aircraft Data—
 - (a) Historical. (b) Modern.
2. Aircraft Manufacturers.
3. Airline Operating Companies.
4. British Airfields.
5. Royal Air Force and Squadron Histories.
6. Registrations—
 - (a) British Civil. (b) Foreign Civil.
 - (c) British Military. (d) Foreign Military.

Other Specialist Sections will be added in due course. The idea of the Specialist Section is that each section should serve as a "clearing house" for the information in which it specializes. AIR-

BRITAIN members will affiliate themselves with the sections appropriate to their interests, and will submit all information, reports and other material to that section. The Section will collate all this material and pass it to Infopool, which will serve to answer members' queries on any subject. In due course, it is hoped that each Specialist Section will provide regular bulletins dealing with its subject, for circulation to its affiliate members. The facilities of Infopool will be available to AIR-BRITAIN members free of charge, provided queries are accompanied by a stamped addressed envelope; a small charge will be made for the Specialist Bulletins when introduced.

Alongside Infopool will exist Photopool, a similar Specialist Section dealing with photographs. Photopool activities will be twofold: original photographs will be available to members at reasonable cost from the AIR-BRITAIN collection of negatives of modern and historic aircraft; and a collection of original photographs and press reproductions will be built up for general reference.

"The Skywriter."—The journals of the British Association of Aviation Clubs and the South-Eastern Aviation Clubs, both of which organizations are now disbanded in favour of AIR-BRITAIN, are being combined into a single publication, "The Skywriter," which will appear in the first instance at monthly intervals. In addition to containing notes and news of AIR-BRITAIN affairs, "The Skywriter" will also be a magazine of general aviation interest, containing news and articles of an exclusive nature not generally available in other aeronautical magazines. Cost of this magazine is 6d. per issue or 7s. per annum, post free.

Behind the Scenes.—General Secretary of AIR-BRITAIN is Mr. John S. Webb, who will need little introduction to most of our readers. Responsible for organizing the highly successful Reading Sky Observers' Club and subsequently the British Association of Aviation Clubs, Mr. Webb has had considerable experience of this kind of work, and will in future be able to devote himself wholly to AIR-BRITAIN. Taking care of the Central Club will be Miss June Pogmore, who will serve in the capacity of a branch secretary to those individuals not able to join a local club. In charge of each Specialist Section will be one of the foremost enthusiasts in the particular subject in the country to-day, supported by a small group of fellow specialists. On these groups will fall the hard and largely unrecognized work of sorting, checking and collating the mass of material which will be submitted by enthusiasts all over the country and, it is hoped, all over the world.

The Advisory Committee, which has also been largely responsible for the formation of AIR-BRITAIN, comprises, in addition to the General Secretary himself: Mr. Charles W. Cain (Chairman) (Editor, THE AEROPLANE SPOTTER); Mr. Alan M. Gardener (formerly Deputy Secretary of B.A.A.C.); Mr. Dennis I. Punnett (formerly member of S.E.A.C. Executive Committee and Editor of "Southern Flying"); Mr. F. Gordon Swanborough (Asst. Editor, THE AEROPLANE SPOTTER); Miss Beryl Vaughan (Ladies' Representative) (formerly Asst. Secretary of B.A.A.C.); Mr. Roger P. Whitehead (Co-ordinator, Specialist Staffs); Mr. Derek H. Wood (formerly Secretary of S.E.A.C. and Managing Editor of "Southern Flying").

Over to You.—The foregoing details should serve to "whet the appetite" of our many readers who have a keen interest in aviation and who are eager to further their own interests and those of British Aviation in general. It will be appreciated that the success or failure of AIR-BRITAIN depends entirely upon the support it receives—this being true of any movement—and in particular the Specialist Sections are entirely dependent upon the full co-operation of members, for no material can be circulated if no material is submitted. The organizers of AIR-BRITAIN therefore look forward to a big response to this effort to give all those interested in aviation the facilities they require, and also hope to maintain contact with readers of THE AEROPLANE SPOTTER, many of whose requirements will perforce go unfulfilled when publication of this journal ceases.

Membership of AIR-BRITAIN can be achieved simply by sending an annual subscription of 7s. 6d. or quarterly subscription of 2s. to the General Secretary of AIR-BRITAIN, Mr. John S. Webb, 15, Tavistock Street, London, W.C.2. All membership enrolment should be done in this way, whether for individual or branch membership—members will be put in touch with appropriate local branches in due course. Any clubs now in existence desirous of becoming AIR-BRITAIN local branches should also apply to the General Secretary.

The Founder-Member list is still open to a limited number of persons subscribing £1 1s., this representing life membership of AIR-BRITAIN. Only 250 Founder-Members will be accepted, and any one-guinea subscriptions received after this figure has been reached will be regarded as 2½-years' normal individual membership subscription.

Air-Britain 25th Anniversary Souvenir



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London : June 1st 1973

For many of you, this will be the first occasion or opportunity you have had to learn a bit more about Air-Britain, justifiably sub-titled The International Association of Aviation Historians.

As aviation historians — in the sense of being students and writers and archivists of the subject — there are some 2,500 of us to be found in more than 50 countries. And some of us have been around and in the movement for the whole span of 25 years.

For an all-voluntary international movement to survive after 25 long years is a remarkable feat. For this same association to prosper entirely of its own doing, to expand its activities and increase its total membership year after year suggests that Air-Britain was a jolly good idea in 1948 (and, in being copied ever since in other countries, it must remain a robust idea today).

This is a 25th Anniversary Souvenir, a concoction to be delved into; something, we hope, for everyone.

Air-Britain has become a great institution (some have flattered even more) and I am proud to have played a part in the development of this pioneer association.

Happy Landings!

Charles W. Cain
 Charles W. Cain
 Founder

We have branches . . .

in various parts of Britain and two on the Continent.

You don't have to join a branch to become a member of *Air-Britain* but if you like the thought of monthly meetings, visits to air shows and so on it can be an attractive idea.

Below is a list of the current branches and their secretaries; several other branches are in the process of formation. Full details will be announced in *Air-Britain* publications in due course.

Gwent	M.C. Gardner, 79 Upper Tennyson Road, Newport, Mon. NPI 8HT.
Heston	K.F. Measures, 21 Pembury Court, High Street, Harlington, Hayes, Middlesex B3 5ER.
Luton	J. Fisher, 119 Crawley Green Road, Luton, Beds. LU2 0QN.
Liverpool	K.W.T. Crowden, 2 Ronaldsway, Upton, Wirral, Cheshire.
Rugby	M. Hayes, 8 Bridge End, Southam, Leamington Spa, Warks.
S.W. Essex	P. Cooksey, 2 Hawksmoor Green, Hutton, Brentwood, Essex.
Stansted	J. Wilkinson, Southgate, High Street, High Ongar, Essex CM5 9NH.
West Riding	P. Jackson, 128 Victoria Mount, Horsforth, Leeds LS18 4PZ.
France	J. Chenot, 61 rue Vercingetorix, 93 Aulnay sur Bois, France.
Italy	G. Apostolo, via F. Redi 23, Milan, Italy.

Editorial

The idea of a souvenir book to celebrate *Air-Britain's* 25th year was a natural one, stemming from the desire to do something which would appeal to our members and at the same time could be offered to the public as an example of our enthusiasm.

You are now holding the outcome of several months' planning and work, contributed by various *Air-Britain* members in their spare time; special thanks go to Arthur Ambrose for help in the presentation.

It was decided that primarily we would try to reflect some of the aviation events in Britain during the last 25 years, with a glance at the early days and a brief look at the present situation; space precludes a number of other items we would have wished to include.

Air-Britain has published a considerable number of important monographs during its first quarter-century but this is the first time we have ventured into full colour — we hope you like it.

We are very proud to be able to publish on page 3 a letter from His Royal Highness Prince Philip, Duke of Edinburgh and thank him most sincerely for his kind words.

The most historic document in this booklet is the reproduction on page 4 of the original announcement printed in *The Aeroplane Spotter* in 1948 concerning the founding of *Air-Britain*. Its writer could hardly have mentioned the Association more times but he could have spelt the word "formally" correctly in the introduction!

The membership at the beginning of May 1973 exceeded 2,500 — it has risen steadily for several years and at the present rate seems likely to reach the 3,000 mark within a short time.

What do you get for your money? Well, the current £3 fee brings you six bi-monthly *Air-Britain Digests* with either 32 or 36 pages, copiously illustrated and the same size as this booklet, plus 12 monthly *Air-Britain News* — 8 to 12 pages of news and registration information. You also get free use of the Association's comprehensive Information Service, the opportunity to buy colour slides at exceptionally low prices plus black and white prints and, of course, all monographs published by *Air-Britain*, normally at two-thirds of the price charged to non-members.

If you would like to know more send 5p in stamps to the Registrar, Mr. H.B. Gwyther, 208 Stock Road, Billericay, Essex; better still, why not send him 50p for a sample copy of Digest and News?

Can we look forward to hearing from you? We have survived the first 25 years — join us for the next 25!

M.J. Hooks
 R.W. Simpson
 JOINT EDITORS

The background to Air-Britain

RICHARD BATESON delves into the history of our Association

Friday, 20 April 1945. Adolf Hitler's birthday. The day on which Boeing B-17 Fortress Groups of the United States Army Air Forces launched one final massive daylight raid on targets in and around besieged Berlin. That same night, as flashes from Soviet artillery supporting the Russian assault on the outermost suburbs of the German capital lit up the eastern sky, two civil-registered Junkers Ju 52/3ms of Deutsche Lufthansa took off from Berlin's Tempelhof airport and set course for the Erprobungsstelle at Travemünde on the Baltic coast.

The airfield of this Luftwaffe experimental station was to serve as Germany's last civil aviation link with neutral Sweden, thus replacing Tempelhof as the base from which a regular Berlin-Malmö-Stockholm service had been operated throughout the entire course of World War II.

One of these tri-motors (a type affectionately known as Tante or 'Auntie' Ju) was registered D-AUAV. Its works number, 641038, indicates that it was one of the last batch of Ju 52s to be allotted to DLH, being possibly of the g11e sub-type. Unlike most aircraft of the pre-war Lufthansa fleet, it bore no individual name or other means of identification.

Soon Travemünde became untenable as the Red Army advanced along the Baltic coast, and the base of DLH operations in north Germany switched to the Luftwaffe Fliegerhorst (air station) Flensburg, in Schleswig Holstein, 130km north west from Travemünde and only a few kilometres from the Danish border.

On Friday 3 May 1945, despite the ever-present danger of Allied fighter interception, Flugkapitän Heinrich Schneehege took off from Flensburg in D-AUAV for the Swedish airfield at Malmö-Bulltofta, some 250 kilometres away.

Landing at Bulltofta, he was advised by local DLH staff that there was no load to be carried onwards to Stockholm. The same applied to the return sector. The flight was therefore cancelled. Schneehege was ordered to position the Ju 52 at Copenhagen Kastrup. As D-AUAV lifted off from Bulltofta for the short hop across the Oresund to German-occupied Denmark, its pilot little realised that he was making history, for this was to be the last flight of a Lufthansa aircraft from Sweden for almost fourteen years.

The flight to Kastrup was made without incident. Positioning back to Flensburg, Schneehege's radio operator, tuning-in to Hamburg Radio, heard the grave news that British troops had entered the city and that the war in the north was to all intents and purposes at an end. Landing at Flensburg, on an airfield now crowded with every conceivable type of German aircraft flown in from all points of the compass, Captain Schneehege could do little but wait for the arrival of the enemy. On 4 May 1945, D-AUAV was handed over to the Royal Air Force.

Several thousand German aircraft were now congregated on the wedge of airfields from Hamburg northward to the Danish frontier, and this figure was swollen by

others grounded for lack of fuel or spares in German-occupied Scandinavia. Soon teams of Allied investigators were being flown into Flensburg and Schleswig to locate machines of special technical interest. However, among the first types seized were a trio of venerable Ju 52/3ms. These were pressed into service with the Royal Aircraft Establishment's General Duties Flight for "hack" work, carrying ferry pilots, ground crew, spares and stores to Germany and returning to Farnborough with captured equipment.

On 18 July 1945, a Ju 52/3m with fresh RAF markings covering its paintwork and bearing the symbol 'AM 104' on the rear fuselage (underwing roundels failed, however, to disguise its civil origin) took off from the badly bombed airfield at Blankensee near Lübeck. Its pilot was Squadron Leader Somerville. Later that day, 'AM 104' landed on the long main runway at Farnborough.

During July, 'AM 104' made the following flights:

- 23rd.: To and from Halton (Grp. Capt. Hards).
- 24th.: To and from Middle Wallop, to and from Beaulieu (twice). On this occasion, Grp. Capt. Hards' main objective was to make a flight-test in the six-engined Blohm und Voss BV 222 C-012 flying boat ('AM 138') that he had ferried to Calshot from Trondheim one week previously.
- 26th.: To and from Brize Norton.
- 31st.: Handling test at RAE (F/O Haines).
- Throughout August 1945, 'AM 104' soldiered on, its flights on behalf of the Royal Aircraft Establishment being as follows.
 - 1st.: To Volkenrode (airfield of the Luftfahrtanstalt (Aeronautical Institute) 'Hermann Göring' near Braunschweig) (F/O Haines).
 - 2nd.: From Volkenrode (F/O Haines).
 - 5th.: To and from Fair Oaks (four times) (Grp. Capt. Hards).
 - 9th.: To and from Perton (S/L Weightman).
 - 14th.: Brake tests at RAE (F/O Haines).
 - 16th.: To and from Volkenrode (landed Biggin Hill on return) (S/L McCracken).
 - 17th.: From Biggin Hill (S/L McCracken).
 - 21st.: To Volkenrode (aborted due weather and returned to RAE) (F/O Haines).
 - 22nd.: To and from Volkenrode (landed Staplehurst on return) (F/O Haines).
 - 23rd.: From Staplehurst.

At the end of August 1945, the use of the RAE's tame Ju 52/3ms ceased, probably because ferrying work as still remained could be handled more efficiently by the larger and faster Junkers Ju 352s, while several Siebel Si 204Ds were available in an 'air taxi' role.

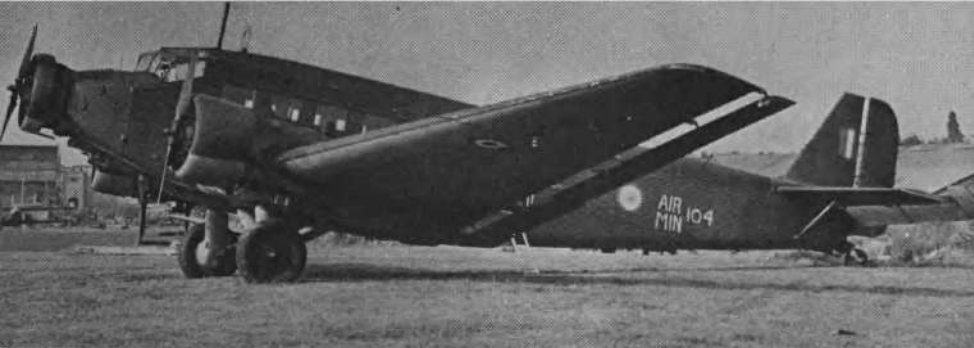
Much still has to be learnt about the RAE's use of captured Ju 52/3ms, especially in the immediate post-war period. It would appear that three airworthy Ju 52s ('Cat.1' machines) were almost immediately overhauled and employed by the RAE's GD Flight. The Farnborough ATC logbooks show an unidentified Ju 52 arriving from Schleswig after a five hour non-stop flight in the hands of Grp. Capt. Hards on 22 May 1945. Capt. Brown has confirmed that prior to flying 'AM' numbered aircraft he and his pilots at RAE flew captured types some of which retained their 'D'-prefixed civil registrations. The civil-registered Ju 52s and the unidentified entries for the period 22.5.45-20.6.45 one of which had the

W.Nr. 5375 may tie in together. Some time later, three Ju 52s were taken from a batch of the type earmarked for possible civil use and allotted to the RAE. In all probability these were 'AM 102', 'AM 103' and 'AM 104'. At the time of the Enemy Aircraft Exhibition, two civil-registered Ju 52s (reputedly D-AGAC and D-AUAV) were still in evidence. It would appear, therefore, that they never received 'AM' or RAF serial numbers. It has been generally accepted that 'AM 104' was ex-D-AUAV, but in a list provided by Peter Corbell covering types logged at Farnborough in November 1945, 'AM 104' is linked with D-AUAN. In an attempt to resolve this matter, Patrick Tilley of Blitz Publications kindly produced an enlargement of the underlying area of the well-known photograph of 'AM 104' at the Enemy Aircraft Exhibition (see illustrations). Although what appears to be a last letter 'U' may just be due to the angle at which the letter is photographed, there remains a sufficient element of doubt for this writer not to positively claim that 'AM 104' and D-AUAV are one and the same aircraft. This scepticism is reflected in the narrative. However, it should be noted that in all cases, the offending letters 'N', 'U' and 'V' are quoted; the combinations 'U' and 'V' and 'N' and 'V' being notoriously easy to confuse at a distance. One thing is certain, *The Aeroplane Spotter* of 3.5.47 confirms that D-AUAV was the Woodley specimen.

Plans were in hand for an exhibition at Farnborough to display both the spoils of war and reveal new British prototypes that had arrived just too late to see combat. So, over the weekend of 10-12 November 1945, those members of the public lucky enough to hear of this show (it was not generally publicised), were given the opportunity to see the array of ex-Luftwaffe types then assembled at the Royal Aircraft Establishment.

Among the many civilian visitors were members of the NASC or National Association of Spotters Clubs. Formed at the height of the 1940-41 Winter Blitz against England, the first branch of what was to become a nationwide network of over 800 cells was founded at Southend-on-Sea, "... on the lines of the Hearer's Clubs and intended for roof watchers in the district." From this small beginning, other Spotters Clubs were formed, comprising non-Royal Observer Corps (ROC) members, who banded together to watch from roof-tops for the first sign of enemy aircraft, so that they could give due warning to fellow workers that danger was approaching. The NASC went from strength to strength, reaching peak efficiency at the time of the massive V 1 Flying Bomb attacks of summer 1944. Hard-core aviation enthusiasts to a man, the Exhibition of German aircraft and equipment that November weekend of 1945 was to be both an NASC Mecca and its swan-song.

Standing neglected in the rearmost row or parked German aircraft was 'AM 104'. It was not airworthy. The 10,000 or more people that Sunday who wandered among the exotic jet and rocket-fighters, gazed transfixed at Heinrich Himmler's Focke-Wulf Condor, examined the piloted Fieseler Fi 103 (V 1) reputedly flown by the famous aviatrix



Above: The Arado Ar 96B "Air Min 120" at Woodley in 1947 with a broken propeller blade (The Aeroplane via C.W. Cain).

Left: Junkers Ju 52/3m "Air Min 104" at RAE Farnborough in late 1945 (Blitz Publications).

tiplicity of advanced weapons, missiles, ejector seats, parachutes, gun and bomb-sights and a hundred-and-one other aeronautical items collected at this Hampshire airfield, passed by this drab undistinguished "Tante Ju", scarcely noticing its presence.

Only on 4 November - one of the Exhibition's 'closed' days - did a solitary Ju 52/3m have a brief moment of final glory when 'AM 103' (flown in from Brize Norton the previous day) was demonstrated for ten minutes before a disinterested audience. On 14 November it returned to Brize, passing out of recorded history.

By 1946, the NASC had passed its zenith. Clubs that had flourished under the stimulus of war and the fascination that aircraft recognition, spotting and other allied arts had held during those excitement-packed years, now closed down as their membership dwindled. The privately-produced magazines and bulletins with obscure titles (*The Gen*: Croydon Spotters Club, *The Bull*: Poole Aeronautical Society, *The Gremlin Rag*: Loughton Gremlins Aero Club, *Flying*: Bognor Aero Club - to name but four) that emerged after VE Day, soon returned to the limbo from whence they had come.

Even the leadership given by that unique journal, *The Aeroplane Spotter* (proudly proclaiming "Incorporating the Bulletin of the NASC" on its masthead) was insufficient to stop the rot. On 23 March 1946, the organisation was wound up. Delegates from all over England met in the Conference Room of the Royal Aeronautical Society. The official reason for closure was, "... that the NASC ... could find no further usefulness in times of peace." Some of those present at Hamilton Place that March Saturday in bomb-scarred London refused to accept this thesis. One of these was the *Spotter* editor and NASC's Honorary Press Officer, Charles W. Cain. He was outspoken in his condemnation of this decision.

In November 1946, details were published of a new National organisation designed to carry on the work of the NASC. Now emphasis was placed on civil aircraft spotting and registration collecting rather than the wartime object of a 'back-up' to official raid-reporting bodies. This new Sky Observers Association - apparently the brainchild of one A.W.T. Vale, living in the London district of Streatham - was also to perform various public services including, "... to assist the authorities when aircraft are reported missing". Aeromodelling was also to be catered for.

One Club that had refused to die was the organisation based at Woodley airfield, Reading. This drew its main support from staff employed by small but dynamic Miles Aircraft Ltd. Leading light in this NASC branch was spotting enthusiast J.S. Webb, a junior member of Miles' Sales and Publicity Department. A locally based cell of the Vale-inspired network - the Reading Sky Observers - was now formed. This initiative

was backed by the Miles family. The President was Mrs. F.G. Miles (herself no mean 'organisation woman' having had much to do with the wartime Air Transport Auxiliary civilian ferry service and being District Commissioner of the Civil Air Guard). The firm's Technical Director, George H. Miles, became Vice-President. Meetings were held weekly in the Woodley games room, where lectures and film shows were organised.

During 1946, Miles Aircraft Ltd. accumulated a number of German aircraft, following a trip that George Miles and his personal assistant, Don L. Brown, had made to Volkenrode in G-ACYR, the Company's Dragon Rapide, the previous October. The exact reason for their assembly at Woodley is unknown.

Among types to be seen at Woodley were a pair of Siebel Si 204 D two-motor trainers, an Ar 96 B single-engined tandem two-seat trainer 'AM 120' and an unairworthy Ju 52/3m. Faintly discernible (either under the weatherworn camouflage paintwork or more likely stencilled on the disassembled wings) was its old German civil registration ... D-AUAV. Yes, Heinrich Schneehege's own "Tante Ju", that had escaped Soviet shellfire and Allied fighters, now found a last resting place on a pleasant grass airfield on the outskirts of Reading.

In the spring of 1947, the Miles Company was persuaded to donate this now surplus Ju 52/3m to the Reading Sky Observers for conversion into a clubhouse. Additionally, the two Si 204 Ds were handed over, "for instructional use and to serve as bases for flying operations". Membership grew apace; by December 1947 it stood at 133.

On 6 September, 1947 Woodley was the venue for an Air Display that appeared to emphasise the vitality and strength of Miles Aircraft Ltd. Many American delegates to the IAeS and RAeS Joint Aeronautical Conference (then being held in London) witnessed flying demonstrations of three of the firm's latest creations, the Marathon, Merchantman and M.68. Also flown were established types such as the Aerovan, Messenger and a trio of Geminis, the Sparrowhawk, Magister, M.28, Martinet, Monitor, Libellula, M.18 and Falcon. However, all was not well with the firm's finances. On 24 November, that well-known paint company, Titanine Ltd., applied for the winding-up of Miles Aircraft Ltd. in London's Royal Court of Justice.

It was against this depressing background that on 5 December the first (and last) Annual General Meeting of the Reading Sky Observers was held. Its main claim to fame (apart from a seven-fold membership growth rate in the first year) was that it was the first, "aviation club for youth to provide flying for its members at a cost within reach of all". This was a reference to air experience flights that had been provided in Miles Aerovan G-AILF at irregular intervals during the year. At this meeting it was disclosed that the

Reading Sky Observers were now part of a larger organisation named the British Association of Aviation Clubs.

By the turn of the year, no less than thirteen Aviation Clubs were linked to the fast-expanding BAAC. Taking its cue from "Czech, Danish and French aircraft recognition spotters" who had linked together to form clubs, the BAAC was also encouraging branches on the Continent. Clubs in The Hague, Eindhoven and Utrecht were all apparently functioning.

All was not sweetness and light, however, for another NASC offshoot, the Association of South-Eastern Aero-Clubs (SEAC), active in the counties of Hampshire, Kent, Surrey and Sussex and publishers of a creditable magazine, *Southern Flying*, laid equal claim to the holy task of "... fostering interest in aviation, aircraft recognition, and, in fact, everything to do with the air". A particularly inflammatory pronouncement was that they offered, "to give information on organising and maintaining Spotting Clubs to interested persons".

This conflict of interests brought a quick response from the editor of *The Aeroplane Spotter*. In a pithy editorial on 7 February, 1948, Charles W. Cain wrote of the need for a nation-wide, all-embracing Spotting organisation, "... indeed, throughout Europe and the New World". The Reading Sky Observers was held to be an example of what "a small but progressive band of enthusiasts" could do.

By April 1948, the British Association of Aviation Clubs boasted 38 branches. One example was the Birmingham and District Aviation Club. The secretary was a certain J. Bagley. Another BAAC member was the Cambridge and District Aviation Club led by M.J.F. Bowyer.

BAAC and SEAC agreed to be absorbed into a new, nationwide (and ultimately international) movement which was to be known as *Air-Britain*. In the event, it was perhaps most fortunate that the new organisation was launched at that time. Certainly the absorbed bodies would have died because they were too small (in reality) to survive except on a purely local-branch level. Almost certainly as well, had *Air-Britain* been any later in realisation, the opportunity for ideal promotion would not have been available - alas, for those who were its devotees, *The Aeroplane Spotter* was "shelved indefinitely" by its publishers with the 217th issue, dated 10 July, 1948. So it came about that on 26 June, 1948, a whole page of the "Spotter" was given over to this new phenomenon and on 1 July 1948 *Air-Britain* became a reality.

Tailpiece

In absorbing the BAAC, *Air-Britain* - in theory at least - also took over certain of its material assets. One of these was, "a weekend clubhouse, in the form of a Ju 52, on Woodley airfield for the use of all members.". So, *Air-Britain* became the

nominal owner of D-AUAV, W.Nr. 641038, once the property of Deutsche Lufthansa, later an impessee of the RAF (possibly also on the books of the MAP/MOS) and finally a gift from Miles Aircraft Ltd to the Reading Sky Observers.

On 1 August 1948 (exactly one month after the founding of *Air-Britain*) the writer topped up the glucose in a pair of prized racing flasks and mounted a BSA bicycle for a lone westerly run from Chiswick to Woodley. Arriving some hours later in one's usual breathless, heart-palpating fashion (the technique was to tuck in close astern of a convenient bus or lorry and stay with it whatever the damage to heart or lungs) admittance to the Miles factory airfield was gained by flourishing a mint Association membership card.

Standing in front of the active EFTS hangar with its rows of yellow Tiger Moths, I looked for the *Air-Britain* HQ that I had come so many excruciating miles to visit. Was that it, over in the left hand corner of the field? It wasn't much to look at. Just a rather rusty corrugated shell that had once been an unexciting Ju 52. As I recall, it had nothing inside to show its club-room status. Not to worry. The ability to wander around my airfield apparently to my heart's content more than made up for this apparent lack of *Air-Britain* presence.

However, upon entering the long Miles Aircraft complex with its groups of ghostly dust-sheet-covered fuselages, even this illusion was shattered. I was firmly ejected by an individual who had never even heard of *Air-Britain*.

Well, that was my introduction to the organisation. Soon afterwards I joined a Branch and scuffed a football with Francis Pound (and others whose names I have now forgotten) outside the old Nissen hut that we used for meetings. I still recall the anticipation with which we devoured those roneoed foolscap lists circulated by 31 First Avenue, Acton (courtesy Mrs. A.R. Farmer and Mr. J.E. MacGeorge), from material provided by such experts as the aforementioned secretaries of those old BAAC branches at Birmingham and Cambridge. Southend-based A.J. Jackson was very much an *Air-Britain* name in those days. The late D.A.S. McKay showed me over the 'hush hush' Reid and Sigrist Desford prone-position prototype shortly before his tragic death; it was he who first encouraged my later devouring passion for German aviation history.

Ah yes, those *were* halcyon days - before the advent of the 'box' and middle-age-spread!

Little did I dream as I pedalled thoughtfully home that August evening, aided by an ever-welcome tail-wind, that 25 years later I would find absorbing pleasure in tracing the story (unhappily, still incomplete) of *Air-Britain's* "Tante Ju"; far less that on a spring-like day in 1973 I would receive a letter from D-AUAV's former Captain describing his own last flight in this aircraft. (By the way, what did become of D-AUAV?)

Still, on reflection, I suppose you could say that such a chain of events is what being a member of *Air-Britain* is all about!

Based on data kindly supplied by John A. Bagley B.Sc., D.L. Brown, MIMechE, AMICE, MICasE, FRAeS, Captain Eric M. Brown OBE, DSC, AFC, MA, FRAeS, RN (Retd.), Horst W. Burgsmüller, Peter M. Corbell, Major John M. Ellingworth, MBE, Flugkapitän a.D. Heinrich Schneehage and E. Olav Sundgren. Most information on the pre-history of *Air-Britain* was culled from volumes of *The Aeroplane Spotter*.



Chronology of Air-Britain - 1948-1973

1948 1 July - Inauguration of Air-Britain. National Headquarters at Tavistock Square. Specialist branch structure and central information service established. First issue British Civil Air Registration News.

1949 International Council formed to organize Air-Britain affairs. Transfer of Air-Britain headquarters from Tavistock Square to 31 First Avenue, Acton. First issue of monthly house journal *Air-Britain Digest*. British Civil Register News superseded BCAR News, appearing fortnightly.

1950 First Overseas Civil Registers published.

1951 Reorganization of Data Sections of Air-Britain. First issue of British Military Serial News (later renamed British Military Aviation News). Civil Airline Fleet lists produced for sale to members.

1952 First association with national monthly journal *Air Pictorial*. Strict observance of all State Security regulations by members re-emphasized. Overseas Civil Register News published monthly. Administrative streamlining undertaken - Branch, Domestic, Finance and Publicity Sub-Committees of International Council formed. Comprehensive guide for those considering formation of a Branch of Air-Britain compiled. Projected federation of enthusiast Societies, formulated by Air-Britain and Aircraft Recognition Society, unsuccessful.

1953 Advertising campaign for new members in *Air Pictorial* and *RAF Flying Review*. Over 30,000 separate publications despatched by voluntary labour this year.

1954 First issue of printed BCRN (later renamed British Civil Aviation News) appeared 1 January; on 1 April first printed *Digest* appeared. Annual membership exceeded 1,000. Six civil registers produced. Black and white photo sales service fully operational.

1955 January - first issue of monthly Overseas Airline News. Initial meeting of the London Society of Air-Britain, the Headquarters Branch of Air-Britain, took place in February.

1956 A bi-monthly 20-page *Digest* replaced the monthly 12-page journal in March.

1958 Annual membership fee raised for first time since 1951, *Digest* subscription and membership fee combined at 75p per annum. Overseas Civil Register News split into European Aviation News and Commonwealth Aviation News from January issues. First issue of printed British Military Aviation News appeared. World Aviation Registers published. Nationwide Aircraft Spotting Organization established.

1959 First issue of monthly Aircraft Movements Review. First Airline Histories and Airliner Production Histories published.

1960 Information Service re-organized. All monthly publications now produced photo-litho. First Air-Britain Annual International Aircraft Recognition Contest took

place in London.

1961 Aviation Historical Society of Air-Britain launched. Three new posts created by retirement of Deputy Honorary General Secretary, J. E. MacGeorge, those of Registrar, Distribution Officer and Sales Officer.

1962 *Digest* and membership subscription raised to £1. Aer Lingus and KLM became corporate members, demonstrating international recognition of Air-Britain.

1963 Decision taken to amalgamate *Digest* and all monthly litho publications into a single monthly letterpress magazine, following ballot among members. Fortnightly British Civil Aviation News to remain unchanged. First appearance of "Your Questions Answered" feature in *Air Pictorial*.

1964 January - first issue of combined *Digest* Distinct Monographs production policy formulated by Liverpool Branch - separate Monographs organization dates from this time. Air-Britain stands appear at public displays - at Abingdon on 11 July and at the Biggin Hill Battle of Britain Display in September.

1965 First annual Current UK Civil Register published. Branch administration reorganized. Annual membership exceeded 2,000.

1966 British Civil Aviation News and *Digest* combined after referendum among members. All inclusive membership and magazine subscription £2.50. Sales Department re-organized. Five Monograph titles published this year.

1967 Sales Department surplus 100% increase on 1966 figure. First edition of Fleet Operators monograph.

1968 24 April - incorporation of Air-Britain (Historians) Ltd., a company limited by guarantee. Separate committee responsible for control of Monographs production formed. 19 Monographs published 1964-1968, 7 titles published 1969.

1969 8 July - His Royal Highness, The Duke of Edinburgh accepts Honorary Membership of Air-Britain. 21st Anniversary Draw.

1971 Mobile Air-Britain Display Stand appears at 12 displays this year (14 in 1972). All inclusive annual membership and magazine subscription raised to £3.

1972 Annual membership exceeded 2,500. First issue of monthly Air-Britain News, bi-monthly Air-Britain *Digest*. Administrative restructuring of International Council - Branch Affairs, Editorial, Finance, Membership, Monographs, Public Relations, Sales and Security Committees established.

1973 25th Anniversary year. International Balloon Meeting, organized by Air-Britain, held at Cirencester Park, Glos., 16-17 June. North American Sales Department created. Colour Print Service into operation, to supplement long-standing Colour Slide Service.

C J Chatfield
E Watson



Those beautiful wings

MICHAEL HOOKS reveals the connection between *Air-Britain* and the AW.52 flying wings of 1948

The story of the AW 52 twin-jet research aircraft, the world's first tail-less jet, began in 1942 when Sir W.G. Armstrong Whitworth Aircraft Ltd. was invited by the Directorate of Scientific Research, Ministry of Supply, to design a wing section for laminar flow drag tests in the National Physical Laboratory wind tunnel.

Tests showed that profile drag had been reduced to only half the usual value and the wing maintained laminar flow up to 60% of the chord.

In conventional aircraft the bulk of parasite drag is in the fuselage, tail and engine nacelles, with some interference drag; it became obvious to the Armstrong Whitworth team that if these could be eliminated ideal conditions would be achieved with the laminar flow wing since parasite drag would be reduced to about a third of the usual value.

Once a satisfactory laminar flow wing had been designed it became necessary to test it in actual flight conditions, so the company built a tail-less glider, the AW 52G, with a span of 53 ft and all-up weight of 6,000 lb.

This wooden flying scale model tested many of the advanced features proposed for the AW 52; its wing had a remarkable contour accuracy with a highly polished finish and there were mechanical means of maintaining by suction the laminar flow effect at low forward speeds.

A pilot and observer were carried in tandem in the centre of the wing and the comprehensive instrumentation included automatic observers for photographically recording instrument readings.

Considerable flying was done with the AW 52G using a Whitley as the towing aircraft and a vast amount of invaluable data was accumulated on general flight behaviour of tail-less aircraft with particular reference to stability and control, confirming previous calculations and wind tunnel tests.

The sole example of the AW 52G, RG324, finished its days as a static exhibit outside the main gate of the Armstrong Whitworth factory at Baginton, Coventry, and was finally broken up.

As a result of experience gained with the '52G, Armstrong Whitworth was requested by the Directorate of Scientific Research to design and build an all-metal powered aircraft to Specification E9/44. This was geometrically similar to the glider but considerably larger — it spanned 90 ft and weighed around 30,000 lb.

Heading: The first Armstrong Whitworth AW.52, TS363.

Below: The AW.52G glider RG324 shows its highly polished finish.

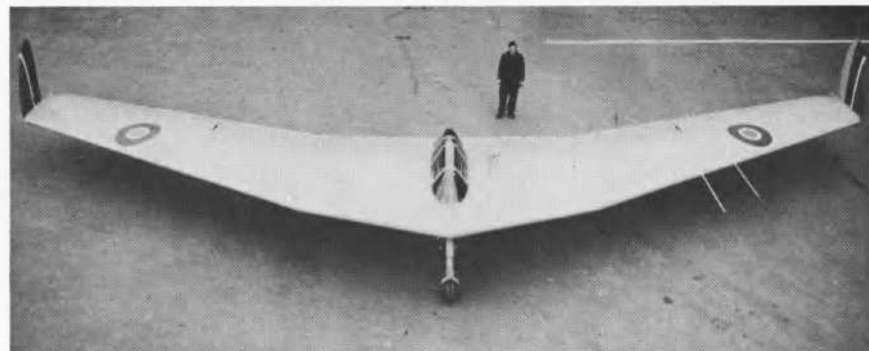
Right: The second AW.52, TS368, showing the black areas painted on the wing for tests at the RAE Farnborough (Photo via J. Bagley).

The first prototype AW 52, TS363, made its maiden flight from the A&AEE Boscombe Down on 13 November 1947, powered by two Rolls-Royce Nenes of 5,000 lb thrust each. The second aircraft, TS368, with two Rolls-Royce Derwents of 3,500 lb thrust, flew on 1 September 1948 and both aircraft performed at that year's SBAC Display at Farnborough between 7 and 11 September, the first and last time they appeared together in public.

The first aircraft, TS363, was destroyed in May 1949 while investigating flutter characteristics, giving its test pilot John Oliver Lancaster the distinction of being the first pilot to use an ejector seat in an emergency.

The Derwent-powered TS368 continued with its flight test programme and in October 1950 was transferred to the RAE Farnborough where it carried out research on airflow behaviour on swept wings before being scrapped in 1954.

At one period parts of the wing were painted matt black and sprayed with a coating of volatile chemical to show up areas of laminar flow, found in practice to be confined



to the first 5% of the wing chord. Better results were obtained later on filling and polishing the wing surface, when laminar flow was observed at about 20% of the chord.

The main problems encountered with the design were instability in certain flight conditions and a wing vibration which was sometimes self-generated and undamped. The speed during the later tests was therefore limited to 250 kts. (288 mph).

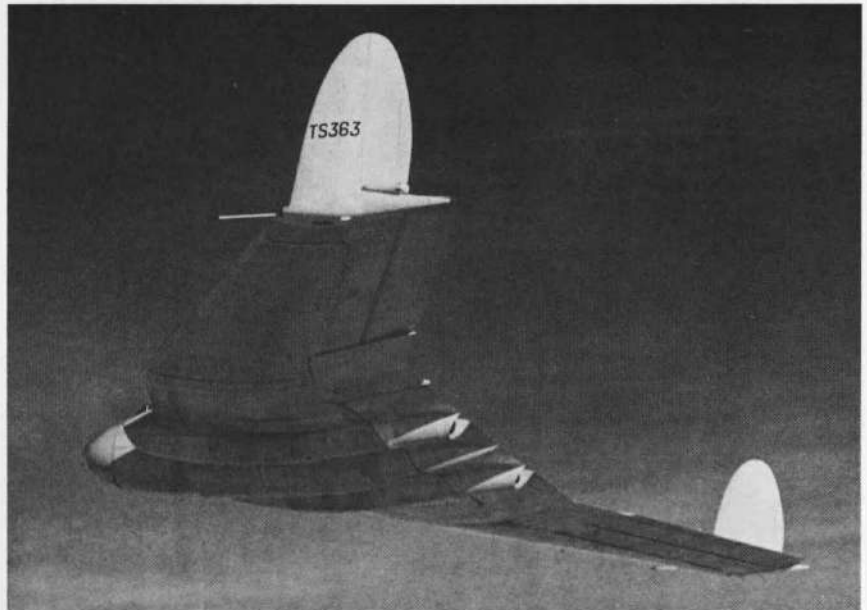
In retrospect it is interesting to look back on the thoughts of Armstrong Whitworth's chief designer, J. Lloyd. At the conclusion of a technical appraisal of the AW 52 he said "An all-wing aircraft with its reduced drag and structure weight indicates the obvious direction of future development and when the investigations of controlling the boundary layer with suitable engines are completed, we shall have made good progress towards high speed economical air transport. One objection to the large all-wing aircraft is the absence of view for the passengers. It is most likely that large Flying Wings will be used either for long range night services, and be provided with sleeping bunks, or alternatively for mail carriers and express freighters."

In the event there was no development along these lines; nevertheless the AW 52 contributed greatly to our aeronautical knowledge.

The connection with Air-Britain mentioned in our introduction – the AW.52 was the inspiration for our emblem.

Right: Two views of the first AW.52 probably taken during the winter of 1948 (Flight). Oliver Tapper in his recently released book *Armstrong Whitworth Aircraft since 1913* (Putnam, £6.00) reveals that after the pilot ejected on 30 May 1949 the aircraft glided down to land in open country with relatively little damage.

Right, lower and below: The second AW52 again showing the black patches painted on the wings (via J. Bagley).



Serial	Engines	Max. speed mph	Ceiling – feet	Normal range – miles	Max. range – miles	Initial climb – ft/min	Weight – lb	
							Empty	Loaded
TS363	2 × 5,000 lb R-R Nene	500	50,000	1,500	2,130	4,800	19,662	34,154
TS368	2 × 3,500 lb R-R Derwent	450	45,000	1,500	2,130	2,500	19,185	33,305



Lord Apsley the Aviator

BERNARD MARTIN traces the history of aircraft owned by Lord Apsley, father of Earl Bathurst, our host for the Cirencester Park International Balloon Meeting on 16-17 June 1973

The choice of a Leisure Park at a stately home for our 25th Anniversary Balloon Meet may, at first sight, seem odd for an aviation organisation. However, the late father of our host, Earl Bathurst, was no stranger to aviation.

Lord Apsley (Allen Algernon Bathurst) joined the Royal Gloucestershire Hussars in 1914 and served with them throughout the First World War in Palestine, earning the DSO and MC for his actions. During the inter-war years he served as Conservative MP for Southampton and, later, Bristol Central, making the welfare of ex-servicemen and the armed services his main political brief. In 1939 Lord Apsley commanded the 1st Regiment Royal Gloucestershire Hussars and, after helping to form further Territorial Army armoured regiments, was seconded to the Arab Legion with General Glubb in the Sinai Desert. He was unfortunately killed on active service in an air crash at Malta in 1942.

One of the first aircraft to appear under Lord Apsley's name was the Parnall Elf. This was the original Elf 1 G-AAFH, a two-seat biplane with plywood-covered fuselage and Warren girder-braced, fabric-covered folding wings powered by a 105hp ADC Hermes 1 engine. Designed by Harold Bolas and built for George Parnall & Co. at Yate during 1928/29, it was exhibited at the Olympia Aero Show in July 1929, and its Certificate of Airworthiness issued on 25.6.30. It was sold to Lord Apsley on 6.12.32 and continued to be based at Yate, eventually meeting its end in a forced landing at Heronsgate, near Rickmansworth, Herts on 20.3.34. Similar to the Elf 1 was the Elf II, which had a horn-balanced rudder and a 120hp ADC

Hermes II engine. Two machines were built, G-AAIN and G-AAIO. G-AAIN was registered on 11.6.29 and a C of A was issued to George Parnall & Co. at Yate on 15.6.32. On 2.11.34 it was re-registered to Lord Apsley also at Yate. The C of A lapsed on 18.8.39 and the Elf moved to Bournemouth in September; C of A renewal was on 13.4.40. After storage during the war it was re-registered to Douglas B. Bruce on 13.3.46 at Badminton, and insured by Miss I.L.V. van Zanten for 12 months from 19.3.46 for ground risks. The intended delivery flight from Tadley to Fairoaks did not take place and G-AAIN went to Kidlington by road for a rebuild by Universal Flying Services. The pre-war C of A was renewed on 17.12.46 and it flew to Fairoaks on or about 18.1.47 after which the C of A lapsed on 16.12.47. It was sold on 3.4.50 and re-registered to William J. Nobbs at Fairoaks on 10.5.50. It was Withdrawn from Use on 12.5.50 and is currently preserved by the Shuttleworth Collection at Old Warden. Although not registered to Lord Apsley, the other Elf II, G-AAIO, had local connections. Registered on 11.6.29 to George Parnall & Co. at Yate it received a C of A on 2.9.31. It was last owned by F. R. Hall of the Cotswold Aero Club at Down Hatherly aerodrome from 24.10.33. It crashed and burnt out at Sapperton, near Cirencester due to fuel pump failure on 13.1.34 killing the owner and his son.

Moving back in time, the Klemm L-25-1A G-AAHL (c/n 144) was sold to Lord Apsley on 15.1.32. It was originally registered to R. G. J. Nash at Brooklands and received Certificate of Validation No. 16 on 26.8.29. It was soon written off in collision with a

windsock at Whitchurch on 27.2.32 and officially removed from the register in July 1932.

An unusual one-off machine acquired on 3.1.35 (in fact registered to Miss Dolly Miles and Lord Apsley) was the Shackleton-Murray SM-1 G-ACBP. This was a 2-seat, wooden parasol monoplane with a 70hp Hirth HM.60 engine driven by a pusher propeller. Designed by W. S. Shackleton and L. C. Murray, it was built by Airspeed Ltd. at York in 1933 with a first flight at Sherburn and a C of A issued on 28.9.33. Following a move to Hanworth it went to Lord Apsley at Whitchurch and was dismantled in 1937 being officially removed from the register in December of that year. During its service with Lord Apsley it force-landed in mid-Solent and was rescued by an oil tanker.

Another Klemm, this time a unique specimen L-27A-VIII G-ABOP powered by a Hermes IIB, was a 1935 acquisition. This was imported by E. F. Stephen (for S. T. Lea Ltd. of Croydon) and a Certificate of Validation No.52 issued on 21.8.31. It was used by British Air Transport Ltd. and Aerofilms prior to 1935. It was registered to Lord Apsley on 30.5.35 and two years later caused a near diplomatic incident when it shed its propeller over Germany and force-landed on an autobahn near a secret airfield! After a C of V renewal on 2.3.39 it moved to Yate and by 29.8.39 moved again to Hanworth. On 4.10.39 it was with Rollasons at Ringway. It was eventually removed from the register on 12.3.46 and was located with C. J. Packer at Burton later where it was broken up in July 1948.

Continuing his speciality in ultra-light machines, the BAC Drone G-AEKU was acquired in 1939. It was originally registered to Kronfeld Ltd. on 24.11.36 although the Authorisation to Fly No.111 was issued on 19.11.36 to H. H. E. M. Winch. In January 1938 it went to Walter P. Bowles at Hanworth and to R. J. Wynne at Shoreham on 4.5.38. On 31.10.38 it was re-registered to J. A. McMullen at Hanworth. It was sold on

Heading: The Parnall Elf II G-AAIN, registered to Lord Apsley in 1934, is currently awaiting restoration by the Shuttleworth Trust at Old Warden (Richard Riding).



2.9.39 and registered to Lord Apsley at Badminton on 11.10.39. Lord Apsley disposed of it to Tattersall's Garage at Preston and it was removed from the register on 1.12.46. In 1967 parts of it were still extant with Mr. G. Eastell at Thetford (together with pieces of G-ADPJ and G-AEJK). G-AEJU was notable in that at one time it acquired an enclosed cockpit.

Another aircraft connected with Lord Apsley was the Spartan Cruiser II G-ACDW. Named *Faithful City* it was operated by

Spartan Air Lines Ltd. between Heston and Cowes and a C of A was issued on 12.5.33. At the end of that flying season the chief pilot, P. W. Lynch Blossie, flew it to Australia and back on charter to Captain W. P. Crawford Green and Lord Apsley. It departed the UK on 9.10.33 and arrived at Sydney on 30.10.33. On return it force-landed on St. Osyth beach in Essex. The aircraft was eventually sold in Egypt in April 1934 as SU-ABL and was cancelled from the UK Register on 7.8.34.

Illustrating the accompanying article are the Spartan Cruiser G-ACDW, B.A. Swallow G-ADPS (both Richard Riding); the Shackleton-Murray SM.1 G-ACBP (*Flight* photo 13015), Drone G-AEJU with canopy (*Flight*), Parnall Elf I G-AAFH and Klemm L.29 G-ABOP (both Richard Riding).

Below: A happy group at the Desprez Challenge Cup competition at Bristol on 26 May 1929. Lord and Lady Apsley are third and second from the left (*Flight* photo 7172).



Military Ballooning

IAN HAYES contributes a brief history of the military use of balloons in Britain

The exploits of the Royal Flying Corps over the Western Front and other theatres are among the best known feats of British arms; it is less well known that the British Army's aviation activities began long before the first aeroplane flew — and that aviators from that Service took part in the Boer War and the American Civil War.

The French were the first to use balloons for military purposes, soon after Jean François Pilâtre de Rozier had become the first person to ascend in a man-made vehicle — a Montgolfier hot-air balloon — in Paris on 15 October 1783.

The French Army used captive balloons for observation purposes and their victory at the Battle of Fleurus in Belgium on 26 June 1794 was said to have owed much to reports signalled to the ground by Captain Coutelle, the first military flyer.

Napoleon considered using balloons to invade England, seeing the new mode of transport as a means of by-passing the Royal Navy.

In fact the first balloon flight across the Channel was made on 7 January 1785 by Jean Pierre Blanchard of France and Dr. John Jefferies, an American.

It is doubtful if even a military genius like Napoleon considered dropping paratroops from balloons but it just might have crossed somebody's mind at the time for the first successful parachute jump was made from a balloon over Paris by A.J. Garneurin in 1797.

Parachute jumping from balloons was a popular show item throughout the nineteenth century.

The first air raid in history took place in 1847 when the Austrians used pilotless hot-air balloons with timing devices to bomb Venice during operations to stamp out revolution in the Austrian Empire.

Despite these spectacular developments it was nearly 70 years before the British Army would have anything to do with such new fangled devices.

The US Army formed its first Balloon Company for reconnaissance and artillery direction in 1861; two years later one of Britain's leading balloonists, Henry Coxwell, was commissioned to make a number of ascents for the Army at Aldershot to show how captive balloons could be used for reconnaissance and signalling and to drop an aerial torpedo on the enemy, a technique he had demonstrated in Berlin in 1848.

On one occasion he was accompanied by Lt. G.E. Grover and Captain F. Beaumont of the Royal Engineers who reported that: "Under certain circumstances the balloon affords a means to an army of carrying with it a lofty point of observation" — precisely what the French had been doing since the previous century.

Another 15 years passed before official balloon experiments began in the British Army, but Lt. Grover and Captain Beaumont as the Army's first aeronauts were able to put their skills to practical use when they were attached to a US Federal Army balloon unit during the Civil War.

The first ever air lift was organised during the siege of Paris (1870-1871) in the Franco-Prussian war. Cut off from the rest of

France the people of Paris organised a balloon lift that carried out of the city over 100 passengers, including the Prime Minister, nine tons of mail and over 400 carrier pigeons, of which 57 found their way back with micro-filmed letters for the population.

A young English soldier, Horatio Kitchener, was serving with the French Army at the time of the siege in order to get some practical experience and he volunteered to go up in a balloon and observe the Prussian positions.

In 1878 the War Office published Britain's first Air Estimates, allowing £150 for the construction of balloons. Captain J.L.B. Templer of the Middlesex Militia and Captain H.P. Lee, Royal Engineers were appointed to carry out development.

Official experiments began under the auspices of the Royal Engineers at Woolwich Arsenal and Captain Templer became the first British air commander. He was also an aeronaut in his own right as the owner of the balloon *Crusader*, the first balloon used by the Army.

The first balloon officially built for the Army was a coal gas balloon, *Pioneer*, made in 1879 for £71 out of the £150 appropriated for this purpose.

By the end of the year the Royal Engineers had five serviceable balloons. In 1880 a balloon section took part in manoeuvres at Aldershot. Further participation in 1882 was judged so successful that the Balloon Equipment Store was transferred from Woolwich to the School of Military Engineering at Chatham where a small balloon factory, depot and training school were soon established.

At last in 1884, a hundred and one years after its invention, the balloon first went to war with the British Army. Three balloons, two officers and 15 other ranks accompanied an expedition to Bechuanaland after freebooters had hoisted a republican flag at Mafeking.

The balloons were not a great success. Mafeking is so high above sea level that the two small balloons could not provide sufficient lift to get a man into the air. The larger model managed to get a single observer off the ground and the opportunity was also taken to give one of the local chiefs a brief taste of tethered flight, which impressed him vastly.

Balloons accompanied a further British expedition to the Sudan in 1885 but still did not form a recognised part of the Army and it was only the interest of Majors F.R. Elsdale and J.L.B. Templer which kept military ballooning alive in England.

Not until 1890 was a Balloon Section officially established as a unit of the Royal Engineers and within four years the Balloon Factory had moved to South Farnborough.

Experiments by Captain B.F.S. Baden Powell showed that kites might be more easily transportable and less vulnerable than observation balloons. Man-lifting kites were attached to a cable suspended in the air by a number of lifting kites, the topmost one being at about 1,000 ft. The RE Balloon School formed a man-lifting kite section in 1894.

The Boer War emphasised both the value and the problems of balloon operations. Successes were achieved by the four sections which saw action, notably in directing the fire of the Royal Artillery at Magerfontein and during the battle of Lombards Kop, but many field commanders were prejudiced against them, mainly because the steel tubes containing compressed hydrogen to inflate the balloons were cumbersome and heavy to transport.

The artillery were not properly trained to take full advantage of the balloons; the flag signalling system left much to be desired to the extent that the balloonists often failed to attract the attention of the gunners until it was too late for their information to be of any use.

In 1904 a detachment from the Balloon School paid a prolonged visit to Malta and in the same year Col. J.E. Capper, Royal Engineers, became superintendent of the School.

Capper was a far sighted man and he travelled to North Carolina to ask the Wright Brothers to continue their aeroplane experiments in England but the British Treasury refused to finance them.

In 1906 the colourful American Samuel Franklyn Cody joined Farnborough as Chief Kiting Instructor. Cody, who came to England with a wild west show in 1903, had spent much time experimenting with kites and found that by coupling kites together a man could be lifted into the air. The British Army was interested in this for observation purposes.

Under the gifted direction of Capper and Cody the Army establishment at Farnborough soon progressed beyond the realms of tethered ballooning and kiting although they received little official encouragement or money.

They produced their first airship, the *Nulli Secundus* in 1907 and on 5 October it flew from Farnborough to London. Eleven days later Cody made the first officially recognised aeroplane flight in Britain at Farnborough with his British Army Aeroplane Number One.

Both sides used tethered observation balloons throughout the First World War. From their lofty perch the observers could spot anything that moved on the battlefield and direct artillery fire by telephone.

Naturally the balloons were vulnerable targets and easily set alight by incendiary bullets from an aircraft's machine guns and for this reason the observers were issued with parachutes although aeroplane crews were not.

Balloon straffing was dangerous for the aircraft as the balloons were usually well defended by AA guns and the gunners naturally knew the exact height at which to set their fuses.

Balloons still carry out a vital training function for the Army today although now they are operated by the RAF. Depending on lighter-than-air hydrogen for lift, balloons provide essential platforms for parachute training.

From the draughty gondola, suspended from the 45,000 cubic feet balloon, trainee parachutists of all three Services and reservists make their first 800 ft drop.

Each balloon costs £3,000 plus £135 for each inflation. This may sound a lot of money, but is minimal compared with the cost of flying a Hercules transport for parachute training.

The balloon can be taken to the parachutists — an important point in the case of Reservists — and they can be dropped

Right: A line up of the London Balloon Club's *London Pride II* (G-AZXB), Dante's *Beatrice* (G-BAGY) and G-BALD *Puffin* (Trevor Wilson).

within a closely defined area rather than strewn across the countryside.

The balloons belong to the Operations Squadron of RAF Hullavington, Wiltshire; the Squadron operates six balloon teams; two are located on permanent detachments at Weston-on-the-Green, Oxfordshire, for trainees from Abingdon and at weekends for local TAVR units. Another is detached to Hankley Common near Farnham, Surrey, where their balloons are used by regular soldiers of 16 Parachute Brigade and TAVR units in the area.

At Hullavington one team operates balloons for the basic training of operators and for any necessary trials. Two mobile teams are based there and travel the country as required by HQ Para (V) Brigade for TAVR training.

The officers of the balloon units are drawn from the RAFs Marine Branch because of their professional experience of weather conditions, wires and ropes, tackles and lifting procedures.



A lot of Hot-air

PHIL DUNNINGTON answers a few questions on the fast growing sport of hot-air ballooning in Britain

It took over 150 years for someone to realise that the Montgolfier brothers were on to a good thing. The Americans, in an attempt to make ballooning simpler and cheap, sought and found a practical substitute for straw and buring paper in the form of domestic Propane, and so in the early 1960s the long reign of the expensive hydrogen-filled gas balloons was challenged, and the hot-air revival began.

Britain did not see its first modern 'Montgolfier' until 1967/8 when Leslie Goldsmith (already well-known in fixed- and rotary-wing circles) imported his *Piccard Red Dragon* (G-ATTN) and the Hot Air Group made their first experimental flights from Weston-on-the-Green in *Bristol Belle*, (G-AVTL) - the latter being the first modern British-built craft. The *Belle* still flies, if infrequently, today, and experience gained on her inspired two of the Group to become currently Europe's two main manufacturers - Don Cameron and Gerry Turnbull.

Since those early days (albeit only six years ago) Britain has forged ahead to become the world's second largest producer and probably the largest exporter of hot-air balloons (14 were sold overseas during 1972), while over 50 fly regularly in the British Isles. Commercial interest in balloons as aerial

hoardings has helped this expansion, but the major impetus has come from the growing body of sport balloonists who are joining powerflying and gliding enthusiasts for leisure in the air. This remarkable upsurge in interest was demonstrated by the presence of over 100 balloons at the first ever World Hot Air Balloon Championships in the USA earlier this year, with the prospect of another such event in 1975.

It is worth remembering, nevertheless, that 'aerostatics' also embraces gas ballooning, still popular in Europe and perpetuated in this country by such veterans as Anthony Smith and Gerry Turnbull, while both gas and hot-air airships are showing signs of emerging once more as practical vehicles.

For those who may feel a growing affinity with lighter-than-air travel, we have composed the following series of answers to likely questions:

(Q) How can I become involved at first hand and meet other like-minded people?

(A) The British Balloon and Airship Club is the central co-ordinating body for lighter-than-air activities in Britain, and holds regular social and technical meetings during the winter while promulgating a broad spectrum of views and information through its bi-monthly publication *Aerostat*.

(Q) Is ballooning expensive?

(A) Once you have overcome the initial cost of the balloon (around £2,000 fully equipped) flying costs for hot-air ballooning can be as low as £5 per person per hour.

(Q) What is the best way to start flying?

(A) Most people form syndicates of 4-10 members for the initial purchase, as in gliding. For those who would like to give it a try first you can now train on an existing club-operated balloon.

(Q) How much flying must I do to qualify for a licence?

(A) Unlike power flying the legal minimum is 12 hours, but most students are ready to go solo at around the 15-hour mark.

(Q) Are there any restrictions on who may learn to fly a balloon?

(A) Anyone over 17 (male or female) who has passed the DTI medical examination may complete a course for a Private Pilot's Licence (Balloons), which includes ground examinations and an air test.

More questions? Then write to the British Balloon and Airship Club, Artillery Mansions, 75 Victoria Street, London S.W.1.

Manufacturers: Cameron Balloons Ltd., 1, Cotham Park, Bristol BS6 6BZ.

Thunder Balloons, 91, Great Titchfield Street, London W.1.

Western Balloons, W/Cdr. G. F. Turnbull, c/o RFD-GQ Ltd., Portugal Road, Woking, Surrey.

Below, left: Don Cameron's Hot-air airship G-BAMK. **Below:** Tom Stafford's Cameron O-84 G-AZRN, Cameron O-84 G-BALD making its first and probably last UK flight before departing for Africa and Cameron O-65 G-BAIY (Trevor Wilson).



The first British military aeroplane

JOHN BAGLEY examines history in the making at Farnborough more than sixty years ago

The first experimental aircraft built at the Army Aircraft Factory at Farnborough were given the numbers S.E.1, F.E.1 and B.E.1, signifying "Santos (Dumont) Experimental No. 1", "Farman Experimental No. 1" and "Bleriot Experimental No. 1", in accordance with a classification of aircraft types devised by Mervyn O'Gorman, the Superintendent of the Factory. It does not seem to be widely appreciated that the same classification system was applied to aeroplanes bought from other manufacturers, and that it formed the basis of the earliest system of numbering military aircraft. Regardless of whether they were monoplane or biplane, and of which company built them, all machines with pusher engine installation and tail surfaces were classed as "Farmans", those with canard layout as "Santos" and all tractors as "Bleriot".

A manuscript note by O'Gorman in the files at Farnborough lists the aeroplanes there in February or March 1911:

"We have at present or shall shortly have:

- (1) Wright biplane old type, Wright engine 25 hp
- (2) Bleriot monoplane old type, ENV engine 60 hp
- (3) a Farman type biplane made by Henry Farman, Gnome engine 7 cyl. rotary, 50 hp 2nd type
- (4) a Farman type biplane made by de Havilland, de Havilland engine 40/50 hp
- (5) a Farman type biplane made by Paulhan, Gnome 7 cyl. rotary, 50 hp improved type
- (6) a Farman type biplane made by the Bristol Co. Renault engine 60 hp

Since (1) and (2) are not representative this means concentrating on the F type—an advantage from the point of view that flyers can change from one to another of a type and acquire the handling within an hour—this makes for a maximum amount of practice. Owing, however, to the machines being by different makers no spares are interchangeable due to accidental variations or minor details of construction, etc."

Two of the aeroplanes in this list are of particular interest; the Henry Farman and the Paulhan. These were in fact the first two aeroplanes bought by the War Office when they finally decided in September, 1910 that the Army might be able to use aeroplanes. The Farman was handed over to the British authorities at Chalons on November 26, 1910, after passing its acceptance trials and arrived at Farnborough around the end of the year, together with Captain C. J. Burke of the Royal Irish Regiment who had obtained his pilot's certificate in France on October 4, 1910. The first trials at Farnborough were reported in *Flight*:

"On Saturday morning (January 7, 1911), Capt. Burke made his first flight, but with unfortunate results. He made a fine flight of about two miles over Laffans Plain

at heights varying from 50 to 80 feet after which he descended near the Balloon Factory. A few minutes later he attempted a second flight but before he had flown 50 yards the machine came down sideways on its right wing. As soon as it touched the ground, it swung completely round and was smashed to pieces. The machine was a total wreck and Capt. Burke was injured."

The remains of the machine were taken into the Balloon Factory for repair. The "repairs" were fairly extensive; in O'Gorman's memorandum he notes: "the so-called repair of Capt. Burke's machine, of which nothing was utilisable except the tail, cost only £160 (Balloon Factory labour and materials) although to all intents it is a new machine; wings spars, struts, main girder, control wires, stay wires etc." The rebuilt machine was test-flown by Geoffrey de Havilland on March 6, according to a report by F. M. Green, but was evidently out of trim. One of the skids on the undercarriage broke during landing; this was repaired and on the following day a short trial was made with the outer wing "extensions" fitted. (These were detachable panels which increased the span of the upper mainplane). Only one flight was made owing to a gusty wind and on landing the repaired skid broke again. On March 8, Capt. Burke flew the machine briefly and de Havilland made further tests, after which the machine was returned to the Factory for re-rigging. On March 13, de Havilland flew twice, once with a passenger, followed three days later by two further flights, after which O'Gorman wrote a test certificate prior to handing the machine over officially to the Commandant of the Balloon School. As this document can fairly be described as the ancestor of all certificates of airworthiness, it is worth quoting in full:

"Certificate No. 1

This is to certify that aeroplane No. F.1 has been tested by me in flights of five to seven miles without wing extension, both with a 14-stone passenger and without a passenger, and in two flights of five to seven miles with wing extension, with a 14-stone and a 12-stone passenger respectively.

Weather calm with slight gusts.

It was subsequently examined and showed no defect.

(sd) Mervyn O'Gorman
Superintendent Balloon Factory
16/3/11"

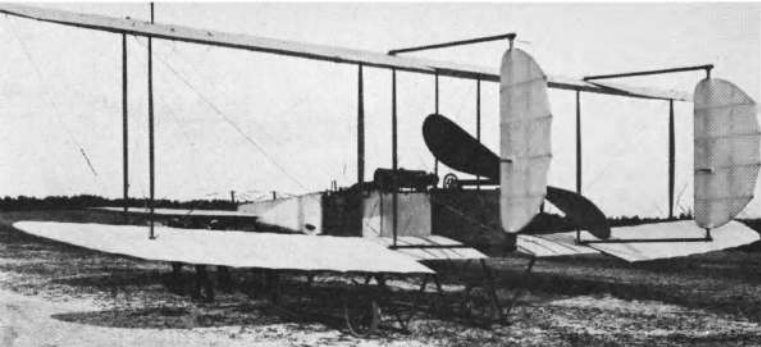
The certificate refers to the aeroplane as F.1, signifying the first aeroplane of Farman type, but there is no evidence that the number was actually painted on the machine. The Paulhan, however, was painted with the number F.2 indicating that it was the second Farman-class aeroplane. This machine has been accepted at the factory at Buc on 11 January 1911, and its arrival at Farnborough was reported in *Flight's* issue of 25 February, but its first flight in England was not until 1 May when it was flown by de Havilland. His log-book for this period is

preserved by the RAE Museum: the entry reads "Paulhan out for first time; rolled and made short flights on Common—very gusty. Several adjustments required". Three days later, he records: "Paulhan out in morning, better than first time; handed over to Captain Fulton". On 5 May Captain J. D. B. Fulton flew it again, with unhappy consequences: *Flight* reported that he was caught by a gust in passing the airship shed, causing the machine to sideslip into the ground and crumple a wing. It was subsequently repaired by the Factory, and tested by de Havilland on 7 July after alterations which included a new forward elevator pivoted at the centre of pressure and enlarged rudder surfaces above and below the tailplane. With these changes, de Havilland noted "Elevator is satisfactory, tail not lifting enough, stopped by puncture." Next day he was out at 8.30 am: "Broke back skid, new skid fitted. Made several short flights". Then on July 12: "Cable pulled out at splice, let machine down on right plane. Broken girder, rear rudder, propeller". Back to the Factory for repairs, then on 16 October: "Paulhan out at 4 pm. Rolled over Common and axle bent". After that, the Paulhan fades from view and was presumably struck off the strength. The Farman F.1 also suffered at the hands of Captain Burke: successive issues of *Flight* recorded a collision with a telegraph pole on 21 March, and another major structural failure about two weeks later; but it seemed to survive and later in 1911 it was flying at Larkhill.

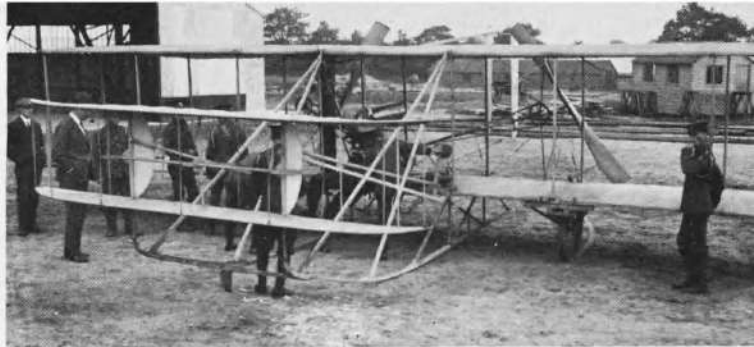
Of the other aeroplanes listed in O'Gorman's memorandum, the "Farman type made by de Havilland" is the machine, originally built at Fulham and flown at Seven Barrows near Newbury, which was bought by the Army for £400 after passing its official acceptance trials at Farnborough on 14 January 1911. This machine acquired the serial number F.E.1, and suffered a number of modifications before it was crashed by Lt. T. J. Ridge on 15 August. On the following day, the Factory's new F.E.2 was taxied by de Havilland, and two days later he made its first flight; later in an official report (R.&M.No.59) O'Gorman implied that F.E.2 was a reconstruction of F.E.1, but it is clear from de Havilland's log-book that they were quite distinct machines.

The Wright machine in O'Gorman's list was the first of six built by Short Brothers: it was bought by C. S. Rolls who subsequently presented it to the Army. It was brought to Farnborough early in April 1910, and Rolls is reported to have given some ground instruction on it to officers of the Balloon School; but he was killed at Bournemouth on 12 July before giving any flights. As the Wright machine had completely different controls to other aircraft, it is virtually certain that it never flew again. C. H. Barnes in *Shorts Aircraft since 1910* reports that it eventually went to Hounslow Barracks.

The Bleriot monoplane listed by O'Gorman is a somewhat mysterious aircraft. Most histories (quoting the semi-official RAE History of C. F. Caunter) refer to a Bleriot "colloquially called the man-killer" which was sent to Farnborough for repair in December 1910 after a crash. Contemporary



Left: The first Wright biplane built by Short Brothers was supplied by Charles Rolls, who presented it to the Army. It is shown being wheeled out of the



Lebaudy airship hangar at Farnborough with temporary wheels under the wings. **Right:** The first

aeroplane entirely designed by the Factory was the tail-first S.E.1.

issues of *Flight* mention a "Bleriot monoplane" flown at Larkhill by Captain J. D. B. Fulton and by Lt. R. A. Cammell who evidently owned the machine. The issue of 3 December 1910, records that Lt. Cammell brought out "his Bleriot XII fitted with ENV engine" on Sunday and set out to fly to Aldershot, being forced down by strong winds at North Waltham. On 29 December, O'Gorman wrote to the War Office that he had "the Bleriot here to repair", and a passage in his memorandum implies that he was considering returning the machine to Bleriot in part-exchange for one of his new monoplanes. The repair of the Bleriot is usually said to have produced the first Factory-designed aeroplane, the tail-first S.E.1; but in fact it seems almost certain that Lt. Cammell's Bleriot XII was repaired and re-

turned to him, for both *Flight* and de Havilland's log record that on 4 May Cammell set out from Farnborough with Captain A. G. Fox in the two-seat Bleriot intending to fly to Larkhill, but they landed at Basing. Further confirmation that the Bleriot did not contribute anything to the S.E.1 is contained in a note by O'Gorman dated 26 April 1911 as a draft for a letter to the War Office:

"S.E.1 aeroplane. I have nearly made this; am I all right as regards authority? It is made up of spare parts from other machines and some new".

The S.E.1 finally appeared on 7 June, when de Havilland taxied it at 5 am. Next morning at 5.30 he flew for about a mile, and on the 10th made several straight flights, concluded by breaking a skid. There were more flights on 28 June, 3, 4 and 5

July, but de Havilland found that it was very difficult to turn. On 14 July, with wing dihedral taken off and a forward rudder fitted, the machine was "turning slightly better, but back rudders too sensitive". On 1 August, with front and rear rudders coupled, de Havilland was able to make several half turns, and on the 16th he flew twice to Laffan's Plain and back—a matter of eight miles in all. Two days later, Lt. T. J. Ridge, the Assistant Superintendent of the Factory, whose pilot's certificate had been granted on the previous day, took the S.E.1 up and crashed with fatal results.

The last aeroplane on O'Gorman's list—the Farman built by Bristol—seems never to have arrived at Farnborough. It was presumably one of the two which were actually delivered to Larkhill in July 1911.



Above, left: Lt. R. A. Cammell's two-seat Bleriot XII probably at the beginning of his Farnborough-Basingstoke flight on 4 May 1911. **Above, right:** An early photograph of Geoffrey de Havilland's first

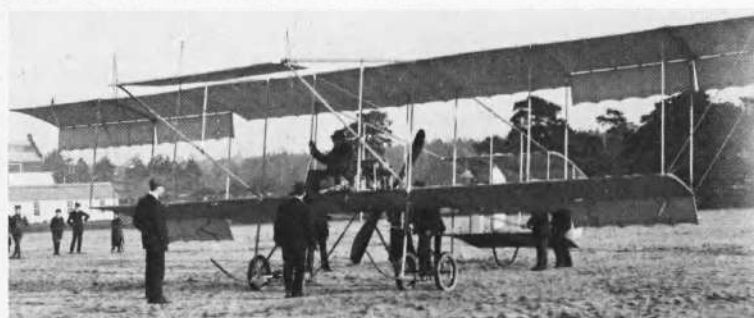


aeroplane, the F.E.1, bought by the War Office for £400 in January 1911. **Below, left:** The extraordinary wing structure of the Paulhan F2 is well

illustrated in this May 1911 picture. **Below, right:** Capt. C. J. Burke about to fly the Farman F.1 at Farnborough.

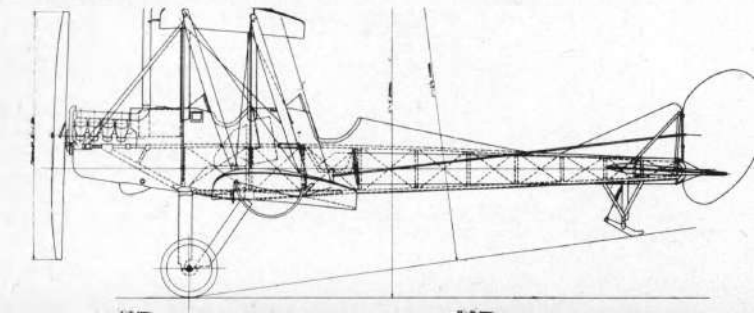


Below, left: The B.E.1. was designed by Geoffrey de Havilland for direct comparison with the S.E.1 and



proved much more successful. **Below, right:** The original B.E.2 was the second machine of the Bleriot

Experimental type. (All photos courtesy of William May & Co., Aldershot).





Royal Air Force 1948

JIM HALLEY looks back to the RAF of twenty-five years ago

In the middle of 1948, *Air-Britain* was under way with the firm intention of covering all things aeronautical. After six years of war, military aviation was inevitably the main interest of most spotters — the title still being respectable in those days. The in-depth surveys of military affairs could, in this day and age, now be mistaken for furtive peeps but the wartime hierarchy of security officers was still in control and apparently defying demobilisation to a man.

Battle of Britain Day did give the enthusiast a glimpse of the RAF while National Service ensured that many received a closer, and probably more alarming, impression of Britain's aeronautical might. On these annual outings, however, cameras were reasonable weapons. The secrets of the RAF's Tiger Moths and Harvards were jealously guarded and one had to wait a further week before attending the SBAC Display to photograph the Meteors and Vampires.

The idea of quoting serial numbers and unit designations was frowned upon. By collating the serial numbers of every RAF

aircraft, someone might be able to calculate the output of the British aircraft industry and this must be prevented at all costs. The fact that in all probability every aircraft manufacturer had a Communist shop steward at the end of each production line tallying off the numbers of each type produced, and relaying it to the Russian Embassy, was presumably a civil matter which need not interfere with the time-encrusted regulations of September 1939.

On June 28, the Berlin Airlift began, only a few days after the opening operations of Operation *Firedog* against the Communist guerillas in Malaya. To meet these tasks, defend the UK, patrol the oceans and deserts, ensure the security of the Suez Canal and tow targets, the RAF could deploy 139 squadrons. Of these, all but 33 had wartime equipment and among these 33 no less than 14 squadrons had Lincolns which were only marginally post-war. Eleven Meteor, four Vampire and four Hornet squadrons had the only modern equipment. Twenty squadrons were manned by the Royal Auxiliary Air Force on a part-time basis.

Spitfires still equipped 8½ regular and 15 auxiliary squadrons, Mosquitos 14½ regular and five auxiliary. There were 14 squadrons of Lancasters, eight of Tempests, five each of Halifaxes and Sunderlands and two with Beaufighters. Sixteen Dakota and eight York squadrons undertook transport duties.

Fighter Command could call on 18 day fighter and six night fighter squadrons for the defence of the British Isles with the support of the Auxiliaries' 15 day fighter and five night fighter units. Bomber Command had 25 squadrons, mainly Lancasters and Lincolns. Coastal Command deployed seven squadrons and Transport Command 18. In addition, there were seven survey and anti-aircraft co-operation squadrons in the UK.

Overseas, the air component of the occupation forces in Germany had ten squadrons — five fighter, four light bomber and one reconnaissance. In the Mediterranean and Middle East there were 13

more, four fighter, two reconnaissance, two maritime and five transport. Ready for *Firedog* in the Far East were 11 squadrons, two fighter (with Beaufighters), three reconnaissance, three transport and three maritime. East Africa had two fighter squadrons and one of Lancaster survey aircraft while No.8 Squadron maintained its traditional solitary vigil in Aden.

While impressive in numbers, the squadrons were only a shadow of their wartime establishments. Most bomber squadrons had only one flight of six aircraft instead of their three flights of ten from only a few years earlier. The same applied to Meteor squadrons at various times and serviceability was hampered by a chronic shortage of spares. Nevertheless, the half-strength squadrons did provide some political comfort to the Government shortly afterwards. Faced by increasing hostility from the Soviet bloc, it enabled them to announce that to counter the threat from the East, they intended to double the strength of RAF fighter and bomber squadrons. Since the actual establishment of RAF squadrons was secret it was presumably felt that the King's enemies would be duly impressed, always assuming a low standard of arithmetic on their part.

Transport squadrons were usually more fortunate in that their task of maintaining communications to the Middle and Far East required a sizeable force. The eight York squadrons formed Transport Command's long-range force but were still dependent on a string of bases through the Mediterranean, Middle East, India, Pakistan and Malaya. The short-range squadrons had the ubiquitous Dakotas which suffered from a chronic shortage of spares due to a perennial dollar famine.

Fuel restrictions kept a large proportion of the RAF on the ground, flying hours being rationed to save the cost of foreign exchange. The serviceability factor was also lower than it should have been through the high proportion of ageing aircraft and shortage of trained ground staff. Despite this, the spotters of 1948 had a wide variety of types to see.

Meteor F.4s were the standard interceptors in all but one of the eleven Meteor

Heading: Hornet F.3s PX293 and PX332 of 19 Squadron, Church Fenton — note different camouflage schemes and roundels.
Left: Tempest F.2s of 33 Squadron based in Germany (Flight).

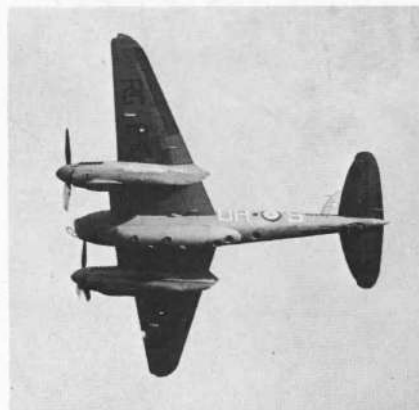


squadrons, No.56 still having Mark 3s. Odiham's three Vampire squadrons were supplemented by No.3 in Germany. The four Hornet squadrons were equipped with the last of the RAF's piston-engined fighters and could more than hold their own with the early jets. The first-line fighter strength was therefore modern by 1948 standards but far too small to defend the country against a major bomber offensive even to contend with only conventional bombs. In a situation where one bomber with a nuclear bomb could destroy London, 100% success in interception was essential and this was quite beyond the available resources of Fighter Command. However, the silver Meteors and Vampires made a pleasant change from the drab camouflage of wartime aircraft though they were to wait for several more years to acquire their colourful squadron markings. Lancasters and Lincolns based on the East Coast still brought back memories of the vast bomber streams heading out over the North Sea. Their smaller companions were still to be seen in the shape of night fighter and bomber Mosquitos. Transport and meteorological Halifaxes were the surviving late marks of Bomber Command's other heavy bomber but it was the white shapes of Coastal's Sunderlands which provided most of the nostalgia. Only three years before, the waters of Pembroke Dock, Loch Erne, Oban,



Above: Britain's earliest post-war long range transport was the Avro Lancrastrian, a civil conversion of the Lancaster bomber with faired in nose and rear fuselage. Illustrated is VM734. **Below:** Further

development finally evolved as the Avro York, represented by MW232 of 242 Squadron (Crown Copyright).



Above: Anson VP514 and Mosquito PR.34 RG245 carrying out mapping work over the London area in January 1949. Note the camera ports beneath the fuselages.

Invergordon and Sullom Voe had been cleft by their creamy wakes as the big boats had set out on patrol. Now only a handful nested at Calshot, manned by two squadrons and an operational conversion unit.

Training units remained virtually unchanged to the observer. Tiger Moths, Harvards, Ansons and Wellingtons still trundled round the circuit as though someone in the Air Ministry had forgotten to send a signal to Flying Training Command telling them to stop the war. The Wimpeys had lost their turrets but their plan views still brought back memories of the early war years. Martinets went on towing targets while their long-suffering pilots prayed for something more airworthy and the occasional Lancrastrian still lingered on, its passengers almost outnumbered by its crew.

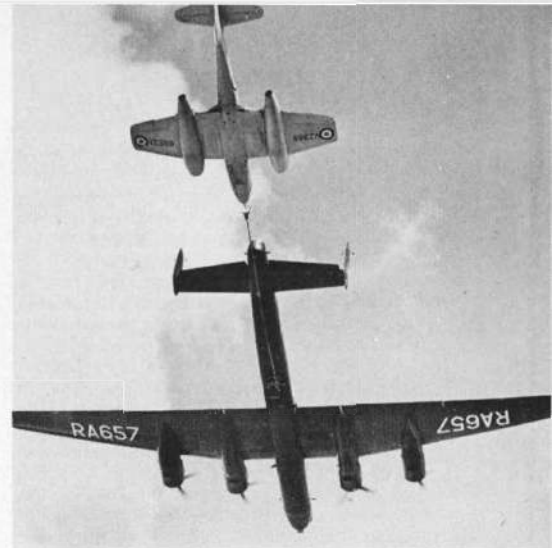
In Germany, the Tempest F.2 equipped three squadrons with two other fighter squadrons flying Spitfire F.24s and Vampire F.1s. Four Mosquito squadrons awaited Vampires and No.2 used fighter-reconnaissance Spitfires. In Africa, the Tempests were F.6s but the two fighter squadrons in the Far



Above: Lancaster RT684 of the Empire Air Navigation School visiting Gibraltar in February 1948.

Below: Mosquito FB 6s of 605 Squadron based in Germany. Note variation in camouflage and markings (Flight).





East both flew rocket-armed Beaufighters, the last of the once-large force of strike squadrons.

In reserve, the Royal Auxiliary Air Force had 20 squadrons in various states of manning. Since it reformed in 1946, the force had been building up with wartime Spitfires and Mosquitos but recruitment had been patchy and while some were well-manned, others suffered from a shortage of ground staff. Six years of wartime service had had its effect on the less glamorous trades!

Twenty-five years later, almost all the types in service in 1948 can still be seen, albeit in museums or on poles. Only the Hornet, Martinet and Halifax have disappeared, apparently for ever. The survivors are, for the most part, dumb. The distinctive crackle of Merlins can still be heard as the solitary Spitfire, Hurricane, Mosquito or Lancaster displays its familiar shape to crowds of spectators that contain fewer and fewer people who remember them not as items in a flying programme but as war-winning weapons. Just as one swallow never made a summer, a single aircraft can never bring back the sight of a squadron of Spitfires in the circuit or a line of Lancasters on the peri track ready for take-off. In an age where one aircraft can have the power of an entire wartime command, their like will never be seen again.

Above: Sunderland VB889 of 201 Squadron on the Havel Lake near Gatow airfield during the Berlin Air Lift (Crown Copyright).

Right: Meteor F.4 VZ389 refuelling from Lincoln B.2 RA657 (Flight).

Below: Vampire F.1 TG301 of 247 Squadron based at Odiham (Crown Copyright).



Order of Battle July, 1948

San. No.	Base	Equipment						
1	Tangmere	Meteor F.4	63	Thorney Island	Meteor F.4	222	Thorney Island	Meteor F.4
2	Wunstorf	Spitfire FR.14, PR.19	64	Linton-on-Ouse	Hornet F.3	224	Aldergrove and Gibraltar	Halifax Met.6
3	Gutersloh	Vampire F.1	65	Linton-on-Ouse	Hornet F.1			
4	Wahn	Mosquito FB.6	66	Duxford	Meteor F.4	230	Calshot	Sunderland GR.5
6	Fayid	Tempest F.6	70	Kabrit	Dakota C.4	242	Bassingbourn	York C.1
7	Upwood	Lancaster B.1	72	Odiham	Vampire F.3	245	Horsham St. Faith	Meteor F.4
8	Khormaksar	Tempest F.6	73	Nicosia	Spitfire F.22	247	Odiham	Vampire F.1
9, 12	Binbrook	Lancaster B.1	74	Horsham St. Faith	Meteor F.4	249	Habbaniya	Tempest F.6
13	Kabrit	Tempest F.6	77	Manston	Dakota C.4	257, 263	Horsham St. Faith	Meteor F.4
14	Wahn	Lincoln B.2	78	Kabrit	Dakota C.4	264	Coltishall	Mosquito NF.36
15	Wytton	Mosquito PR.34	80	Gatow	Spitfire F.24	266	Tangmere	Meteor F.4
16	Gutersloh	Mosquito B.35	81	Tengah	Spitfire FR.18;	295, 297	Fairford	Halifax A.9
18	Waterbeach	Lincoln B.2			Mosquito PR.34	500	West Malling	Mosquito NF.30
19	Church Fenton	Tempest F.2	82	Eastleigh	Lancaster PR.1	501	Filton	Spitfire LF.16e
23	Coltishall	Dakota C.4	83	Hemswell	Lincoln B.2	502	Aldergrove	Mosquito NF.30
24	Bassingbourn	Hornet F.3	84	Tengah	Beaufighter TF.10	504	Hucknall	Mosquito NF.30 cv.
		Mosquito NF.36	85	West Malling	Mosquito NF.36			Spitfire F.22
		York C.1;	88	Kai Tak	Sunderland GR.5	511	Lyneham	York C.1
25	West Malling	Lancastrian C.2	90	Wytton	Lincoln B.2	540	Benson	Mosquito PR.34
26	Gutersloh	Mosquito NF.36	92	Duxford	Meteor F.4	541	Benson	Spitfire PR.19
27	Oakington	Tempest F.2	97	Hemswell	Lincoln B.2	595	Pembrey	Spitfire LF.16e, F.21
28	Sembawang	Dakota C.4	98	Wahn	Mosquito B.16			Vampire F.1
29	West Malling	Spitfire FR.18	99	Lyneham	York C.1	600	Biggin Hill	Spitfire F.21, F.22
30	Oakington	Mosquito NF.36	100	Hemswell	Lincoln B.2	601	Hendon	Spitfire LF.16e
32	Nicosia	Dakota C.4	101	Binbrook	Lincoln B.2	602	Abbotsinch	Spitfire F.21, F.22
33	Gutersloh	Spitfire F.18	107	Wahn	Mosquito FB.6	603	Turnhouse	Spitfire F.22
35	Stradishall	Tempest F.2	109	Coningsby	Mosquito B.16	604	Hendon	Spitfire LF.16e
37, 38	Luqa	Lancaster B.1	110	Kuala Lumpur	Dakota C.4	605	Henley	Mosquito NF.30
39	Nairobi	Lancaster GR.3	113	Fairford	Dakota C.4	607	Ouston	Spitfire F.14, F.22
40	Abingdon	Tempest F.6	114	Kabrit	Dakota C.4	608	Middleton St. George	Mosquito NF.30
41	Church Fenton	York C.1	115	Stradishall	Lancaster B.1	609	Yeading	Mosquito NF.30 cv.
44	Wytton	Hornet F.1 cv. F.3	120	Leuchars	Lancaster GR.3			Spitfire LF.16e
45	Negombo	Lincoln B.2	138	Wytton	Lincoln B.2	610	Hooton Park	Spitfire F.14
46	Oakington	Beaufighter TF.10	139	Coningsby	Mosquito B.16	611	Hooton Park	Spitfire F.14, F.22
47	Fairford	Dakota C.4	141	Coltishall	Mosquito NF.36	612	Dyce	Spitfire F.14, LF.16e
48	Changi	Halifax A.9	148	Upwood	Lancaster B.1	613	Ringway	Spitfire F.14
49	Upwood	Dakota C.4	149	Stradishall	Lancaster B.1	614	Llandow	Spitfire LF.16e
50	Waddington	Lancaster B.1	201	Calshot	Sunderland GR.5	615	Biggin Hill	Spitfire F.14, F.21
51	Abingdon	Lincoln B.2	202	Aldergrove	Halifax Met.6	616	Finningley	Mosquito NF.30
52	Changi	York C.1	203	St Eval	Lancaster GR.3	617	Binbrook	Lincoln B.2
53	Waterbeach	Dakota C.4	204	Kabrit	Dakota C.4	631	Llanbedr	Spitfire LF.16e
54	Odiham	Dakota C.4	205	Koggala	Sunderland GR.5	691	Chivenor	Spitfire LF.16e;
56	Waterbeach	Vampire F.1, F.3	206	Lyneham	York C.1			Harvard T.2b;
57	Waddington	Meteor F.3	207	Stradishall	Lancaster B.1			Martinet TT.1;
58	Benson	Lincoln B.2	208	Ein Shemer	Spitfire FR.18	695	Horsham St. Faith	Spitfire LF.16e;
59	Abingdon	Anson C.19	209	Seletar	Sunderland GR.5			Oxford T.2;
60	Sembawang	York C.1	210	St Eval	Lancaster GR.3			Beaufighter TT.10;
61	Waddington	Spitfire FR.18	213	Khartoum	Tempest F.6			Harvard T.2b
62	Manston	Lincoln B.2	214	Upwood	Lancaster B.1			
		Dakota C.4	216	Kabrit	Dakota C.4			



Jaguars for the RAF

JOHN COOK gives the background to the RAF's newest aircraft, the Anglo-French Jaguar

By the middle of 1973 the RAF will have received the first of its Sepecat Jaguar close support aircraft and will form the Jaguar Conversion Team responsible for training pilots for the first two operational squadrons, due to be formed in the first and second quarters of 1974.

The Team will form at Lossiemouth which returned to the RAF in September 1972 after 26 years with the Royal Navy. By mid-1974 it is intended that the unit will become a full Jaguar Operational Conversion Unit, incorporating, as a separate squadron, the Jaguar servicing school which commenced operations early in 1973 under the aegis of Headquarters Training Command, pending its transfer to Strike Command at a later date.

Thus, this year, the RAF will introduce a new aeroplane the importance of which can be judged from the fact that when the build-up is completed it will form the largest single element of front-line strength.

Jaguar is a collaborative programme with France and is derived from originally independent Royal Air Force and Armée de L'Air requirements for an advanced training aircraft that was also to have a secondary close-support capability.

The political and economic advantages of co-operation, however, were deemed to be such that a joint development programme was justified and the original joint operational requirement was issued in March 1964, specifying a two-seat training and light strike aircraft. At this stage the French were primarily interested in the strike rôle but the RAF's need was for the operational trainer to replace its Gnats and Hunters.

The French programme was at the design competition stage when the joint agreement was drawn up and the successful contender, the Breguet Br 121, was adopted as the basis for the two-nation programme when the Memorandum of Understanding was signed by the British and French governments on 17 May 1965. For the United Kingdom the British Aircraft Corporation was designated as prime airframe contractor,

Breguet and Dassault acting in that capacity for France.

In their original independent submission Breguet had specified the Rolls-Royce RB 172 engine and in February 1965 Rolls and Turbomeca had agreed upon joint development of an engine based on the RB 172 and Turbomeca's own T-260. This engine, since named Adour, was also specified in the Memorandum of Understanding.

Each nation's original requirement was for 150 aircraft, France specifying equal numbers of the Jaguar E (Ecole) two-seat trainer and Jaguar A (Appui) single-seat support aircraft while the total British order was to be for the Jaguar B (Biplace) advanced trainer.

The Jaguar B was intended to be a most extensively equipped aeroplane with navigation and attack systems representative of the most advanced military aircraft and this proved to be a very useful factor when cancellation of other RAF programmes such as TSR.2 and HS1154 necessitated revised thinking on the Jaguar.

On 16 January 1967 a joint amendment to the Memorandum was signed, increasing

Heading: Jaguar SO7 (XW563) with retarded bombs on the inboard racks and 1,000 lb bombs on outer wing and fuselage racks. **Below:** SO6 (XW560) in landing configuration.



each nation's order to 200 aircraft. The additional 50 for France were to be for the Aeronavale (for the subsequently rejected Jaguar M) but the re-statement of the British order was interesting in that it revealed a requirement for 110 Jaguar Bs and 90 of a new strike single-seater, the Jaguar S.

The composition of the order has since been varied again and now comprises 35 two-seat and 165 single-seat aircraft but the basic types remain and are now designated Jaguar T.2 and Jaguar GR.1 respectively.

The definitive Jaguar GR.1 is now in full production at BAC's Warton factory, using French-built front and centre fuselage sections and undercarriage; the wings, rear fuselage and tail assembly for all Jaguars are built by BAC. The parallel French production line is at Toulouse-Colomiers.

In single-seat form the Jaguar carries a basic twin-Aden 30mm cannon armament with a magazine capacity of 150 rounds per gun and has five external weapons stations which can carry up to 10,000lb. of stores. Two are located under each wing and one under the fuselage and can be fitted, within the specified weight limit, with any type of bomb from 250lb. to 1,000lb., SNEB, Matra 155, Matra 60, LAU 10A, LAU 3A rocket launchers and AS.30 air-to-ground, AS.37 Martel anti-radar and Sidewinder air-to-air missiles.

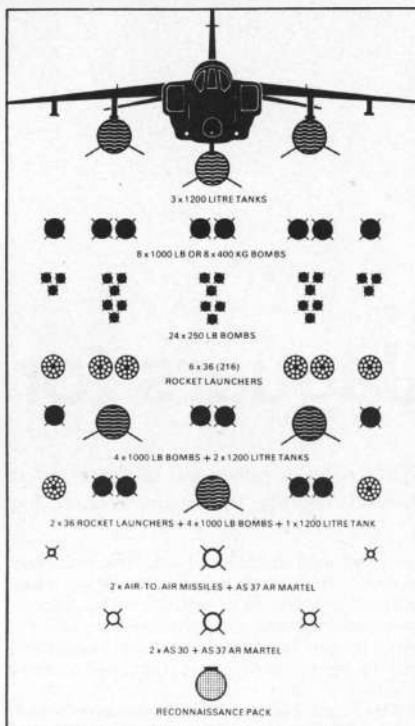
A Martin Baker Mk.IX ejector seat is fitted and provision is made for flight refuelling, the retractable probe being housed in a bay on the starboard side. The avionics fit includes the NAVWASS (Navigation and Weapon Aiming Sub-System) built by Marconi-Elliott Avionics around an inertial velocity sensor and digital computer with read-out to a projected map display and a navigational display unit in the cockpit. Both navigation and weapon aiming information are also provided to the pilot by the Smiths Industries Head-Up Display. The Sperry Gyroscope Division of Sperry Rand Ltd supply the compass system which is of a type fitted as standard in the Lockheed F-104G and HS Harrier.

Ferranti have developed the laser rangefinder and marked target seeker equipment. The latter is used in conjunction with a Forward Air Controller near the target who is equipped with a pulsed laser marker. Energy from the pulse directed at the target is acquired by the equipment in the aircraft and the object of the attack indicated to the pilot.

The two-seat Jaguar T.2 is to the same



Left: MO5 makes a carrier landing – note long-stroke undercarriage. **Above:** S2 (XX109) before painting. **Above, right:** An impressively laden Jaguar. **Right:** Diagram showing some of the armament alternatives.



Above: EO2 (French serial C) flies slowly over BO8 (XW566), the first British two-seater also shown below. Note length of the nose compared with the single-seaters opposite.

Above: Two production aircraft – S1 (XX108) with twin Matra rocket launchers and 1,200 litre fuel tank and S2 (XX109) with two 1,200 litre tanks and three 1,000 lb bombs. **Below:** SO7 (XW563) and SO6 (XW560).

specification and aft of the cockpits is identical to the single-seater. It has, however, only one cannon, on the port side, and does not have the laser rangefinder.

Designed with the ability to operate from motorways or grass strips in addition to prepared runways the Jaguar requires a take-off ground roll of 1,900ft. and the distance required to clear a 50ft. obstacle is only 2,900ft. Low-speed characteristics are said to be excellent and permit a threshold speed of about 125 knots and a landing distance from 50ft. of 2,800ft. (ground roll 1,550ft.)

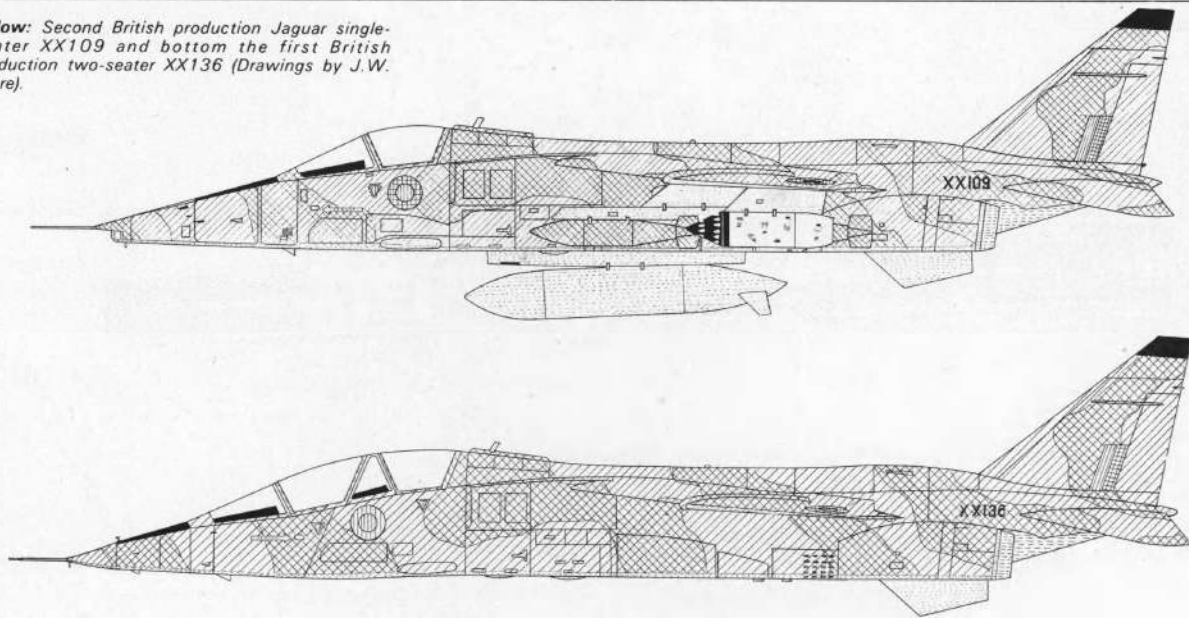
The aircraft is therefore able to operate close to the battlefield but it also has the ability to carry a useful weapon load over several hundred miles, determined by the mission profile. Jaguar can carry 264 gal. drop tanks on each of the inboard wing weapons stations which confer a ferry range of 2,270nm (including internal fuel). On a hi-lo-hi mission (climb to altitude, descend to attack, climb to return) range on internal fuel is 440nm, increased to 710nm. with external fuel. Comparable figures for a lo-lo-lo mission (low level strike) are 310nm and 450nm. respectively. Jaguar is supersonic at all altitudes with standard Adour at 50% reheat; its estimated maximum speed at 36,000 ft. is Mach 1.6 (1,056mph).

The introduction of any new military aircraft demands the closest liaison between manufacturer and service units and in the case of Jaguar the RAF involvement has been particularly extensive. Servicing and reliability targets were set very early in the programme and both British and French military personnel have worked with the manufacturers' teams throughout the design and development stages. Engineers from the RAF Central Servicing Development Establishment at Swanton Morley, Norfolk, have been deployed at Warton and at the Centre d'Experimentations Aeriennes Militaires (CEAM) at Mont-de-Marsan, near Bordeaux, where the French Air Force have for some months been training flying and engineering personnel prior to the formation of the first operational unit at St. Dizier.

The target figure for maintenance man hours per flying hour is 10.5 which is claimed to compare with 25 man hours for a



Below: Second British production Jaguar single-seater XX109 and bottom the first British production two-seater XX136 (Drawings by J.W. Ware).



small sub-sonic fighter or 50 for a large tactical strike or reconnaissance fighter. Certainly, where possible, equipment is grouped in accessible positions, much use being made of the airbrake apertures, engine hatches and the dorsal spine. Most other access panels are at working height and, in fact, doors and panels cover nearly 30% of the aircraft surface. An engine change takes less than three hours.

Turnround time between sorties is set as a standard of fifteen minutes and involves opening only four panels, two for engine oil, one for liquid oxygen and one for refuelling, the latter operation taking approximately three minutes using a single connector. If they have been deployed in landing the

arrester hook has to be retracted and the brake parachute container replaced.

To conclude this brief survey of Jaguar it is, perhaps, pertinent to consider the general and particular effects that its introduction has had on RAF operations and planning. The fact that it was not produced for its original rôle as an advanced trainer will result in the Gnats and Hunters remaining in service at least until the HS.1182 becomes available.

In addition, it was considered necessary to form two new Hunter squadrons, each with 8 Hunter FGA.9s and 1 Hunter T.7, to provide single-seat tactical support training for pilots who will form the first Jaguar squadrons at Lossiemouth. The first Hunter unit, No.45 Squadron, was formed at RAF

West Raynham in September 1972 and it was intended that the second, reportedly No.81 Squadron, would be formed by splitting the first when sufficient aircraft had become available.

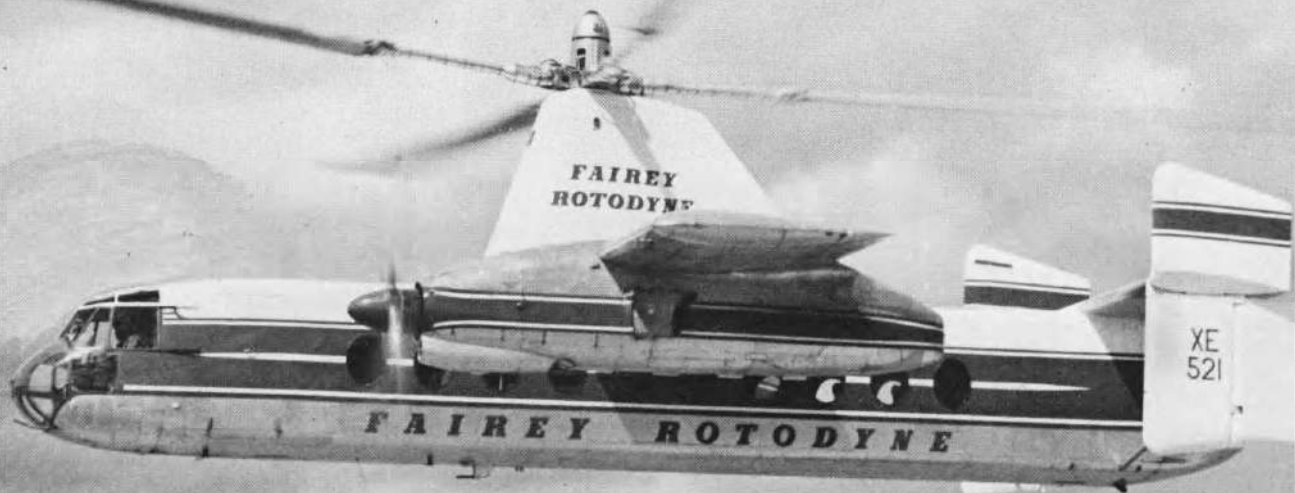
Furthermore, the Phantom FGR.2s will be released from their ground attack duties and will be available to supplement the BAC Lightnings of Strike Command, operating in the Air Superiority rôle.

The rôle of Jaguar in RAF service, therefore, will be to complement the Harriers in ground attack and tactical support operations. The present order is sufficient to equip nine squadrons and these will be assigned to RAF Germany and to No.38 Group, Strike Command, in the United Kingdom.

Jaguar Aide Memoire

NO.	SERIAL	FIRST FLIGHT	SEATS	FOR	REMARKS
E01	B	8. 9.68	2	FAF	Aerodynamic development
E02	C	11. 2.69	2	FAF	Engine development. Flutter testing.
A03	D	29. 3.69	1	FAF	Aerodynamic development and handling. Gunnery. Performance. Stores carriage. Spins. Armament.
A04	E	27. 5.69	1	FAF	Handling. Performance. Gunnery. Stores carriage. Armament. Stores flutter.
M05	J	14.11.69	1	FN	Development of naval version for French Navy.
S06	XW560	12.10.69	1	RAF	Flutter-clean/Stores. Stores release. Gunnery. Armament.
S07	XW563	12. 6.70	1	RAF	Stores carriage. Development & proving of nav/attack system. Flight refuelling.
B08	XW566	30. 8.71	2	RAF	Two-seat nav/attack trials.
S1	XX108	11.10.72	1	RAF	Initially remaining at BAC Warton for development flying. Will later go to the RAF.
S2	XX109	16.11.72	1	RAF	
S3	XX110	1. 3.73	1	RAF	First aircraft for ground school at Lossiemouth, for delivery May or June 1973.
S4	XX111	- 4.73	1	RAF	
S5	XX112	-	1	RAF	For handling at A&AEE, Boscombe Down
S6	XX113	-	1	RAF	
S7	XX114	-	1	RAF	First "flying" aircraft for Lossiemouth.
B1	XX136	22. 3.73	2	RAF	Development aircraft.
B2	XX137	-	2	RAF	First two-seater for Lossiemouth. To be delivered with first batch of "flying" aircraft in late summer.

The above list includes the five French and three British development aircraft and RAF aircraft on which information was available when we went to press in mid-April. It does not include French production aircraft, both single and two-seaters, of which some 15-20 have flown. Initial deliveries of these began on 4 May 1972 when the first production aircraft was delivered to the French Air Force base at Mont-de-Marsan, near Bordeaux. Crews are being trained for the formation of the first operational unit at St. Dizier.



The Fairey Rotodyne XE521 in its ultimate silver, blue and white colour scheme (Fairey Aviation photo 23057).

Britain's experimental helicopters

A survey of experimental helicopter work in Britain since World War 2 by the *Air-Britain* British Helicopter Research Group
- ERIC MYALL, PETER SMITH and ELFAN AP REES

Introduction

The subject of this article is a very broad one which could not possibly be covered comprehensively in the restricted area of this anniversary booklet. Consequently it is necessary to define the terms of reference fairly closely. We have confined ourselves to those helicopters which have either been completed, or completed and flown, but which for various reasons never became the subject of a production order.

We have concentrated on the helicopters produced by the major manufacturers, although a few of the minor projects are listed at the end of the article.

Although we have taken a broad view of the definition of "helicopter" and have thus included the Gyrodyne/Rotodyne projects which are strictly speaking convertiplanes, we have excluded all those many one-off gyrocopter and autogyro types appearing in British skies in recent years.

Experimental work in the British rotary-wing field in the period covered has been largely devoted to two main areas; (1) stability and control (2) propulsion/transmission/rotor drive.

In the first area the experimental work has largely been carried out at Farnborough and Bedford on examples of helicopters which have achieved production status (eg Sycamore, Whirlwind) and it is therefore the second area on which we shall concentrate.

It will quickly become obvious that the types covered in the article are largely products of the late 1940s and 50s. This is due to a number of reasons.

Firstly, the economy of the country does not seem able to bear such a wide ranging pure research capability as before. Secondly the problems of marrying turbine power to the helicopter have now been almost entirely overcome. Thirdly the role of the helicopter

has been more clearly defined and will not now be as wide as might at one time have been thought, and fourthly because the majority of problem areas are now fairly well understood and solutions can generally be found without the need for large separate experimental programmes. The Westland WG.13 Lynx is a good example of this, where the problems are being tackled in specific areas by what amounts to a batch of pre-production machines in similar fashion to that employed on fixed-wing projects for a number of years.

FAIREY GYRODYNE

The origins of this design go back to pre-World War II days to a design of the late Dr. J.A.J. Bennett who assumed control of the Cierva Autogyro Company following the death of Juan de la Cierva in 1936.

This design, to specification S.22/38 for a naval shipborne observation aircraft, was not built but incorporated Dr. Bennett's ideas on the combination of a lifting rotor and an asymmetric propeller on a stub wing to provide not only counteraction to yaw but also forward thrust to lessen the loading on the rotor.

In 1945 Dr. Bennett joined Fairey and the Gyrodyne was designed to government contract in the search for a light 4/5 place helicopter, one of two basic types for which a market was then foreseen. Construction commenced in 1946.

The exact origins of the government requirement are now somewhat obscure for it is thought that at least three separate specifications applied to the basic Gyrodyne design. These were E.4/46, A.7/47 and E.16/47 respectively. The first and the last were probably the basic contract and a later revision, but A.7/47 would appear to presage a military requirement optimistic as

to time scale at least.

In the event two Gyrodynes were built. They were G-AIKF (to which aircraft the serial VX591 was also allocated but never applied) and G-AJJP. They had the constructor's numbers FB.1 and FB.2 respectively - the 'FB' probably signifying Fairey-Bennett.

G-AIKF was shown statically at the 1947 SBAC Display at Radlett and was flown for the first time on 7 December 1947, in the hands of Basil Arkell. Early flight trials seemed encouraging for by June 1948 a world record speed of 124 mph was achieved over a 3km. course and in the following month the aircraft was demonstrated to the Helicopter Association of Great Britain.

Unfortunately G-AIKF was lost when it crashed at Ufton near Reading on 17 April 1949, the pilot, F.H. Dixon, being killed.

By the early 1950s the cause of the accident had been established as a fatigue failure of a rotor blade retaining nut and by this time the programme had been abandoned. In any event Fairey had already begun to think of a larger capacity machine - the Rotodyne.

The second Gyrodyne, G-AJJP, joined the flying programme by September 1948 when it was shown at the 1948 SBAC Display at Farnborough. This aircraft was basically the same as G-AIKF, but was furnished internally to a comfortable standard as a passenger demonstrator aircraft.

FAIREY JET GYRODYNE

Naturally enough, the second prototype of the Gyrodyne was grounded pending the investigation into the crash of the first prototype, although by this time Fairey had its sights much more clearly on the Rotodyne.

Since the latter was to have a rotor driven

by pressure jets at the tips, it was decided to modify G-AJJP to a configuration which would enable it to conduct the preliminary test flying for the basic propulsive system. The modifications involved the provision of two pusher propellers at the end of stub wings and substitution of the original 3-blade rotor by a 2-blade rotor of increased span at the ends of which were two pressure-burners.

The Alvis Leonides engine was retained from the Gyrodyne, but whereas before this had driven both the tractor propeller and the rotor, the engine was now modified to drive the pusher propellers only. There was no mechanical drive to the rotor. Two Rolls-Royce Merlin compressors provided air under pressure to the tips, the fuel being taken out to the tips under centrifugal force.

It is thought that initial design work took two to three years and that the conversion of G-AJJP was not started until late 1952. First flight was in March 1954, with the serial XD759 indicating that this project continued under Ministry of Supply sponsorship (the covering specification is not known to us). Full transitional flight was not however achieved until 1 March 1955.

By September 1955 when the Jet Gyrodyne was displayed at Farnborough that serial had been changed to XJ389 (XD759 had already been allocated to a Sabre F.1)

The system-proving for the Rotodyne obviously lasted until at least November 1957 when the Rotodyne first flew, but probably continued for some time after this.

By 1961 the aircraft was scheduled for scrapping, but luckily was acquired by a Southampton ATC Squadron for static display purposes. Its condition deteriorated over the following years but in 1971 the aircraft was repainted externally for display at the 50th Anniversary A&AEE celebrations. Following this it returned to Southampton where it remains to this day. It is to be hoped that such a historic machine will in due course be preserved in more sheltered surroundings.

FAIREY ROTODYNE

A separate book deserves to be written about this fascinating project, which in this article can only be covered in the sketchiest detail.

There can be little doubt that the project was years ahead of its time, and that given time Fairey would have overcome the problems that the first prototype encountered.

At the same time the project suffered from conflicting requirements by prospective operators, and the overall effects of these was to constantly put the all-up-weight on an ever upward path until eventually the power-plant chosen (the Napier Eland) could not be further developed and the Rolls-Royce Tyne would have needed to be substituted. Even that engine would probably not have sufficed alone since provision had to be made for the Rolls-Royce RB 176 booster jet in the final design scheme.

Even with the prior experience gained on the Jet Gyrodyne the project took as long as from 1947/8 (when the early design commenced) until almost the end of 1957 before first flight.

Two prototypes were ordered under 1953/4 Ministry of Supply specifications. These were allocated the serials XE521 and XH249 respectively. The second aircraft was never completed but XE521 flew for the first time in the hands of Sqdn.Ldr. Ron Gellatly on 6 November 1957.



Top: Gyrodyne G-AIKF and below the Jet Gyrodyne XJ389 can be readily compared in these photographs. **Right:** The Rotodyne XE521 in an early configuration - note splayed out fins (*Flight* photo 37176s).

The aircraft's subsequent history is outlined below.

April 1958 First complete transition to autorotative flight. By this time the original fin assembly had been modified.

September 1958 Displayed at SBAC Display, Farnborough (it also appeared in each of the subsequent years to 1961)

January 1959 A world record speed of 191 mph was achieved over a 100km closed circuit course. The fin assembly had again been modified by this time.

July 1959 The weight lifting potentialities of the aircraft were demonstrated by the successful transportation of a 100ft bridge span. At about this time XE521 was also flown between Paris and Brussels in the record time of 59 minutes.

April 1960 Fin assembly again modified to have a third central fin. The rotor head was also modified and streamlined.

November 1960 Aircraft demonstrated to the services in a casualty evacuation role.

March 1961 Noise tests conducted over central London - including monitored landings at Battersea Heliport.

September 1961 Final appearance at Farnborough.

In May 1960 Westland took over Fairey as one of the Government-sponsored moves towards rationalisation of the British aircraft industry. At that time the future prospects of the Rotodyne looked bright enough for Westland to continue this programme at the expense of their own Westminster project. Nevertheless despite interest from such diverse prospective users as BEA, the British services, New York Airways and Okanagan Helicopters, the problems mentioned above could not be satisfactorily resolved. In February 1962 the Government withdrew its support for the Rotodyne and the project was abandoned.

XE521 (by this time known as the Rotodyne 'Y' as distinct from the proposed Tyne-engined production aircraft - the Rotodyne 'Z' (or Fairey FA-1)) was kept intact for several years but was noted in a derelict state at the RAE in 1964 and by the



following year had been broken up. Certain components were presented to the College of Aeronautics at Cranfield to serve as a memento to a pioneer project which deserved to succeed, but like so many other aircraft projects had suffered a fate that was political rather than commercial.

FAIREY ULTRA-LIGHT HELICOPTER

This was destined to be Fairey's last attempt at a helicopter project. Once again it was destined to meet failure - on the grounds of economy - that well known political catch-phrase.

Specification HR.144T was issued in 1954 and called for a light two-seat helicopter basically for 'spotting' duties. It was primarily an Army requirement although the Army at that time did not possess its own separate Air Corps.

Several British companies evinced interest in the specification including Auster, Bristol, Percival, Short and Westland, but only the Fairey project was actually built. A contract for the construction of two prototypes was

Left: Fairey Ultra-Lights G-AOUK and XJ924; note the revised tail and skids of the military version (latter Flight photo 32496s).



awarded in November 1954 and these duly appeared at the 1955 SBAC Display as XJ924 (first flown on 14.8.55, and XJ930 (shown statically). A third prototype, XJ928, was flown for the first time on 20.3.56, by which time the project had been cancelled despite the impressive agility and performance shown by XJ924 at Farnborough the previous year!

Fairey themselves decided that continuation of the project was justified on private venture grounds and in due course three civil registered machines appeared. These were G-AOUK (F.9426) - first flown in August 1956, G-AOUJ (F.9424) - first flown 1.9.57 (and understood to have been XJ928 rebuilt) and finally G-APJJ (F.9428) - first flown in April 1958.

There is just a small suspicion that parts of XJ924/XJ930 might have been incorporated into G-AOUK and G-APJJ since they quickly disappeared from the scene and their ultimate fates are unknown to us.

G-AOUK was demonstrated at the 1956 SBAC Display, both G-AOUJ and G-AOUK at the 1957 show and G-AOUJ alone in 1958 - the last appearance of the type.

At Farnborough in 1958 G-AOUJ appeared in a dark blue colour scheme with Royal Navy markings and roundels! G-APJJ also appeared in this scheme. This reflected Fairey's efforts to promote RN interest in a lightweight helicopter with torpedo-carrying capability. As part of the sales campaign successful trials were carried out with G-AOUK on board HMS *Grenville* in February 1957.

By 1958 G-AOUK was involved in static tests, G-AOUJ was continuing to undertake trials with the RN (possibly with HMS *Undaunted*) and G-APJJ was on C of A flying at White Waltham. C's of A were in fact granted to both G-AOUJ and G-APJJ in September and October 1958 respectively. However, at about this time the project started to falter, as no material interest on the part of any buyer emerged.

One machine is believed to have gone to Canada for Arctic trials in the winter of 1957/8 and for possible interest by the Canadian forces. The C's of A expired in the spring of 1959 although the aircraft stayed on the register until 1961. It is understood

that little, if any, flying was done thereafter.

G-AOUJ was still in existence in 1964 but was probably then broken up, and G-AOUK was probably broken up at the end of static tests in late 1958. G-APJJ was sent to the RAE Bedford where it was mounted on top of a bus for slow-speed rotor trials. By late 1970 it had been presented to the Cranfield Museum where it still remains.

The power-plant for the Ultra-Light was the French Turbomeca engine - the Palouste built under licence by Blackburn Engines. This provided gas to the pressure jets at the rotor tips, in the by now well-proven Fairey system.

Modifications to the machines during their relatively short careers largely affected the tailplane/rudder assembly and the undercarriage.

Squadron Leader Gellatly has publicly stated that by the end of the programme they had got the controls just right and it was the most delightful helicopter he had flown.

WESTLAND WESTMINSTER

Westland's first three production helicopters - the Dragonfly/Widgeon, the Whirlwind and the Wessex were all based on proven Sikorsky designs, but the Westminster was based on one of the least successful Sikorsky helicopters - the S-56. It will be remembered that this was a rather portly helicopter with two engines mounted on stub wings. It was originally designed as an assault helicopter for the US Marines, although there were also Army and Navy variants.

Having successfully adapted the Sikorsky S-58 to turbine power as the Wessex, Westland decided to enter the big helicopter field by the application of two Napier Elands to the basic S-56. First thoughts were to keep the design basically intact with the Elands mounted on stub wings, but it was felt that a better aerodynamic solution would be to mount the engines on top of the fuselage, behind the cabin. The rotor head, transmission to tail rotor etc. was pure Sikorsky however.

The initial intention was to construct a ground test rig for the rotor and transmission system. This proposal was made in November 1955, but by March 1956 it was decided to make this a flying test rig. Since the early investigations centred on the engine control and response area, the airframe was made as simple as possible.

The fuselage was completed by February 1958 and G-APLE (c/n WA.1) was first flown on 15.6.58. It looked rather like a flying cutaway drawing! By this time a need was seen for a weight-lifting helicopter of this size (about 36,000 lb auw) so the airframe was slightly modified to permit 'flying-crane' duties to be performed.

Test flying took place in 1958/9 and on 4.9.59 the second prototype G-APTX (c/n WA.2) joined the programme. It flew with G-APLE at the 1959 SBAC Display (as G-APLE had done, solo, in 1958).

External differences between the first and second prototypes were a closed flight observer's cabin amidships, and more extensive fuselage skinning.

The programme was a private venture on the part of Westland and there was a marked lack of interest by the government. To broaden the appeal of the design it was modified to cover a 40-seat transport machine. A mock-up of this was made at

Yeovil in 1959 and later that year work was started on modifying G-APLE to the basic configuration. This largely involved the complete skinning of the fuselage. First flight in this new and attractive guise took place on 12.6.60. At the same time the original 5-blade rotor was replaced by a 6-blade rotor and flight testing continued - interrupted by the 1960 SBAC Display.

Despite the projection of a third basic version - a modified crane into which would fit a number of different specialist pods (for which yet another mock-up was completed at Yeovil in 1960) no real interest had been shown in any version by the time that the series of mergers took place with Bristol, Fairey and Saro, in 1960.

Westland were then faced with a severe rationalisation programme, and in September 1960 announced that they would be dropping the Westminster and concentrating on the Rotodyne in the large capacity helicopter field. One can sympathise with their decision, but it is rather ironic that the first successful passenger-carrying helicopters have been built to the basic formula of the Westminster rather than the Rotodyne.

Both prototypes ended their days at Yeovilton where they were dismantled in August 1962.

HUNTING PERCIVAL P.74

Towards the end of 1952 it was announced that the Percival Company had turned its attention to the design of jet helicopters.

At the 1953 SBAC Display a model of the P.74 project was displayed, looking rather egg-shaped with a large fin at the rear of the fuselage. The helicopter was a basic research machine although it was designed to accommodate about eight passengers.

The power unit was to be the new Napier Oryx, basically a gas generator supplying hot air/gas at relatively low pressure through stainless steel ducts to the extremities of the 3-bladed rotor. This system eliminated clutches, couplings, gearboxes etc. and had the added advantage that the optimum rotor speed could be selected for any condition of flight since the rotor speed was not fixed in relation to the engine.

Construction was said to be under way by September 1953 but it was not until the spring of 1956 that the prototype, XK889,

Below: The Westland Westminster G-APLE in its covered and uncovered forms.



emerged from the factory at Luton without a fin. By this time, of course, there had been another periodical Government purge on the grounds of economy and Government support had been withdrawn.

Ground running was commenced but Hunting Percival decided by mid-year that they could not continue the project in the absence of Government support, and XK889 was broken-up in 1959, never having flown.

It is understood that ground running produced good results but we cherish the remark of one of the former Luton staff "It nearly worked. We think that the rotor stayed still and the fuselage rotated".

CIERVA W.11 AIR HORSE

Members will recall that we covered the Air Horse in detail in the December 1970 edition of *Air-Britain Digest* so that what follows is very much a potted history of this project.

It was the first attempt to provide a large capacity helicopter in this country and was probably ahead of its time in that the design concept could not be matched by the production facilities available at that period.

There were links between the post-war Cierva Autogyro Company and the firm of G. & J. Weir Ltd. who had started building autogyros to Cierva design and then branched out on their own successful helicopter designs.

All rotary-wing research and construction virtually ceased in this country in the early years of World War II. By 1943, however, a small design team had been formed in the reformed Cierva Company led by C.G. Pullin who had been with Weir, thus the link was perpetuated in the 'W' of the subsequent designations.

The early Weir helicopters (again see *Air-Britain Digest*, March/April 1973) had a side-by-side rotor configuration, and were very stable in the rolling plane, but much less so in the pitching plane. The Air Horse was therefore designed to have three rotors. On the original mock-up the third rotor was at the rear end of the fuselage, but on the final design this was transferred to the front. The power plant was a Rolls-Royce Merlin 24.

By mid-1945 a design brochure was finalised, but later that year the design was revised to accommodate a crop-spraying role. At about this time the firm of Pest Control Ltd. became closely involved in the project and it was anticipated that a large Commonwealth market existed for a crop-spraying helicopter.

Arrangements were made for the construction of prototypes by Cunliffe-Owen Aircraft at Eastleigh. A civil aviation operational requirement (CAOR 3/46) was issued covering the type and in 1946 under specification E.19/46 the construction of a prototype, VZ724, was commenced. In 1947 the project looked promising enough for a second prototype, WA555, to be ordered.

Both prototypes also had civil registrations allocated - G-ALCV and G-AKTU respectively. The latter was never applied (and was re-allocated) but the first prototype appeared as a static exhibit at the 1948 SBAC Display as G-ALCV.

Ground running and hovering trials commenced shortly after and on 8.12.48 VZ724 flew for the first time with Alan Marsh at the controls.

Development continued throughout 1949 and by the time of the 1949 Display the fins had been increased in size. In October 1949 the all-up weight had been increased to 17,500lbs, with more to come.



A model of the Hunting Percival P.74 at the 1953 SBAC Display showed somewhat different details to the almost completed fuselage of XK889 illustrated. The smoke stacks are not part of the design! (Percival photos PY3509 & PN2702).

By February 1950 WA555 had been also completed but on 13.6.50 VZ724 crashed near Eastleigh thus virtually writing 'Finis' to the project, and the Cierva Company as well.

WA555 was stripped down for investigation purposes and the wreckage of VZ724 went to RAE Farnborough for similar purposes. WA555 was eventually re-assembled but in 1951 the assets of the Cierva Company were acquired by Saro and the Air Horse project was discontinued.

WA555 in fact survived until 1960 when it was broken up at a MoS depot in Cheshire.

Sundry Other Projects

Having detailed the projects of the major British companies, we conclude this article by listing the other helicopter designs which actually reached the 'hardware' stage. In some cases the projects are fairly well documented but in others hardly anything seems to have been recorded. Any reader with material relevant to the projects listed in this section, or above, is invited to make contact with the Group, through *Air-Britain*.

FIRTH F.H.O. 1/4

This was an attractive looking twin rotor (side-by-side) aircraft based on engineering principles of American designer Fred Landgraf, who built and flew somewhat smaller machines in America towards the end of World War II.

A Gipsy Major 10 engine was used and this was inserted into the fuselage of the abandoned Planet Satellite light aircraft. A novel feature of the design was the use of ailerons on the rotor blades.

The machine unfortunately ended up far too heavy for the power of the engine. A grant was sought from the Ministry of Supply, but was refused and the company went out of business.

Luckily the prototype (to which the registration G-ALXP was allotted) was acquired by the College of Aviation at Cranfield in 1954 where it remained for many years.

HOPPICOPTER

This was basically an American helicopter, the brainchild of Horace T. Pentecost who brought two examples of his model 102 Ultra-Light helicopter (the basic empty weight was less than 200lb.) to Britain in 1948. The Ministry of Supply showed interest and it was proposed that one example should be tested at Beaulieu where there was a Rotary Wing Research Development and Training Unit.

Negotiations to form an English company for manufacture of the type centred around Marwyn Ltd. at Bournemouth. Mr. B.E. Martin was associated with the company and was flight testing the design at Hurn in the summer of 1950. By this time the original American twin-stroke power unit had been replaced by a 750cc motor cycle engine - probably a Triumph. Nothing is known of the fate of the British machines although rumour has it that at least one was still in the Bournemouth area until recent years, at least. Any readers in this area please investigate!



KING PROJECT

In 1953 it became known that the King Aircraft Corporation of Glasgow was involved in the development of helicopters and ramjets.

A small single-seat helicopter powered by ramjets was projected, and it is believed to have been almost completed before the project was abandoned for reasons which are unknown to us.

MURRAY M.1

This was practically the only example of a "do-it-yourself" helicopter to have appeared in this country. It was built by John Murray of Glasgow and featured a co-axial two-bladed rotor system.

Severe restrictions on flight testing were laid down by the Ministry of Transport and Civil Aviation, and this probably discouraged the constructor from fully developing the machine, which was powered by a single Jap 99 engine of 36 hp.

The aircraft was acquired from Mr. Murray at Salford in 1972 by the Northern Aircraft Preservation Society and has been allocated BAPC 60 in the Preservation Aircraft sequence. It is now stored at Peel Green.

Finally one should not overlook the very protracted experimental programme conducted by initially Servotec Ltd., then Rotorcraft Ltd. then Cierva Rotorcraft Ltd. towards the development of a light twin-engined rotorcraft. This originated back in 1956/7 and was initially known as the Grasshopper, now designated Cierva Rotorcraft CR-LTH-1. It is still in the experimental stage at Redhill and consequently (although by now a lot different in appearance) must be one of the longest running projects in the business!

Whether it will ever achieve production status (and thus take itself out of the scope of this article) remains to be seen.

Do-it-yourself

RODERICK SIMPSON writes on the current trend in home-builts



To many people every private aircraft is a Piper Cub — just as every airliner is a Jumbo Jet. Once upon a time this may have been close to the truth, but aviation has come a long way since the original Cub, and privately-owned aircraft now range up to the DC-9 jet airliner of *Playboy* publisher Hugh Hefner and the £1.5 million business jets of the big business corporations. In recognition of the wide area of civil aviation outside the scope of the airlines, people now talk of General Aviation and this can include crop sprayers, trainers, business aircraft, helicopters and the converted airliners used by air travel clubs. General Aviation can also include the aircraft which are closest to the spirit of the Piper Cub — the homebuilts.

It may seem strange that an amateur builder can design and build his own light aircraft. And yet, Orville and Wilbur Wright were little more than enthusiastic homebuilders, and most of the major aircraft manufacturers started with an experimental aircraft in the backyard. The aircraft produced by today's enthusiasts cover a wide spectrum, but the control and inspection procedures which are universally adopted ensure that the aircraft builder is not likely to bring harm to himself or the public when he finally launches into the air. Each country has different requirements for these inspections, but the workmanship will normally be checked by a government inspector at various stages in the construction process. When the new aircraft is ready to fly it will generally be given a probationary period for initial testing and receive a restricted airworthiness certificate after this period has been completed successfully. By this process, the good name of the homebuilt aircraft movement is maintained.

Beyond all doubt the most powerful national amateur movement is in the United States. The controlling body is the Experimental Aircraft Association which boasts assets of almost \$500,000 and maintains a permanent headquarters, full-time staff and a well-appointed air museum. The US homebuilt fleet at the beginning of 1972 totalled 3,300 aircraft (out of a total General Aviation fleet of 147,621), and much of the credit for this strong situation is due to the EAA and its efforts to establish the homebuilt movement as a respectable part of the aviation system. The tangible evidence of EAA's respectability is the annual convention to which amateurs from throughout the USA flock once a year. At the 1972 convention at Oshkosh, Wisconsin, over 5,000 aircraft were in attendance, and this included over 340 amateur-built machines.

Outside the United States there are strong homebuilding movements in Canada, France, Australia, South Africa etc. In Britain the Popular Flying Association is the controlling body and the enthusiasts in this country and in France (under the Réseau du Sport de l'Air) form the largest block of amateurs outside the USA. However, the resources of

the PFA are not yet up to the level of the Americans and part-time devotion keeps British homebuilders in the air. The fact is that the fleet of these light aircraft is growing strongly in Britain and this is amply demonstrated at the PFA rallies and the Flying for Fun rally held each year (this year's rally is again at Sywell, Northampton, on 7, 8, 9, July).

Homebuilt aircraft fall into two classes. Firstly, there are the genuine original designs produced by individuals from scratch to their own particular theories or needs. Secondly, there are amateur-built machines constructed from plans which are commercially available. These plans are usually published by other amateur builders who have come up with a specially promising design which becomes suitable for general application by fellow enthusiasts. In Europe the most popular designs are the single or two-seat Jodel, the Piel Emeraude, the Druine Turbulent, and the Luton Minor. In America the Corben Baby Ace, Bowers Fly-Baby, Pietenpol Air Camper, Smith Miniplane, Stolp Starduster and Wittman Tailwind are shown as the leaders. In general these designs embody wood or metal tube construction with fabric covering, but there is growing use of fibreglass for non-structural parts, and all-metal construction is growing in popularity.

The truly exciting area of amateur-built aircraft comes with the unconventional design ideas of a few experimenters. The most recent and most widely publicised of these is the Bede BD-5 Micro — a tiny super-streamlined aircraft with the engine buried in the fuselage behind the pilot, and a pusher propeller in the tail. The Micro has been flying in the USA for over a year and is being sold in kit form. It is all-metal and can reach a top speed of 200 mph.

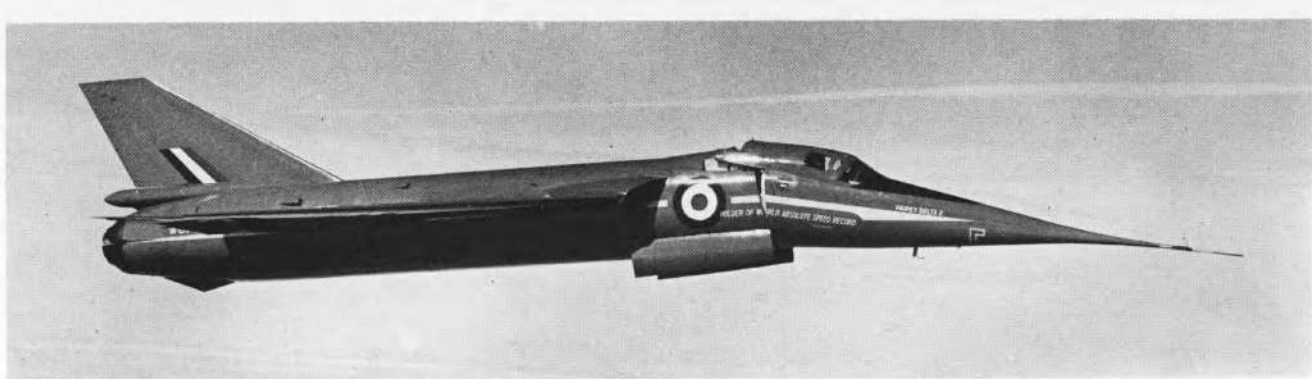
Also coming within the scope of homebuilders are a number of rotary wing machines. Most of the rotary enthusiasts build gyrocopters — generally to the Bensen design and the Popular Rotorcraft Association coordinates the interests of this group. Recently plans and kits for fully fledged helicopters have become available, and the most popular of these is the Rotorway Scorpion. No homebuilt helicopters have yet appeared in Britain, but several gyrocopters have been built to Bensen plans (in addition to those manufactured by Campbell Aircraft Ltd.).

It is impossible to illustrate all types of homebuilt aircraft in the space available — and indeed a particular model built by different constructors can show so many variations as to be almost incomparable. However, we are illustrating a selection of varying types which indicate the diversity of approach to the problem of getting into the air with the minimum expense. It is to be hoped that the homebuilt movement will continue to breed these beautiful little aircraft which bring variety to an otherwise mass-produced General Aviation scene.



Left, top to bottom: Ward Gnome, Turbulent, Evans VP.1, Jurca Tempete, Mignet HM.293, Currie Wot, Stits Flut-r-Bug, Thorp Tiger, Bede Drag'n Fly, Pietenpol Air Camper and Linn Mustang. Right, top

to bottom: Smith Miniplane, Bede Micro, Dyke Delta, Storey TSR.3, Cassutt, Taylor Monoplane, Luton Minor, Baritault JB.01, Augsburg EPR.301, Elmendorfer Special and Wittman Tailwind.



1,000 plus for Britain

NORMAN PARKER gives the background behind the Fairey Delta 2's record breaking flight in 1956

When the prototype Fairey Delta 2 arrived at Boscombe Down on 19 August 1954 for final assembly and first flight, no one in the Fairey Aviation Experimental Department could have envisaged the exciting possibilities that this beautifully slim, yet potent design would be capable of producing in the hands of its pilot, Peter Twiss.

Built to Ministry of Supply Specification ER103 (Experimental Research No.103) the Fairey Aviation type 'V' WG774 took to the air for the first time at 17.00 hrs on 6 October 1954. In the space of six weeks, fourteen flights were made in all, itself a type of record for a very advanced design indeed, but then the aeroplane was a natural, well designed, well engineered and well built.

Taking off just before lunch on 17th November, Peter Twiss was making his third flight in the Delta that day, completely unaware of the problem that was building up in the air intake behind him. During previous flights the rubber seal between the engine and air intake had become displaced; to prevent ingestion and subsequent damage to the compressor it had been cut away without realising the danger of such an action. To ensure that all air intake pressure was delivered to the engine, this seal had been fitted, but the missing section allowed intake pressure to enter the fuselage and the collector fuel tank bay which housed a rubber bag tank held in position by rubber studs. As air pressure built up, it gradually overcame the weight of fuel inside the bag and slowly collapsed around the booster pump supplying fuel to the engine. Finally, at 30,000 feet, over Bournemouth and climbing away from the airfield, the engine ran down, although the fuel gauges were barely off the full stops.

The Fairey Delta 2 was one of the first of the new generation of high speed aeroplanes that had fully powered flying controls, but had no manual reversion, which meant that without an engine the period of permissible flight was strictly limited. Stored hydraulic pressure would allow controls to be moved, but there would come a time when stick deflection produced no corresponding aircraft movement. The pilot would have to follow the time honoured custom, when self preservation assumed the highest priority, and grab a handful of Sir Jimmy Martin's very useful ejector seat. I used to maintain the seats in the Deltas, and he once told me "Young man, if you ever have to use that seat, it will work"; fortunately, this was never proved. Peter Twiss

nursed the crippled aircraft back over forty miles, using a minimum of control to align himself with the runway, not for him the privilege of a second attempt should the first be unsuccessful. After all the gliding capabilities of this aircraft had never been explored, therefore, the undercarriage was kept up until the last minute in order to reduce drag to the minimum, as also was the nose. It was more important to conserve pressure and maintain control, than to lower the nose and undercarriage which would only increase drag and so increase the control problem anyway. As a result, dropping the undercarriage as the Delta crossed the airfield boundary at a very much higher airspeed than normal and an unheard of rate of descent, only the nose leg locked down. This raised the nose even higher and gave rise to some very expensive noises as the rear fuselage destroyed itself on the hard unyielding surface of the concrete runway. Unstabilised, the aircraft slid off the runway, crossed the perimeter track onto the grass, slewing round as it went. Peter Twiss' view of the heavens as he buffeted about his cockpit did little for his peace of mind as he helplessly sat in a seat that could well have catapulted him into space as a result of the hard ride. Fortunately nothing worse than a badly damaged aircraft was the result of his hair raising attempt at gliding.

As a result of this accident, a ram-air driven hydraulic pump was installed during the rebuild at Hayes, but this insurance policy was to my knowledge never required, although it was tested and proved adequate for the job. However, a lesson had been learnt and it was fitted as standard equipment on the Sea Vixen which also had power controls.

After such a promising start the accident was a serious setback; it knocked nearly a year out of the programme. The second aircraft was not ready but the repair period was not entirely lost and a number of improvements were incorporated before returning by road to Boscombe Down to fly again in October 1955. Soon after the flying programme re-started, the Delta slid smoothly through the barrier which had been limiting the performance made possible by the gas turbine, that scarcely a decade before had made the first generation jet-propelled fighters only slightly faster than contemporary piston-engined aircraft.

But the Fairey Delta had been designed with supersonic flight in mind. As the programme progressed it became obvious that the aeroplane was capable of lifting the

absolute speed record from the Americans who held it at 822.26 mph with a North American F-100C. Not only was it capable but it could easily reach four figures — 1,000 miles per hour plus was a very attractive goal indeed.

The barrier however was a paper one, not aerodynamic. The aircraft designed and built by Fairey Aviation belonged to the Ministry of Supply, although it was usually thought of as "ours". Eventually, after many weeks of lobbying, meetings, decisions, and counter decisions, permission was finally given, although all costs and insurance, no mean item, had to be met by the firm. As an investment for potential development, the firm were well justified in accepting the conditions, the prestige value alone of a World Speed Record should have been enormous, but in the event, nothing came of the design, and the firm disappeared into the grey anonymity of enforced amalgamation that inevitably cleaned the slate of the pioneers of British aviation in the sixties.

The secrecy that surrounded this attempt was of the highest order. The reasons for this, were twofold. Both the French and Americans were in the running for an attempt, the French, who could have raised it from the existing American record, and the Americans themselves who could have capped that. Therefore to make sure of a British record attempt that would stick, the whole complicated operation required absolute secrecy. Once the attempt was agreed, things moved very quickly indeed, the aeroplane could do it, but for record purposes, it would need to prove that it had done so, and accurately, therefore the instrumentation was checked, calibrated and then calibrated again. John Inglesby of the A&AEE appeared in the hangar, and spent many long hours calibrating instruments, which were then checked in flight using a special pacing Venom flown by "Brian" Purvis or "Doc" Stuart with John Inglesby as flight test observer. Flying at 40,000 ft, the Venom became a fast moving fixed datum by which the Delta instruments were calibrated. As the aircraft being calibrated flew past the datum, it was photographed by the pace aircraft which at the same time photographed its own instruments. An identical photograph was taken of similar instruments installed in the Delta 2 at the same time. As a signal that this had been done, a small high powered lamp installed in the nose above the VHF aerial of WG774 flashed as the photograph of the instruments was taken; this same lamp is the tell-tale that identifies the record breaking prototype from the second aircraft, WG777. This exercise, completed many times through the speed range, constituted a record in itself; the Venom flying at about Mach 0.75 or 500 mph, being chased by an aircraft flying at well over 1,000 mph, was probably the first

Heading: The Fairey Delta 2 WG774 in its later mauve colour scheme with the nose drooped and undercarriage doors open (Flight).

Peter Twiss waits as the author works on the FD.2 cockpit.



ever interception by a supersonic aircraft.

Another problem was that of aiming at the "target", a tiny dot of an aircraft, invisible in the vast void of space some 20 miles ahead, even if Peter Twiss could see it from this cramped cockpit with its very restricted visibility. Fortunately, at the height being flown, contrails from the jet pipe were commonplace, but not necessarily so, therefore an artificial aid to location was built into the Venom during its preparation as a pace aircraft in 1953. The author, employed at that time in the section of the A&AEE operating the Venom, actually manufactured the four special pylons that carried an electrically-fixed smoke canister fitted to the tail booms for this purpose. The pylons, manufactured from sheet steel, beaten and welded into a complex shape, amalgamated two curved surfaces with the minimum of drag and proved an interesting exercise in sheet metal development that probably has no bearing whatsoever on this story except as a link between writer and event. Suffice to say the calibration was a complete success, the maximum height error during the record attempt was only 98 feet.

At the beginning of March the aircraft was ready and the course had been established. All that was required, was a serviceable aircraft and instrumentation capable of recording the attempt accurately, really the most difficult part of the whole operation. Although the feat of flying an aeroplane at over 1,000 mph through two invisible

hoops in the sky, to an accuracy of plus or minus 164 feet, the maximum height variation permitted by FAI rules, along an accurate course laid out on the ground 38,000 feet below, was one lightly cast aside by Peter Twiss, it called for extremely accurate flying of a very high order indeed.

Late on Friday afternoon, 2 March 1956, the final scene was set by Freddy Parker, the engineering manager of Fairey Aviation. The people who had been carrying out the work of preparation without being let into the secret, were told of the plan, the preparations that had led up to the final stage and the news that the attempt would be made the following week, which meant an early start on Monday morning. WG774 was thoroughly serviced, cleaned and polished for the first attempt on Thursday morning. The one variable, outside anyone's control, was the weather, but even this turned in our favour, bright, cold and very clear, with a contrail height of 38,000 feet, a natural marker in the sky and far superior to the oily white smoke tried one Saturday afternoon during an engine run, when three canisters were fitted into the brake parachute housing at the expense of the parachute; contrails were more effective, and free! About 7.30 on Thursday morning, the tiny aircraft was hitched up behind the Land Rover and towed down to the end of the runway with the Murex generator. To save space and weight, all engine starting gear, except the motor, was built on to the ground rig. Fuel, ever a problem in this slim-winged delta, was to be the limiting factor during the record attempt. A total of 320 gallons was available of which 32 were for emergencies. To help relieve the situation the port 16 gallon emergency tank was included in the total available, leaving only enough for a very quick circuit if needed. In practice, only about forty gallons were left in the tanks after landing, not much for a very thirsty engine.

My log records the first attempt, take off 08.35. By nine o'clock it was all over for the day, but much experience had been gained as although it had not been possible to have a full dress rehearsal any flying was grist to the mill for this relatively new aeroplane.

Friday dawned cold and clear, the first take off was at 08.00, the second at 10.15, a third flight at 12.30, a fourth had to be aborted as on engine start up the starboard fuel tank vent valve began spewing fuel over the runway. Changing that valve, a fiddly job at the best of times, was proved doubly difficult by the cold, but eventually an en-

gine run proved its serviceability and the fourth flight was made at 5.15, only failing light putting paid to another attempt that day. On each flight the record had been shattered, as had many windows by supersonic bangs, but each time for some reason or other, the record had not been recorded.

Saturday morning and it all started once more, no lack of enthusiasm, just tiredness and frustration, not only were people weary, but so was the aircraft. Its air intakes were reacting most unfavourably to the hammering they were receiving. Between each flight they were very carefully inspected for increasing deterioration; small as they were, a pitot rake across the duct made an inspection impossible to all except the very smallest and slightly built. It fell to Tom Couch who was also the oldest member of the team, (he was a rigger in the RAF at Old Sarum in 1924) to be fed head first down the intake, myself being the tallest feeding him in, like a sausage into a machine. On Saturday the 10th, the first flight was at ten past eight and a second at 11.20 but this was to be the last one as the intakes were giving cause for concern — it had to be this time or never. The first check indicated that the last flight was the best ever, the height accurate to 98 feet but the camera had missed the aircraft, just a contrail. The inevitable space between the jet pipe and contrail but no Delta, of course there was no doubt that the FD.2 had caused the trail, but there was no photographic proof.

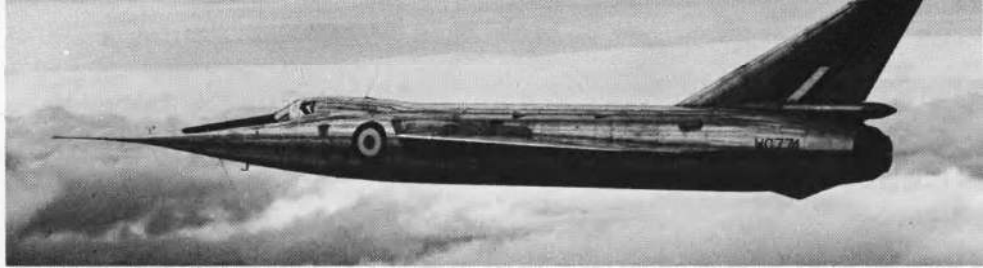
Mechanically, we put the aircraft to bed, had a bottle of beer that had been provided in case of celebration, but it all fell rather flat. We all went home and tried to forget about it. Not until midday on Sunday did the news break, and we knew it had all been worthwhile.

The following day, a normal start when we found that the south-west corner of the weighbridge hangar where we kept our brace of Deltas, was a very popular place indeed. Out in the sunlight once more, this time for the victory photographs, but by 10 o'clock the work of rectification was well under way and by nightfall it was just a pile of pieces. Press photographers who visited about a week later had to make do with the second aircraft in the background with the serial changed to WG774, a small subterfuge perhaps, but probably justified. The Press had their photographs and were happy, only the purist would complain, but then the only difference between the two was simply a number and a small taxi lamp in the nose, either could have taken the record.

The FD.2 at rest on a wet tarmac with nose in the flying position (Flight photo 3323s).

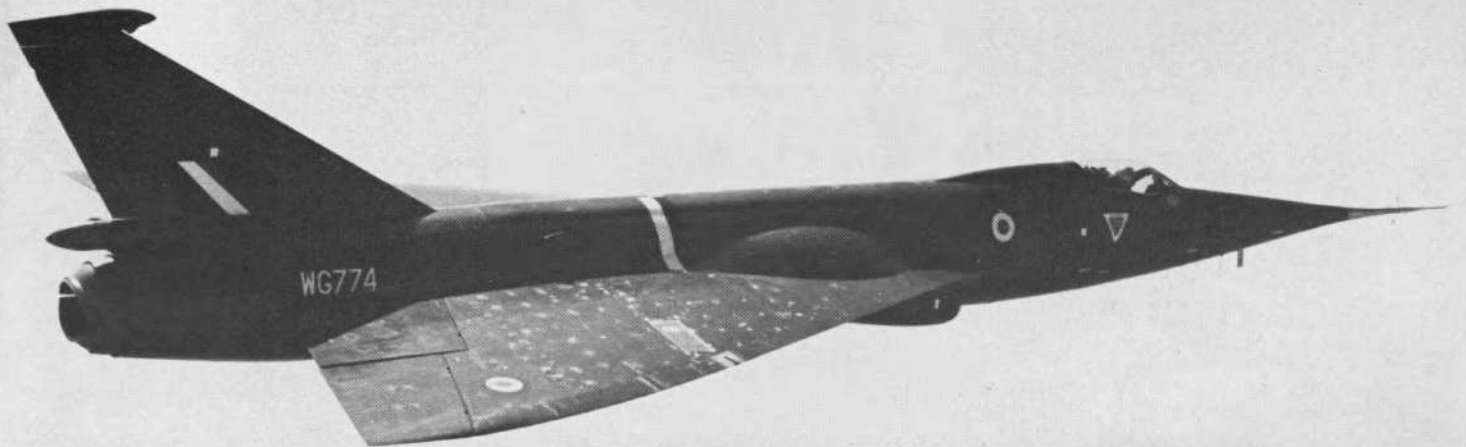
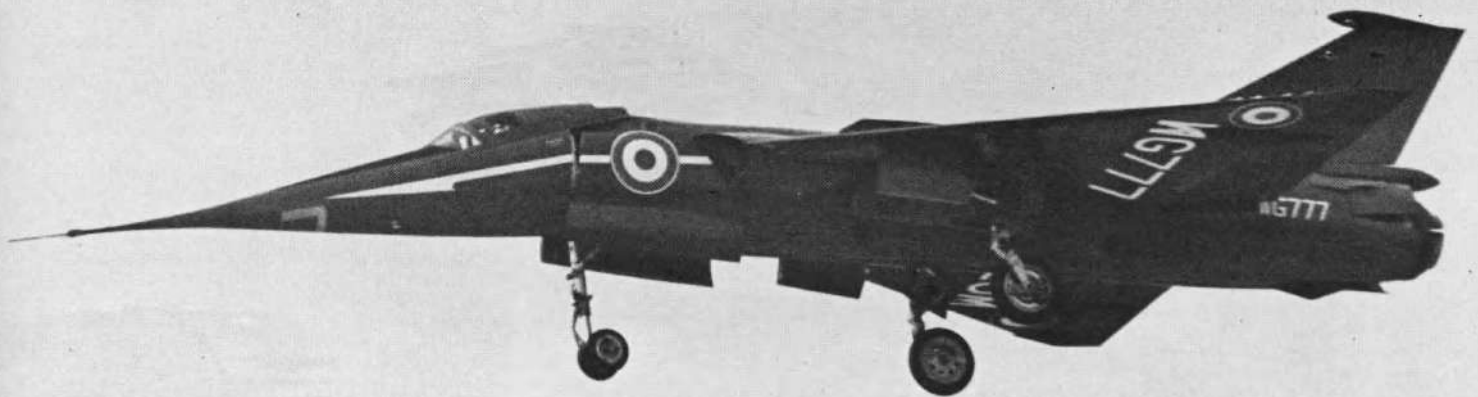


A sequel to the record occurred that year, during the SBAC Display at Farnborough. The grand spectacle was to be both Delta 2s at about 32,000 ft, flying toward one another at 1,132 mph, allowing people to see for themselves the effect of a closing speed never before witnessed in this country. Unfortunately, two problems existed; arriving at Farnborough on Saturday afternoon, the aircraft were prepared for the dress rehearsal to be held next day. With Peter Twiss on board the record breaking aircraft and Gordon Slade flying the second, which had been borrowed from Aeroflight at Bedford for the show, the Deltas took off and climbed up to altitude where the pass was duly made. Unfortunately no one saw it due to cloud. Farnborough had never before or since heard such supersonic bangs, but the result was a max speed limitation of Mach 1.25. However, although the cause was never witnessed during that week, the effect was heard each day by many. Thus ended their day of glory; the two Fairey Deltas continued in service with Aeroflight at RAE Bedford, until the early sixties. In 1964 WG774 was rebuilt by the British Aircraft Corporation as the type 221, with the Ogee wing - à la Concorde - and WG777 in the royal blue finish resides in a museum based at RAF Finningley, proof indeed that the design of 1950 was a sound one, and that Fairey Aviation knew exactly what they were doing when they built it.



Top: The FD.2's clean lines are well emphasised here. Above: WG774 painted as WG777 for the press (*Salisbury Times*).

Below: WG777 in its later royal blue scheme. **Bottom:** WG774 rebuilt and retitled BAC.221 to test the Concorde wing plan form (RAE Bedford).



A permanent identity

RODERICK SIMPSON examines the need for a permanent means of identifying a specific aircraft throughout its life

The abbreviation "c/n" is a mystery to many who first look through *Air-Britain's* publications. Yet, this particular piece of information, included in those sections dealing with new allocations of civil aircraft registrations, is the only permanent identity record of an aircraft through a life which may see many ups and downs. Registrations, military serial numbers, colour schemes and owners can change with great rapidity, but the c/n will never change.

C/n is an abbreviation for "Constructor's number" – sometimes referred to as "Manufacturer's Serial Number". This identity is given on the manufacturer's production line, and its value to the manufacturer is in the obvious function of line monitoring and stock control. The formal system which is used, however, would not be strictly necessary but for the fact that there is a legal need for the c/n system. Most World registration authorities insist that every aircraft should be allotted a number for three main reasons. Firstly, the c/n identifies when an aircraft was built and under which production and certification agreement approved by the relevant governing agency. This has important implications when one considers the safety needs of regulating the issue of airworthiness certificates and the control of mandatory modifications to correct design faults. To take the example of the United States, one can always find a reference to the batch of c/ns issued to a particular aircraft model in the Type Certificate Data Sheet issued by the Federal Aviation Administration. This means that the detailed aircraft specification contained in the Data Sheet can be related to particular aircraft – as can the details of alterations which have taken place to examples of that aircraft type. And so, the c/n is of prime importance to the smooth operation of the official system.

The second need for c/ns is for an identity which does not change when an aircraft is transferred from one country's registry to another. This may also be needed in the case of changes of registration within the same country. The third important application of the c/n is in the legal aspect of registration, because this number is the only constant identity of an expensive piece of equipment, and owners, mortgagors, lessors and lawyers must have a method of keeping track of the aircraft on a constant basis. When this is taken to its extreme one can consider the case of an aircraft which is stolen – and may have its colour scheme and registration changed by the thief. The only way that person may financially gain from the theft is by selling the aircraft to an innocent third party, but the checking of a c/n can positively identify that the seller has no right to dispose of the machine. Naturally, a c/n can be falsified, but the comprehensive records kept by most authorities will usually reveal the anomaly.

For the home-builder or the constructor of a limited number of aircraft of a single type, the problem of allocation of a c/n is simple; indeed, most one-off homebuilt aircraft have a simple "1". However, the system of giving c/ns adopted by the large scale manufacturers becomes much more complex than

this. In many cases, the c/n identifies the model of aircraft concerned, and some manufacturers even incorporate the year of manufacture into the allocation.

Each manufacturer maintains a predetermined, logical system of c/ns – some commencing at "1" and progressing in sequence regardless of aircraft model, and some starting a new series at "1" for each new model. The c/n can consist of numerals alone, or of a combination of numerals and letters, and the identity is always carried on the aircraft itself. This is invariably found on a metal plate riveted to a major structural part of the aircraft, usually showing the manufacturer's name and address, the model number and the Approved Type Certificate number. Generally, the plate is readily visible in the aircraft's normal condition, and favourite locations are the inside of the cabin door frame, pilot's cockpit rear bulkhead, or rear fuselage below the tailplane. In certain cases – particularly with Eastern European built aircraft – the c/n is merely painted on the aircraft and can easily be obliterated when a repaint is carried out.

The c/n systems used by different manufacturers should be understood by aviation enthusiasts – if for no other reason than that maintaining systematic lists of aircraft in c/n order brings a new dimension to the aircraft seen at the local airport. For this reason we now list some of the main aircraft manufacturers with a summary of the c/n systems they use.

AERO COMMANDER c/n example: 560F-1279-55

c/n is a three-part number consisting of (1) the aircraft model number, (2) a sequential number identifying the aircraft within the total production of Aero Commander aircraft (3) a sequential number identifying its position within production of that model.

AEROSPATIALE c/n examples: 11-757 (an MS.893A); 1763 (Alouette III)

Each model has its own numerical series – normally, but not always, commencing at "1". Rallye Commodores have their c/n prefixed "1", thus the example above is c/n 1757 in the normal series. Alouettes start at c/n 1001 with a separate series for the Alouette II and III. Prototypes normally have c/ns outside the production list – 001 etc.

BAC c/n example: 010 (BAC One-Eleven); 324 (Viscount); 804 (VC10)

All new BAC designs (One-Eleven etc.) have a new series commencing "001" for each type. Inherited designs have been mainly Vickers designs which were allocated c/ns in an overall series commencing with the Viscount and progressing through Vanguard and VC10.

BEECH c/n example: 34 (Model 17); D-5059 (Bonanza 35); LJ-55 (King Air 90)

Pre-war c/ns commenced at "1" in a constant series for all models – principally the Model 17 and 18. Post-war, the company has allocated a new prefix letter or letters for each model, and the series in each case starts at "1". Sometimes aircraft are modified to a different type and receive a new c/n – e.g. Model C33A c/n CE-236 modified to Model F33C and given c/n CJ-1. The system extends to missile and target production and to production of major assemblies for other manufacturers.

BOEING c/n example: 17628 (Model 707-123B)

An overall company series covering all models and consisting of five digits. Immediate postwar production (Model 377 etc.) was in the 15000 range and current production is in the 20600 and 20700 series with blocks of numbers allocated to particular models.

BRITEN NORMAN c/n example: 264; 660 – Islanders

Simple numerical series covering all Islander models, commencing at "1" and now at around 380. Rumanian production allocated c/ns starting at 601.

CESSNA c/n examples: 660 (C-172J); 61385 (C-172L); 185-0518 (C-185B); 38056 (T-37)

Pre-war series commenced at "1" and has continued (with some small gaps) to date. A blocking system of allocating the full numerical series is used and current c/ns fall into the 60000, 61000, 73000 and 74000 range. Not all models use this system, however. The more recent types are given a separate c/n series of their own which consists of the Model number followed by a sequential number starting at "1". Sometimes a new series is started for every new sub-model produced and sometimes the same series continues irrespective of the introduction of sub-models. The 600 series is used for prototypes and has now reached around "672". Reims-built aircraft have their own c/n series and certain aircraft with Reims serials also have a Cessna c/n indicating that they have been built from Wichita-supplied parts.

CONVAIR c/n example: 16 (Convair 990)
Simple numerical series for each new model commencing at "1" in each case.

Beech Queen Air HK-1095-X of the Colombian operator Aerotaxi; the c/n plate is the tiny arrowed patch beneath the tailplane (E.J. Bulban).



De HAVILLAND c/n example: 04326 (DH.104); 2124 (Trident)

Numerical series for each model with the first two digits indicating the aircraft model number. Thus, the DH.104 Dove carries c/ns in the 04 series; the DH.121 Trident has c/ns in the 21XX Series. Each new c/n series starts at 01 or 001 following the model designator. This system is continued by Hawker Siddeley for former De Havilland designs.

GATES LEARJET c/n example: 24-163 (Model 24); 25-010 (Model 25)

Numerical series for each model, prefixed with the model number and starting at "001" for each series.

PARTENAVIA c/n example: 53 (Model P.64B)

Simple numerical series for each model, starting at "1" in each case.

AVIONS ROBIN c/n examples: 410 (DR.1051); 37 (DR.220); 189 (DR.253B)

Initial Centre Est production of Jodels used the Avions Jodel allotted c/ns in a simple 3-digit numerical series. The Model 220 and 221 started a new series at "1" which continued to c/n 145. The Model 250 started another new series at "1" and this gave way, at c/n 101 to Model 253 production which continued to c/n 200. The DR.300 series was commenced at c/n 301, covering

all marks of the 300 series, and has now continued, without interruption, into the Model 400 series. The current allocation of c/ns is in the region of c/n 760-799.

PIPER c/n examples: 16-392 (PA-16 Vagabond); 28-24428 (PA-28); 7125326 (PA-28)

The post-war system, starting with the PA-11 Cub Special, consisted of a prefix number denoting the model, followed by a simple number in an individual series for that model. There were few variations to this rule, although the PA-23 Aztec was given the prefix 27- to denote its differences from the previous PA-23 Apache. Sub-models (particularly of the Cherokee) have been given defined sub-blocks of c/ns, all prefixed with the main designating number. Prototypes normally have c/ns, at the beginning of the normal series for that model. In 1971, the system was changed to a three-part c/n under which the first two digits show the year of construction, the second two designate the precise model and the last three are a series number. Thus, the c/n 7125326 indicates - (1) it is a 1971 aircraft (2) that code 25 shows it to be a PA-28-140 Cherokee, and (3) it is the 326th aircraft built. For comparison, the 326th Piper Seneca built in 1971 (if there was such an

aircraft) would have a c/n 7150326 - the code 50 denoting the PA-34 Seneca 200.

The c/n plate on a Piper Cherokee (M.J. Hooks).



Viscount preserved

PETER DAVIES tells of the world's oldest surviving Vickers Viscount preserved at Liverpool

Today, living in the jet age, we take for granted the speed, comfort and convenience of modern air transport. It is perhaps a fitting reminder that the world's first turbine-powered airliner, the turboprop Vickers Viscount which was the forerunner in this field, should be preserved.

On 28 April 1972 the Viscount Preservation Trust was established to enable the world's oldest surviving Viscount, G-ALWF, to be preserved for permanent public display as a tribute to the British aircraft industry. This trust was the brainchild of Paul St. John Turner author of the *Handbook of the Vickers Viscount*.

'WF's final resting place is Liverpool/Speke Airport where arrangements were made with Liverpool Corporation to keep it under cover. Speke is a fitting place in more

ways than one as G-ALWF has operated both to and from there in the colours of British Eagle and Cambrian Airways. On 29 April 1972 at the Liverpool Air Day 'WF was on static display for the public for the first time and on that day some 1,750 people passed through it.

G-ALWF, a V.701 c/n 5, was the fifth Viscount to be built of a total of 439. It was also the second production machine and the second of the type to be delivered to an airline, the first being G-ALWE c/n 4. Not only is it the oldest Viscount but also the earliest example of any turbine-powered airliner still in existence. Built at Weybridge and first flown on 3 December 1952, it was delivered to BEA on 13 February 1953 as *Sir John Franklin*. After eleven years' service with BEA, 'WF was sold to Channel Airways

and delivered in March 1964, subsequently being leased to British Eagle from September 1964 to January 1965. In December 1965 'WF went to Cambrian Airways operating its last service for them on 24 December 1971. As Cambrian was the last operator of 'WF it is fitting that the aircraft will be preserved in their colours.

On 12 April 1972 'WF made its last special commemorative and publicity flight. As Flight No. CS 1972 in the hands of Capt. G. A. Perrott and Capt. J. Nemes it flew from Rhoose to Liverpool via Heathrow. On arrival at Liverpool it had completed 28,299 flying hours in 25,938 flights and had carried an estimated 800,000 passengers over nearly 7,000,000 miles.

The official opening ceremony of the Viscount Preservation Trust was carried out by the Lord Mayor of Liverpool on 5 December 1972, just 20 years and two days after 'WF's first flight. This was the first time that a postwar airliner had been preserved for public display in the United Kingdom.

Viscount G-ALWF arrives at Liverpool/Speke on its last flight from Rhoose via Heathrow on 12 April 1972 (M.J. Hooks).



PPS – the replica makers

DOUG BIANCHI of Personal Plane Services at Booker (now known as Wycombe Air Park) has been an *Air-Britain* member and supporter for many years. Here he looks back through his company's history

PPS had its origins in 1937 with the purchase of a Desoutter 1, G-AAPK, for £175 for joyriding. This was based at Hanworth and we used to joyride at a field near Brentwood. After a short while, we obtained a Spartan three-seater, G-ABKT. The pilots were Ronnie Jude and R. A. Henderson. We were often joined by M. Coxon with a Genet-engined Avro Avian. The name of our company was Aerial Enterprises. Incidentally, we handed over this name to a company operating Rapides at Booker in 1966.

With the outbreak of war, the aircraft were impressed into the RAF and neither of them survived the war, although the Desoutter passed through White Waltham in the early days of 1940.

The company, one strong, came to life again in 1946 with the formation of Personal Plane Services based at White Waltham and maintaining the Rapide G-ADAE of Airborne Taxi Services. The first C of A renewal we carried out was on "Daddy" Probyn's Whitney Straight G-AEUX.

In 1947, we moved to Blackbushe and carried out maintenance in some Nissen huts on the north side of the airfield. Unusual aircraft used to haunt us even then and we overhauled the Benes Mraz Be 550 G-AGSR, a whole batch of Proctors, our own Miles Falcon G-ADFH and Magister G-AIUE. We also maintained the DC-2 ZS-BTN. We collected the famous Mew Gull G-AEXF from Lyon in July 1950 and commenced a long and difficult overhaul which was only finished when we moved back to White Waltham in 1951.

At this time, we were all buying Tigers, Magisters and Proctors from the Ministry sales and converted several Fairchild Argus' for private owners. Several Tigers were purchased from Cosford and Hullavington and we rarely paid more than £25 for any of them! We purchased several Proctor IVs for £15 and used to overhaul and upholster them and repaint to owner's scheme—selling them for £325!

The Mew Gull was crashed at Shoreham and rebuilt again to go on and win the King's Cup twice more. Aircraft we overhauled were Aeronca C.3s Piper J-4s and American Taylorcraft, a South African Ercoupe, Swallows, Klemm L.25, Praga Baby, Heath Parasol, Avro Avian, Moth Minor etc. Aircraft from abroad included Whitney Straights HB-URO, HB-EPI, Jungmeister EC-AEX and Macchi MB.308 I-TALY. We converted several Tiger Moths for Holland which involved fitting the modified fin and rudder and we also designed and built a coupé Tiger G-ANSA for ourselves.

In about 1955, we joined forces with Schreiner & Co in Holland to operate half a dozen Proctors for Army Cooperation and gunnery practice. This went on for about two years and then we sold the aircraft back in England.

Around this period we started to specialise in continental aircraft and the Garland Bianchi Aircraft Co. was formed to manufacture the Emerald under the name Linnet.

The prototype, G-APNS, was built at White Waltham and made its first flight in the hands of Neville Duke at Fair Oaks in September 1958. Two more aircraft were completed before I left the company in 1960.

In 1957 we built the replica Vickers 22 and in 1963 we built two Santos Dumont Demoiselles for the film *Those Magnificent Men in Their Flying Machines* plus a third spare machine. Personal Plane Services were responsible for the maintenance and operation of the replica aircraft throughout this film. This work included major modification to the Antoinettes to try and get them to fly decently. We failed dismally!

The following year, we manufactured a replica Pfalz D.III, G-ATIF, which was flown to Ireland for the film *The Blue Max*. We purchased and overhauled in France the Morane 230 for this film and, again, sent a team to Baldonnell for the maintenance of these aircraft. Our next replica was the well known Fokker E.III G-AVJO which we still own.

Around this time, we started to import second-hand French aircraft – Jodels, Emeraudes etc. and these became a major part of our business.

We had been associated with Airways Flying Club for some years and when White Waltham became difficult to live with, we both moved to Booker and the first aircraft we flew in were Jodels G-ATJN, G-ATGE and G-ATHX. The Fokker was first flown at Booker by Joan Hughes. Around this period we imported and overhauled many odd aircraft – Nord 1101s, a Bellanca Cruisair, various makes of Jodel, Emeraudes, Bölkows, Fourniers etc. and we became well known in France, joining forces with a company at Lognes by the name of Société Commerciale de Réparation d'Avions Légers.

We imported for The Hon. Patrick Lindsay another Morane 230, G-AVEB, leading up to a considerable collection of interesting aircraft.

The film *Mosquito Squadron* involved the operation of four Mosquitos at Bovington and afforded us the experience of overhauling one of these, G-ASKA, and fitting equipment for a transatlantic flight for the Confederate Air Force with whom it now flies as N9797. We subsequently inherited the overhaul and maintenance of the Spitfires G-AIST and G-ASJV which are still with us.

Our Morane 'N' replica, G-AWBU, was completed at this time and is in constant use, now being followed by a replica Manning-Flanders monoplane, G-BAAE, which should be completed this spring.

The complete rebuild of the Yak-11 G-AYAK for Mr. Philip Mann has been one of our major successes and is being followed up with a Lysander and a Valmet Viima which is at present under major rebuild.

Our scheme to import Renault-engined Stampes kept us fully occupied with these aircraft, terminating in the operation and maintenance of the Rothman's Aerobatic Team.

We have become the major company holding spares for these aircraft – Rollasons concentrating on the SV.4A with Gipsy engine. Our own Stampe G-AWXZ is kept as a communications aircraft and has done well in competitions flown by Tony Bianchi.

Latent work in progress is the rebuild of a Morane 500, a Harvard, and a Seafire 47 which is now under restoration, but it seems unlikely that it will fly again.

We think that PPS is almost the only British aviation company that has existed for 25 years with the same management and the same line of business i.e. overhaul and maintenance of light aircraft.

Aircraft owned by Personal Plane Services and its predecessor are as follows:

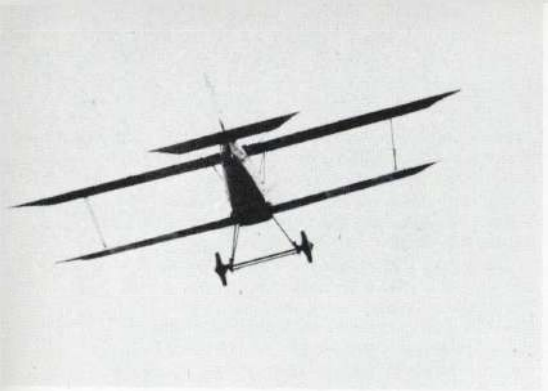
Miles Magister G-AIUE, G-AHYL, G-AKUA,
Miles Falcons G-ADFH, G-AEEG,
Stinson Voyager G-AGZW,
Percival Proctors G-AKEA, G-AMTJ, G-AKYA, G-AOBF,
G-AHGR, (Dutch Army Co-op flight),
D. H. Tiger Moths G-AHND, G-ANSA, G-ANRD, F-BDJM,
PH-UFO, PH-UFN, G-AOAH, G-AOAE, G-ANSP,
D. H. Puss Moth G-AAZP,
Spartans G-AAHV, G-ABKT,
Jodels G-ATGE, G-ATHX, G-ATJN,
Stampes G-AWXZ, G-AVES, G-AVJG, G-AVYV, G-AZNK,
Rallye G-AWXZ

Interesting flights in which PPS has been involved and responsible for: Mew Gull G-AEXF: Twice King's Cup winner, Whitney Straight G-AEYG to Australia, Comanche G-ATOY: South Africa Record & North Atlantic flight (Sheila Scott).

Fokker Triplane G-ATJM: Dublin to Munich and return,
Mosquito G-ASKA: Transatlantic flight.

The two earliest aeroplanes mentioned in the adjoining narrative were the Desoutter G-AAPK and Spartan three-seater G-ABKT (via R. P. Howard); the Mew Gull G-AEXF is shown soon after its post-war restoration (M. J. Hooks).





Some of the aircraft with which PPS have been involved. Above: the Pfalz D.III replica G-ATIF built for the film *The Blue Max*; right, the beautiful black and red Morane Saulnier MS.230 G-AVEB; below, two replicas, the Fokker E.III G-AVJO and Morane Saulnier N G-AWBU and the appropriately registered Macchi MB.308 I-TALY and Yak-11 G-AYAK. At the bottom of the page, a quartet of Mosquitoes involved in the film *633 Squadron* and seen at Bovington on 23 July 1963 - TA642 being assembled with fake fuselage serial HX835 and coded HT-R, RS718 painted as HJ662 HT-C (note dummy nose guns and bullet holes), TW117 as HR155 HT-M and TA719/G-ASKC as HJ898 HT-G (All photos on this page by M.J. Hooks).



The luxurious boats

JOHN COOK tells of BOAC's early post-war flying boat services

Long-range transport aircraft were at a premium in the United Kingdom at the end of the war and BOAC found it necessary to continue the use of the flying-boat fleet which had been built up from Imperial Airways' pre-war Empire boats and the Boeing 314As and Short Sunderland 3s that had been acquired for essential war-time services.

One of the Corporation's major problems at that time arose from the very varied fleet which it was forced to operate. In 1946, for example, it had 207 aircraft of 19 types, including a total of 37 flying-boats. The latter included Short S.23 and S.30 "C" class, "G" class, Hythe and Boeing 314As and there was an obvious need to rationalise. As the later Sunderland developments became available, the Empire flying-boats were retired, followed by the Boeing 314As.

Built at Boeing's Seattle plant for Pan American Airways, the three aircraft had been purchased by BOAC in July 1941 and registered in Britain as G-AGBZ *Bristol*, G-AGCA *Berwick* and G-AGCB *Bangor*. From Foynes, they were used on services to West Africa and later, to the United States.

Their two last years of BOAC service were limited to the route between Darrell's Island, Bermuda and Baltimore, USA; all three were withdrawn from service on 15 January 1948. The Darrell's Island base was closed and the route continued using Lockheed Constellations operating from Kindley Field, Bermuda.

During their 6½ years with BOAC the three aircraft had flown a total of 291,000 hours and nearly 4½ million miles. They were sold to the General Phoenix Corporation, Baltimore, in April 1948 and were later purchased by Transocean Airlines.

BOAC's post-war UK-based operations depended largely on the Sunderland, or, more correctly, on the civil derivatives, the Hythe, Sandringham 5 and Solent. The fleet was based at Poole, Dorset, but in April 1948 Poole Station closed and services were transferred to Southampton, using Imperial Airways' post-war alighting area.

The first aircraft to use the base was a *Plymouth* class Sandringham 5 on a flight from Japan but the station was officially opened on 14 April by Lord Nathan, Minister of Civil Aviation. The ceremony was followed by another in which the Mayoress of Southampton christened the Solent G-AHIN *Southampton*, this act being complemented by the presentation of a ship's clock by the Mayor.

The new station, complete with a purpose-built terminal building including customs, immigration and air traffic control services, was located at Berth 50 in the Old Dock area, close to the Graving and Ocean Docks. It was supported by the BOAC maintenance base at Hythe on the western shore of Southampton Water.

From the alighting area, the aircraft taxied under their own power to moor at a buoy opposite the U-shaped dock into which they were drawn stern-first by means of a cable attached by launch. Disembarkation was, therefore, direct onto land but the whole procedure took more than twenty minutes, much longer than for a comparable land-plane. This really exemplified the time-consuming aspect of flying-boat operations.

Marine-based services were conducted in a much more leisurely manner, as can be seen from the 4½ day timing for BOAC's Solent service to South Africa which commenced on 4 May 1948. This represented a journey time more than double that set for the weekly Avro York service, which ran alongside the twice-weekly Solent schedule, and the South African Airways Douglas DC-4 service, on which there were no night-stops.

Passengers left London for Southampton by coach at 7.00 am, to board the Solent for the first stage of the flight to Marseilles, then on to Megarese harbour, Augusta (Sicily) for a night-stop, 6½ hours out from Southampton.

Next morning the flight continued, to reach Cairo for lunch and Khartoum for the next night-stop. The third day was occupied by the passage to Port Bell on Lake Victoria,

Uganda and the fourth by the flight to the Victoria Falls, alighting on the Zambesi River near Livingstone, Southern Rhodesia. Journey's end came on the fifth day when the Solent landed on the Vaaldam reservoir, nearly 60 miles from Johannesburg.

Travel at flying-boat pace was more in keeping with the needs of the pre-war world, however, and little more than two years later BOAC's flying-boat operations were discontinued, Canadair Argonaut and Handley Page Hermes airliners taking over on the Far East and African services, respectively.

The last BOAC flight from Berth 50 was made by Solent G-AHIO *Somerset*, on delivery to Short Brothers and Harland Ltd.'s factory at Belfast.

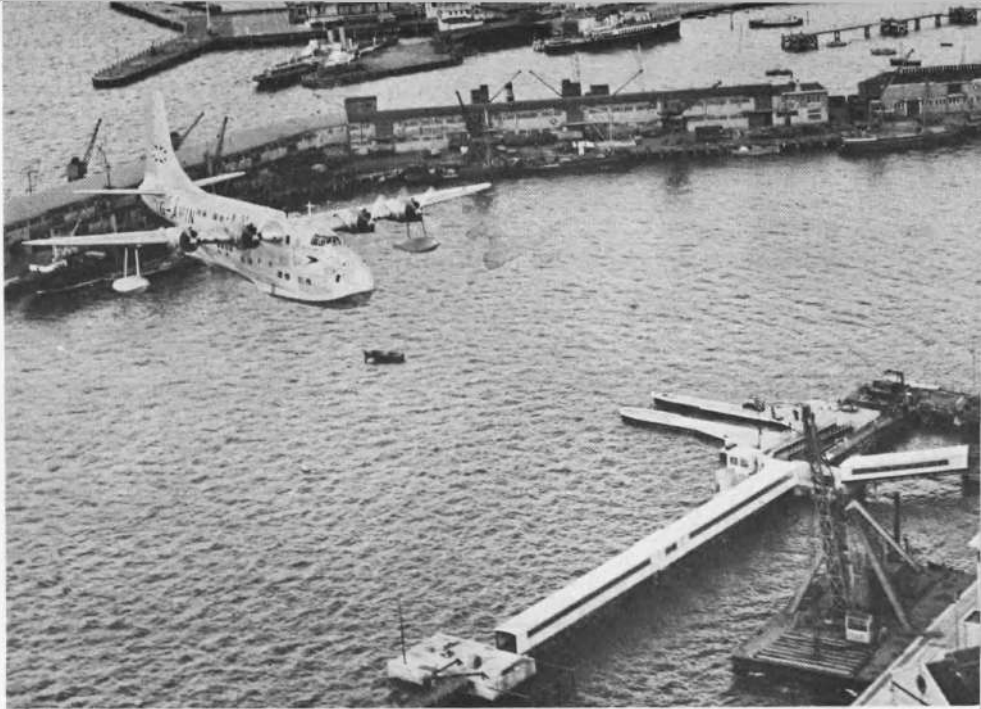


Above: The Short Sandringham G-AJMZ Perth was the first incoming flying boat to dock at BOAC's Berth 50 at Southampton; it is shown being towed in by cable on 31 March 1948.

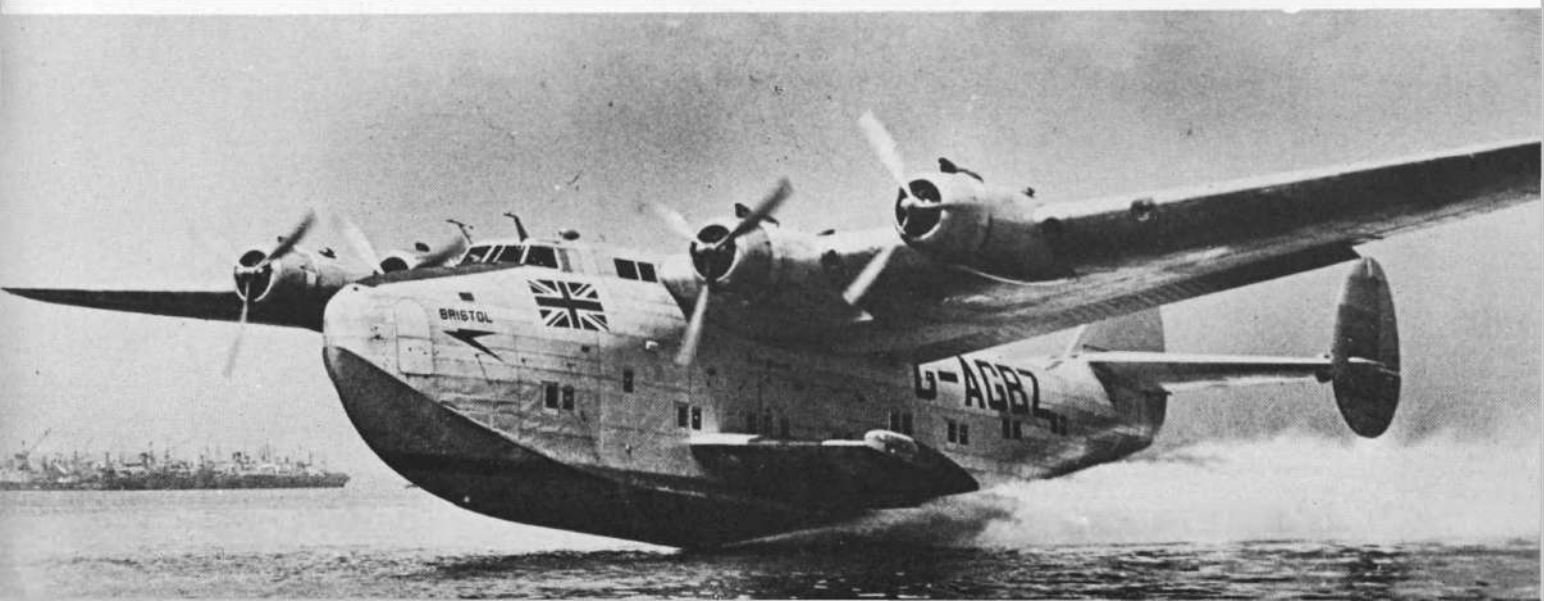
Below: Boeing 314 G-AGBZ Bristol in its wartime camouflage.



Right: Short Solent G-AHIN Southampton flies over the new BOAC Marine Air Terminal in 1948.



Below: An evocative picture of BOAC Sunderland ML725 being towed to the take-off area in Poole Harbour prior to the opening of the Southampton terminal. This aircraft was later registered G-AGHW and was destroyed in a crash near Newport, Isle of Wight, on 19 November 1947. A contemporary was G-AGKY, shown over Cairo; this sank at Calshot on 28 January 1953. The Solent 2 G-AHIL Salisbury was later converted to Mk.3 standard. Sandringham G-AHZB landing on Belfast Lough was short-lived – the Certificate of Airworthiness was issued on 25 April 1947 and the aircraft crashed at Bahrein on 22 August. At the bottom of the page is another view of Boeing 314 G-AGBZ, this time in post-war colours.



The numbers game

RODERICK SIMPSON explains civil aircraft registration marks and the fascinating hobby of "reggie spotting" - collecting aircraft registrations

The most obvious outward difference between one aircraft and another is the registration marking. For many members of *Air-Britain* and those who spend many hours spotting at the country's airports, these registrations have a special fascination and a meaning which goes far beyond the mere collection of lists of identities.

The allocation of aircraft registrations goes back to 1912 when the Brussels International Federation meeting placed on record the need for "every aircraft to carry on two sides, in such a manner as to be plainly visible, the registration numbers which shall identify such aircraft as well as an indication of the country where the formalities of registration have been complied with." Military aircraft were able to adopt alternative national systems of registration, but this formula for civil aircraft became the basis of the jumble of letters and numbers in use today.

The 1914-18 war interrupted civil flying in such a way that formal aircraft registration only became effective after the armistice. In 1919 the Air Convention was held in Paris to lay down a definite system of identifying aircraft to which most countries would adhere. Major exceptions at this time were Germany, Russia and the USA. The original recommendation was that each aircraft would have a single nationality letter followed by four identification letters, at least one of which should be a vowel. This was satisfactory for a while, but between 1919 and 1929 the number of countries needing nationality letters grew to exceed the 26 letters of the alphabet, and a system was evolved whereby the first letter after the hyphen subdivided the allocation and also indicated the nationality.

The initial allocation of split registration groups filled the need until 1929, and worked tolerably well. However, many of the countries issued with registration groups had failed to make use of them and the detailed problems resulting from an increasing fleet of aircraft throughout the world meant that the problem had outgrown the system. At that time an International Commission for Air Navigation was formed to set matters in better order. A fresh series of registrations, allotting one or two letters as nationality marks, was drawn up. Originally it was intended that these prefix letters should be followed, after a hyphen, by a group of three

or four identification letters, but many nations adopted numerals or a combination of letters and numerals, and, as the system advanced it even became necessary to allocate nationality marks which consisted of a letter/numeral combination. One of the first such markings was 4X- adopted for Israel

At this stage it may be useful to note the main registration markings in use by European countries. These are the groups most likely to be seen at airports in the United Kingdom:

Great Britain — G-xxxx; France — F-xxxx; Netherlands — PH-xxx; Belgium — OO-xxx; West Germany — D-xxxx; Denmark — OY-xxx; Norway — LN-xxx; Sweden — SE-xxx; Finland — OH-xxx; Switzerland — HB-xxx; Italy — I-xxxx; Spain — EC-xxx; Portugal — CS-xxx; Austria — OE-xxx



Top: N24062, an American Hot-air balloon (R. E. Nichol); **Above:** Gazelle G-BAGJ represents the current British sequence (M. J. Hooks); **Left:** HS. 125 HB-VAZ and DC-3 HB-IRX show the Swiss white cross on a red background (M. J. Hooks); **Below:** The experimental Nord 500 shows the French F-W sequence; **Right:** Large pre-war type registration on a Canadian Gipsy Moth.



In addition one may see US registered aircraft with the letter N followed by a varying number of numerals and letters (five maximum) and Russian aircraft with CCCP- followed by a numeric identification group.

Within the structure given by the national identity markings it has always been up to each country to allocate and maintain records of civil aircraft registrations. In many cases the registration is tied to the airworthiness certification of the aircraft and some countries include an airworthiness classification within the registration marking. For instance, in France all aircraft involved in pre-certification test flying carry a registration with W as the first letter of the identification group — e.g. F-WTSS (Concorde prototype). When the aircraft completes its test flying it will get a new registration with a "B" or "P" prefix depending on whether it has a full or restricted airworthiness certificate. This type of system is in common use for test flying and many countries include "X" in experimental registrations (eg Switzerland with X-HB-SUP or Canada with CF-ROM-X).

Many countries allow considerable latitude in the allocation of markings and are quite willing to give one's initials if requested. In particular this tends to happen in the United States where an aircraft will often get a new registration each time it changes hands. One Lear Jet 23 which first flew in 1965 was registered to Lear Jet Corporation with the marking N805LJ, then went to Boise Cascade Company as N292BC and was sold to Orcolo Corporation as N292OC. In each case the registration included the initials of the new owner. However, there are few countries which allow this degree of choice and in Britain an aircraft must keep the same marking for its entire life in the United Kingdom. If a British-registered aircraft is sold abroad it will, of course, be allocated a new marking by the recipient country, but if it returns again to Britain it will revert to its original British registration.

Indeed, the British system is one of the most logical and least complex in the world. It basically started at G-AAAA in 1928 (after a honeymoon period as K-xxx and G-Exxx) and by the end of 1972 had just passed G-AZZZ and was into the G-Bxxx series. The registrations are allocated in strict alphabetical order with exceptions being allowed in only the most extreme circumstances. Such an extreme circumstance is the British Concorde prototype G-BSST which is well in advance of the normal allocation of this marking.

With an ever increasing number of emergent nations in the world the pastime of registration spotting can only become more interesting. *Air-Britain* tries to record in its monthly *Air-Britain News* the markings given in many parts of the world to new aircraft, and the details of owners etc. can be fascinating information when allied to the registration seen on an aircraft at the airport.



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This page: The Dante Group's Cameron O-84 G-BAGY and London Balloon Club's Piccard Ax6 G-AWCR (P. J. Bish). Two examples of British homebuilts – the first Evans VP.1 G-AYXW and Mignet HM.293 G-AXPG at recent Flying for Fun rallies at Sywell, Northampton (M. J. Hooks) and the Royal Air Force's aerobatic team of Jet Provosts **The Blades** in their new red, white and blue colour scheme (Ministry of Defence).

Front cover: A Phantom intercepts a Russian Tupolev Tu-20 over the North Sea (Ministry of Defence).

