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IN THIS ISSUE:

Approaches to Armament

ILLUSTRATED elsewhere in this issue is an experimental pack housing 31 air-to-air rockets which was displayed at the R.A.E. Golden Jubilee exhibition. It gave the first public indication that we, as a nation, are developing simple, unguided missiles as fighter weapons. At the same exhibition was a great deal of other armament, previously secret, which emphasized the breadth of British research in this field.

Before the era of nuclear weapons, it was possible—though we know of no actual instance—to develop a system of defence against air attack on a purely businesslike economic basis. Continuous re-appraisal of the problem should always have shown that, in terms of results for a given expenditure, one system—not necessarily always the same—was superior for a given situation. Now, there is only one possible objective in air defence: to prevent *any* enemy aircraft or missile from reaching our shores. Economics must be forgotten in the dire necessity of establishing a defence through which not one devastating weapon can slip.

Nevertheless, taking a broad view of the whole problem of interception, it is at once apparent that not one of the fundamental variables has yet been solved—or at least, not one has yet been agreed upon internationally. On the score of armament, divergence of opinion is obvious. The U.S.A. has (after initial dubiety) come out solidly in favour of the unguided air-to-air rocket, typified by the "Mighty Mouse." Such missiles, first used—with devastating effect—by the Luftwaffe, against daylight B-17 formations, are now highly developed, reliable, relatively cheap and of proven effectiveness. The U.S.A.F. and Navy employ such missiles on a large scale, and are according them priority over the gun in the arming of all-weather intercepters.

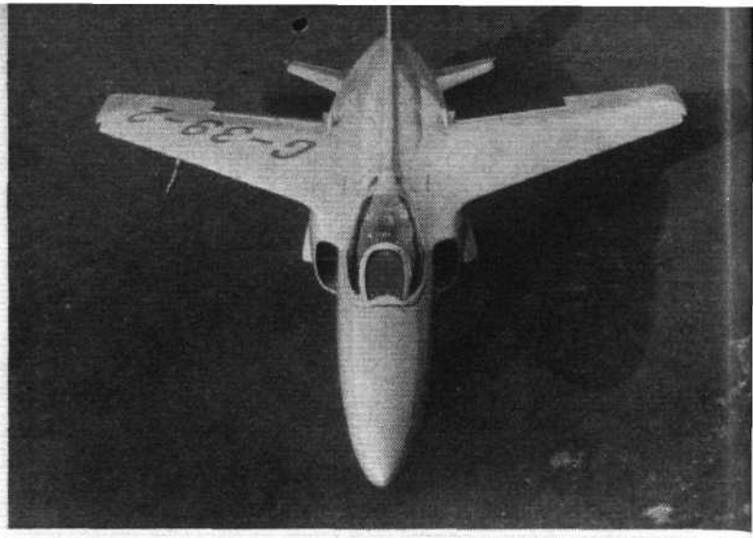
We in Britain, however, have never introduced an air-to-air missile of this nature into squadron service, and the pack referred to above has not yet been flown. Even the Javelin is fully armed with guns, which, presumably, it will retain to supplement its guided missiles (these, as stated officially, it is to carry when such weapons are ready). Overall, perhaps, the guided missile may prove to be the most effective weapon of all, particularly when it is air-launched in the neighbourhood of the target. Later U.S.A.F. intercepters, such as the Convair F-102 or DF-102, will carry the Hughes GAR-98 Falcon homing missile, six being a typical load, and any one being virtually lethal to any aircraft target from the moment of firing. The Falcon is six feet long and weighs but 328 lb; it is doubtful if in the present state of the art, there can be a fully-active homing missile smaller than this.

Interim Mixtures

The French, presumably aware of current thinking in this country and America, are trying to have the best of both worlds. Most of the later Dassault fighters are armed with a mixture of guns (twin 30 mm) and air-to-air missiles similar to the Mighty Mouse. The Canadian CF-100 already has guns and Mighty Mice, and will later have guided weapons as well. How this armament would be employed is by no means clear. The latest Sabre, the F-86K, also raises a question. This aircraft is virtually a D re-armed with guns and equipped with the MG-4 fire-control system. The question raised is "can the collision-course technique be employed with gun armament?" Even with the fast-firing M-39 gun it would seem impossible to be sure of obtaining sufficient strikes at the ranges and closing speeds involved.

The other undecided fundamental is whether or not it is necessary to have a crew of two. The F-102, just mentioned, is a single-seater, and not one new two-seat intercepter has been announced for American service. On the other hand, no less an authority than our own Minister of Supply has said that in our climatic conditions a single-seater is not capable of doing a complete job. We cannot take sides on this point, beyond stating the obvious fact that, if automatic equipment can be made to take over the duties of the navigator, the resulting aircraft will be more efficient and will have a higher performance. The ultimate, it would seem, is to eliminate the pilot as well.

FROM ALL QUARTERS



INSET AILERONS of the Folland Gnat, subject of "first flight" news (Col. 1), are well shown in this specially posed view, taken last week.

The Gnat Airborne . . .

THE first prototype of the Folland Gnat light fighter, powered by a Bristol Orpheus engine, made its initial flight last Monday afternoon from Boscombe Down, in the hands of S/L. E. A. Tennant, the company's chief test pilot.

Visibility was so poor that nobody was able to observe the entire take-off run, but it is known to have been surprisingly short—probably less than 400 yd. Airborne for 15 min in the mist, Tennant landed at Chilbolton, expressing himself "highly delighted" with the behaviour of the little fighter.

Apart from the bigger intakes and larger and shorter tailpipe occasioned by the fitting of the new engine, the Gnat differs only in details from the latest version of the Midge. The size of the extra windows behind the main cockpit canopy has been increased and the undercarriage wheels are apparently of much lighter build. The high-speed-pitot head has been mounted under the starboard wing, some way in from the tip, and the navigation lights are of a different type. The tailplane root carries a slightly bulged fairing.

The Gnat, of course, has the wing of increased span which was first fitted to the Midge. As the photograph at upper right shows, it has inboard ailerons, which can be drooped together to lessen the angle of attack during take-off and approach. This involves the displacement of the aileron actuating gear at the wing root. A small fairing opens to allow the linkage to rise up clear of the wing-root upper surface. No armament is yet installed.

. . . and the Second Prototype P.1 . . .

ALSO on Monday last, the second prototype of the English Electric P.1 single-seat twin-jet fighter was flown for the first time from the maker's airfield at Warton, Lancashire. W/C. R. P. Beamont was the pilot. It may be surmised that this second machine more nearly approaches production standard than the first, and that provision may be made for armament.

. . . and the Gyron

IN a joint statement, the de Havilland Engine Company and Short Brothers and Harland announce that the first flight of a de Havilland Gyron turbojet took place on July 7th, at Aldergrove, Co. Antrim.

As already well known, the Gyron's flying test-bed is the first Short S.A.4 Sperrin (VX 158), the D.H. unit replacing the lower port Avon. The design and conversion work was undertaken at Aldergrove by Shorts. Selection of the Sperrin was dictated by such factors as flight-performance, structural strength, ease of accommodation of the Gyron and the required test gear in the airframe, and availability. The big Short bomber amply meets most of the requirements, although the installation of the mighty de Havilland engine, together with its fuel system, controls and test equipment, has been a major task.

Engine-handling has been rationalized so that the pilot can select the appropriate power on each of the three Avons and the Gyron to maintain trim about all three axes under all conditions of flight. The asymmetry is scheduled to be removed later in the year when a second Gyron is fitted in place of the lower starboard Avon.

On its first flight the Gyron was airborne for 30 minutes, the Sperrin being flown by Mr. Jock Eassie, test pilot to Short and Harland, who was accompanied by Mr. C. D. Beaumont, chief test pilot to the D.H. Engine Co. The manufacturer's announcement states that: "During the test the Gyron engine behaved entirely satisfactorily and was opened up to its full flight-approved thrust: throughout the whole speed range the engine was notably smooth and tractable. After preliminary handling trials at Aldergrove the Gyron-Sperrin will be flown to Hatfield for an intensive engine flight-test programme which will be conducted by Mr. Beaumont."

Hunter Production at Coventry

IN the House of Commons last Monday Mr. Reginald Maudling, Minister of Supply, resisted demands for the placing of further contracts with Sir W. G. Armstrong Whitworth Aircraft, Ltd., at Coventry in view of labour redundancy caused there by the cancellation of contracts for Hunters and Sea Hawks. He said it had long been envisaged that the production of these aircraft at Armstrong Whitworths for the Ministry of Supply would come to an end by the spring of 1956 and that the firm, if unable to secure projects of its own design, would turn over mainly to the manufacture of Javelins under contract to Glosters.

For reasons already explained, the Javelin programme had been rearranged and it was also a fact that export orders had not, so far, been forthcoming in the numbers hoped for.

Mr. Maudling said he was informed that Armstrong Whitworth were making every effort by re-allocating sub-contract work to

ORPHEUS POWER is proclaimed in this side view of the Gnat by the increased diameter of the tailpipe. Flight trials of the new prototype are now beginning. At the controls will be S/L. E. A. Tennant, D.F.C., Folland's chief test pilot—who, as reported above, took the Gnat on its maiden flight from the airfield of the Aeroplane and Armament Experimental Establishment, Boscombe Down.

minimize the redundancies and they were also seeking further export orders. The full extent of redundancies would depend on their success in this direction; but if no more work at all was found the figure would amount by next April to about 3,300 out of a total labour force of about 8,000. The Minister added that he was anxious to find further work for Armstrong Whitworths, but he would not be justified in either spending additional sums on military aircraft beyond the requirements of the Services or in transferring work within the existing programme.

Mr. Maudling's reply did not prevent a barrage of questions from the Opposition; he reminded them, however, that it was illogical to ask for a cut in defence expenditure and then to protest when the cut was made.

Answering a later question, he said that the pound-for-pound cost of Hunter production by Armstrong Whitworth in Coventry might be a little cheaper than that at Blackpool, because the Blackpool factory was less fully loaded. The transferring of work from Blackpool to Coventry would, however, increase the cost of work at Blackpool and would bring no economy at Coventry.

Livery for the Guild

THE Guild of Air Pilots and Air Navigators of the British Empire has been admitted to the exclusive ranks of London's City Livery Companies. A meeting of the Court of Aldermen, held last week under the presidency of the Lord Mayor, agreed to constitute the Guild a Livery Company, "the number of the Livery not to exceed 300."

The Guild was founded in 1929 to watch the professional interests of air transport pilots and navigators, and to act as a link between them and the M.T.C.A. and other official bodies. The Queen is Patron, and the Duke of Edinburgh was installed as Grand Master in October 1953. A new Master is installed each year; Capt. J. C. Harrington currently occupies the post.

"The Guild will be remarkable in that it is a guild of employees rather than of independent business men," comments *The City Press,* adding, "but the independence and authority of the highly trained and courageous pilots and navigators are only equalled by the Master Mariners, who became a Livery Company in 1932."

Britannia Tank Tests Progress

THE test airframe of the Bristol Britannia 100 completed the first phase of its tank tests at Farnborough last week. It had been subjected to 5,000 complete simulated flight operations, involving complete pressurization cycles and air-turbulence effects, without any signs of failure. For a Britannia 100 this would be equivalent to some 20,000 operational hours.

A further series of tank tests is to begin in the near future, but at the moment the first evaluations are being made, and strain-gauges and lacquers are being used to check some regions of stress concentration on various airframe components.

The National Gliding Championships

THIS year's national gliding championship meeting is due to start at the Surrey Gliding Club's site at Lasham Airfield, Hants, tomorrow—July 23rd. It will last for ten days, until August 1st.

As reported in *Flight* last week, a number of new sailplanes are to take part, including the Slingsby T.42 and the Skylark III; but, since the second Army Gliding Club Skylark II has been withdrawn, the entries now number 40. Because this aircraft will not be completed in time to take part, Maj. C. G. Dorman and Capt. E. G. Shepherd will join the team for the other Skylark II, flown by D. Macey and P. W. Ball.

If conditions experienced during the last week continue, some excellent results can be expected, albeit at the expense of some damage to aircraft. An indication of the possibilities was given by the two record flights made on Thursday last week and referred to elsewhere on this page.

Admission for spectators at Lasham will be 2s 6d, and for children 1s. Car charges will be 2s 6d, or £1 in the special enclosure. Motor-cycle parking will cost 1s. A recommended route from London is along A.30, turning left at Hartley Wintney on to B.3016, joining A.32 at Odiham and turning right at the Golden Pot. There will be A.A. signposting.

Unexpected Glider Records

ON Thursday of last week abnormally unstable atmospheric conditions led to the establishment of four new United Kingdom glider records. F/L. Alan Piggott, flying a Skylark II belonging to Imperial College G. C., was towed to 1,800ft and immediately found strong lift which took him up into a large cu-nim cloud. He reached a height which he estimates at 25,000ft—well past the 23,000ft which was the maximum reading his barograph could give.

Carrying no oxygen, Piggott suffered to some extent from anoxia; and his aircraft was severely battered and struck several times by lightning. The fabric was stripped off the nose, leaving the Fibreglass cone bare, and the tips of all surfaces were badly dented. Wings and tail were badly punctured, and the canopy was cracked. The top of the cloud is estimated to have been near to 40,000ft. With this flight F/L. Piggott can claim the U.K. national absolute height and gain-of-height records for single-seaters.

On the same day Stuart Morison and W/C. A. A. J. Sanders, in a Slingsby T.42, made a flight which enables them to claim the British national absolute height and gain-of-height records for two-seaters. Altogether seven pilots climbed to over 10,000ft and four of them exceeded 15,000ft.

M.o.S. Electronics Appointment

THE Ministry of Supply announces that Dr. R. Cockburn, C.B., O.B.E., has been appointed Deputy Controller of Electronics in succession to Rear Admiral G. Burghard, C.B., D.S.O.(retd.), whose tour of duty has expired.

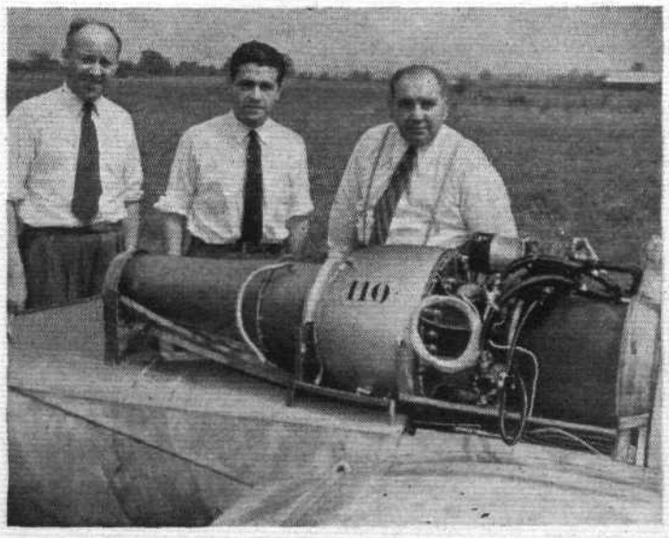
Dr. Cockburn, who is 44 years of age, has held the post of Principal Director of Scientific Research, Guided Weapons and Electronics, since March 1st last year. Before that he was Scientific Adviser to the Air Ministry.

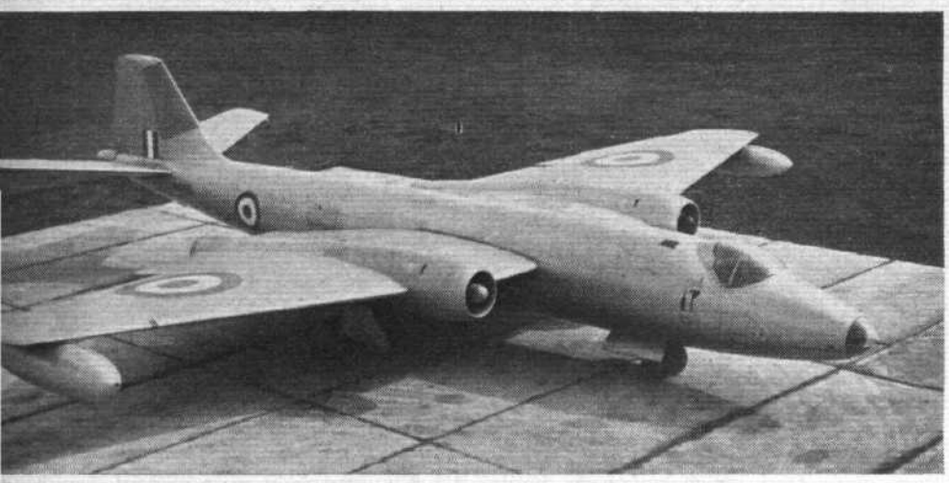
The Somers-Kendall Racer

THE butterfly-tailed light jet aircraft designed and built by H. Kendall and J. N. Somers is now nearing completion at Woodley and should make its first flight in about a month. The Turboméca Palas, of 330 lb thrust, has been installed, a series of ground runs made and the aircraft taxied. A number of details still remain to be completed.

Some delay was caused when a rag was sucked into the intake, but the engine was flown back to the factory in France and the damage rectified in a few days. It has not yet been decided who will make the first flight.

***NEW WHINE:** As reported above, the Somers-Kendall machine should make its first flight in about a month. These "Flight" pictures show a Turboméca representative, M. Péru, supervising engine runs last week, together with Nat Somers (left) and Mr. W. Megalow (right) who has a financial interest in the design. Training and sports flying are foreseen as applications in addition to racing.*





FAR, FAST AND HIGH: First announced in our last issue, the English Electric Canberra P.R.9 is stated to be capable of operation "at altitudes well above the ceiling of present-day fighters." The first machine, shown above, has a P.R.7-type forward fuselage, but a Mk 8 type layout (with more room for special navigational equipment) will be the production standard.

South African Sabre 6s

THE South African order for Canadair Sabre 6s (Orenda 14)), referred to on page 118 of this issue, is for two squadrons and full spares and involves a sum of more than $10,000,000 (about £3,571,000). Although the aircraft could be supplied almost at once from current production, first deliveries are to be made in nine months' time and the order will be completed three months later.

The tender was initially made at government request by Canadair's representative in South Africa, but S.A.A.F. pilots also went to Germany to assess Sabre 6s belonging to the R.C.A.F.'s 1st Air Division. The S.A.A.F. squadron in Korea for some time operated with F-86F Sabres obtained on hire from the U.S.A.F.

Australian Bristol Appointment

ELECTED director and general manager of the Bristol Aeroplane Co. (Australia) Pty., Ltd., is Mr. C. H. Tucker, O.B.E. For the past three years he has been general manager of the company. Mr. Tucker, who was born in London, has spent a considerable part of his business career in the West of England. He joined the Bristol Engine Division in 1942 as business manager at the Corsham shadow factory and held other executive posts with the organization before taking up his duties in Australia.

He was made O.B.E. in recognition of war-time services as commanding officer of the Home Guard unit at Cosham.

Mr. C. H. Tucker.

A SKEETER ferry from Bembridge Airport was provided for Air Marshal Sir John W. Baker, Controller of Aircraft, M.o.S., when he visited the Saunders-Roe works at Cowes. He was met by Capt. E. D. Clarke (managing director), on right, and Mr. R. V. Perfect (sales director).

Maj. L. W. F. Turner

WE regret to learn of the death, at Blandford, Dorset, of Maj. Lewis W. F. Turner, well known as a pilot before and during World War I. He was 72 years of age.

He qualified as a pilot at the Grahame White School at Hendon in 1911, his certificate being numbered 66. Between then and the outbreak of war he held instructional and "chief pilot" posts with a number of companies operating at Hendon, and he also flew in Russia, for the Kennedy Aviation Co.

He won numerous awards in racing and other flying competitions at Hendon and elsewhere, and he is believed to have been the first pilot in Great Britain to fly at night.

In 1914 he joined the R.F.C. as an air-mechanic pilot and by 1916 had attained the rank of squadron commander. In September 1917 he was assistant commandant at the School of Technical Training, Halton.

Canadian Helicopter Surveys

HELICOPTER reconnaissance of the geology of the Queen Elizabeth Islands, in Canada's far North, will head the list of new projects by the Geological Survey of Canada, the Minister of Mines and Technical Surveys, Mr. G. Prudham, announced recently. From the main base at Resolute, Northwest Territories, subsidiary bases will be set up, from which two helicopters will operate throughout the season. The bases have been carefully selected so that helicopters will not have to operate over open water.

Another helicopter project, Operation Thelon, will continue the Department's air reconnaissance policy and will employ five geologists to map over 60,000 square miles of Northwest Territories, in the south-east part of the district of Mackenzie.

MARS AND VIKING: In a recent experiment at Blackbushe, a Sugg Solar Mars gas-turbine generator unit was used to start the Hercules 634 engines of a "long-nosed" Viking 1B of Airwork, Ltd. Both engines were running in under 25 sec; had circuitry permitted, they could have been started simultaneously. The Mars was driving a generator with an output of 28 V at 625 amp max. and 500 amp continuous.

Mr. C. Dunsford

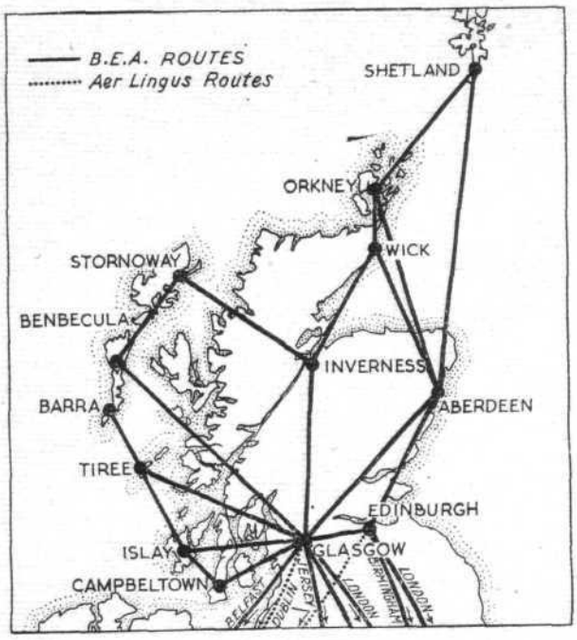
WE regret to record the death of Mr. C. Dunsford, B.Sc., A.F.R.Ae.S., of the de Havilland design department. After serving in the Royal Artillery during the 1914-18 war Mr. Dunsford joined the Fairey Aviation Company in 1921, eventually becoming drawing-office manager at the Hayes works.

In February 1946 he went to the design department of de Havilland at Hatfield, where he was ultimately placed in charge of design progress and planning in connection with Vampires and Venoms. In November 1951, when the development work on these aircraft was transferred to the company's Christchurch division, Mr. Dunsford continued in charge of it there. He was latterly chairman of the S.B.A.C. standardization committee.

Mr. Dunsford leaves a widow, a son at present serving in the Royal Navy, and a married daughter.

(Right) D.H. Herons, known in B.E.A. service as the Hebrides class, have lately taken over the Barra services from their biplane predecessors.

(Below) The Scottish network operated by B.E.A. At the bottom of the map are shown the B.E.A. and Aer Lingus connecting routes to English and Irish cities.

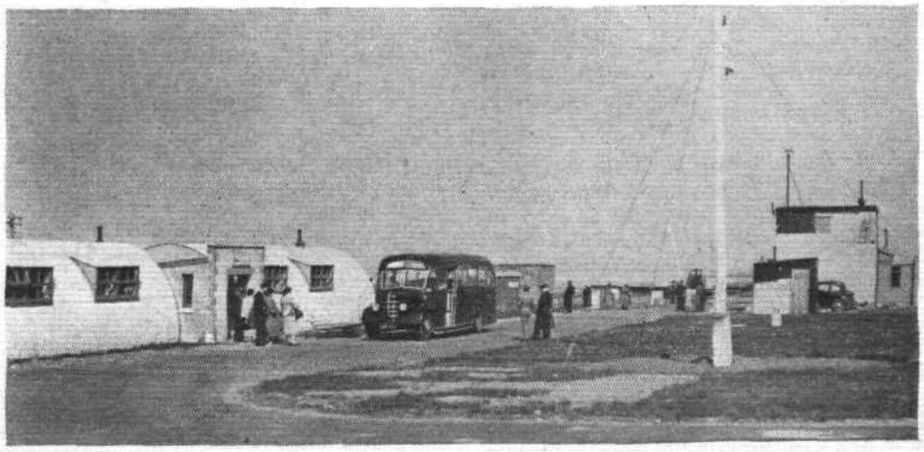


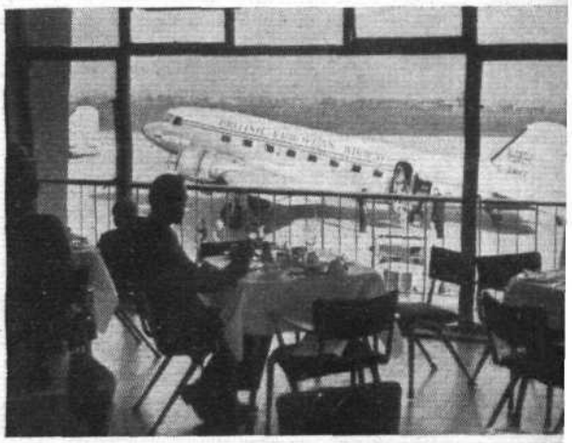
BRITAIN'S "OUTBACK"

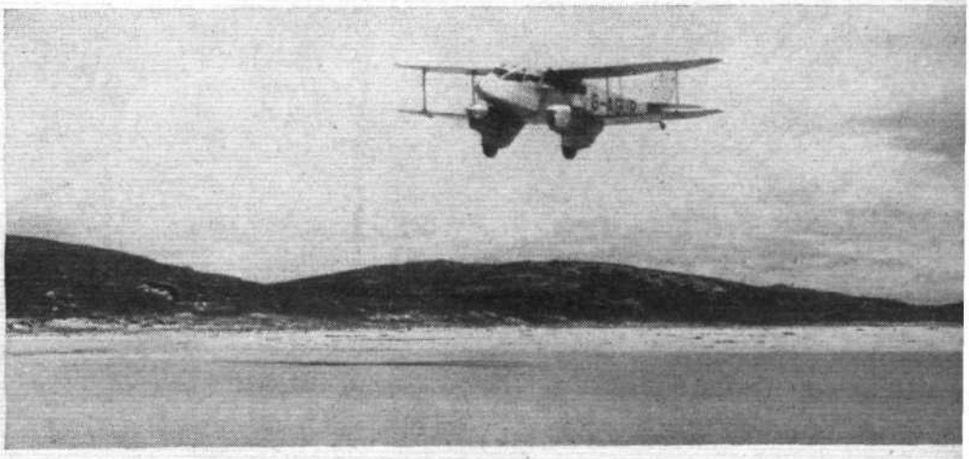
WITHIN most parts of the British Isles air transport is thought of as a luxury—a time-saving service supplementary to road and rail. In the northernmost part of B.E.A.'s domestic network, however, aircraft are essential to the everyday movement of people and goods. Here one may find children who have never seen a train but to whom the aeroplane is as natural a means of transport as the rowing-boat. These "highland and island" routes comprise about 20 sectors, ranging in distance from 28 to 188 miles. Most services are operated by 32-seat DC-3 Pionairs, though new Hebrides-class 14/17-seat Herons are now linking Glasgow with Tiree and Barra.

(Below) Grimsetter Airport, near Kirkwall, serves the Orkney Islands. Shown here are Grimsetter's modest terminal buildings and (background) a B.E.A. Pionair. Centre of the network is Renfrew, Glasgow, which boasts the first post-war terminal building at any British State airport. Pionair "Frederick Lanchester" is seen from the airport restaurant.

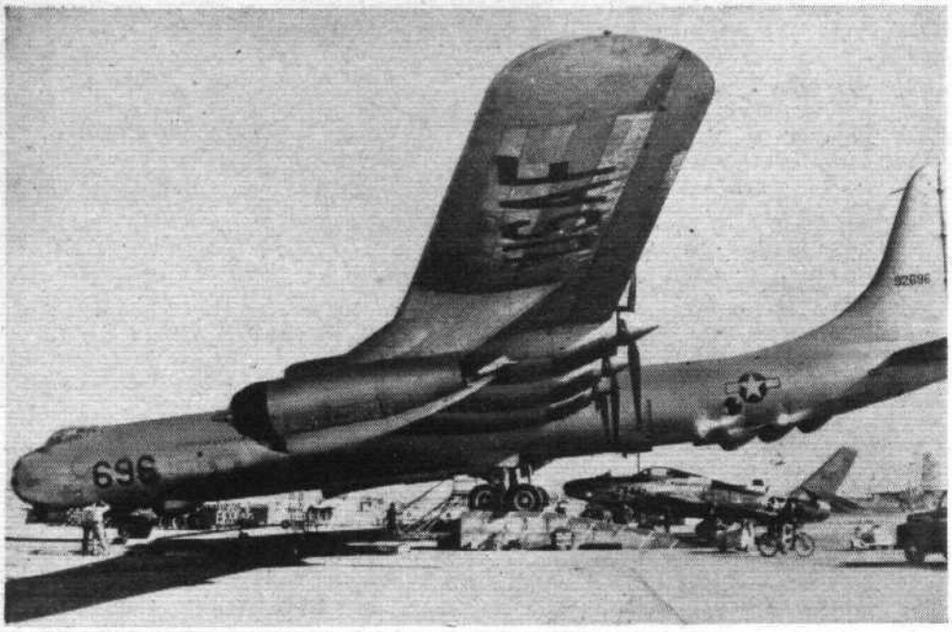
(Bottom) Departure of the airport bus for Sumburgh, some 30 miles south of Lerwick, is an important daily event in the Shetlands' capital. Operations from the sands of Barra, performed for many years by the Islander-class Rapide illustrated, are "subject to weather and tide."







HERE AND THERE



GLOBAL HITCH-HIKER: Taken at Great Falls A.F.B., Montana, this is one of the first photographs to show the ground loading of a FICON Republic RF-84F Thunderflash under a Convair GRB-36. The FICON system combines the 10,000-mile range of the B-36 with the near-sonic speed, high ceiling and 2,000-mile range of the Thunderflash. The 91st Strategic Recce Squadron is forming at Great Falls and the 99th is at Fairchild A.F.B., Spokane, Wash.

Venoms for Venezuela

A NUMBER—unspecified—of Venom Mk 4 fighter bombers has been ordered by the Venezuelan government from the de Havilland Aircraft Company, Ltd. The Mk 4 has powered ailerons and represents a considerable improvement in performance over earlier marks.

Show-time Approaches

WORK has already begun on the erection of the immense marquee which, covering some 112,000 sq ft, will house the indoor static show at the S.B.A.C. Exhibition (Farnborough, September 5th-11th).

Un-American Activity

AS seemed likely when we closed for press last week, Cdr. H. C. Goodhart, the well-known British gliding exponent, maintained his points lead to the end of the American national soaring contests. He was competing by invitation, and cannot, of course, be recognized as winner of this nationals-only competition.

At Ford Tomorrow

HISTORIC Naval aircraft, from the Sopwith Pup onwards, will be seen at the Air Day of R.N. Air Station Ford (near Arundel, Sussex) tomorrow, Saturday, July 23rd. The flying programme, which begins at 3 p.m., will include a Meteor low-level ejection demonstration of a dummy from a Martin-Baker seat.

Quick Sisters

THE American coast-to-coast race for women pilots, a 2,800-mile handicap flown in daylight only, was won on July 7th by the sisters Bera and Edna Bower, flying a Cessna 180. Forty-seven aircraft competed, all airscrew-driven and mainly of the private-owner type. First prize was $800 (£285).

"Stressed-skin" Claim Abandoned

PIONEER of stressed-skin aircraft construction in this country, Mr. Oswald Short has for health reasons withdrawn a claim—entered "a good many years ago"—from the Royal Commission on awards to Inventors. It has been stated on his behalf that the claim—which concerns stressed-skin construction—is being withdrawn not because he might feel unable to support it, but because his medical advisers have said that the physical strain of attendance before the Commission might prove too much for him.

Channel Jumper

THE French parachutist Omer Naudin is to attempt to cross the Channel from Dover by parachute as soon as weather and wind conditions are favourable. He has developed a large slow-falling parachute which, from 22,000ft, should take some 45 minutes to descend. In a test jump at Chartres he covered eight miles and took 21 minutes to drop from 9,800ft.

XC-99 Completes Its Airlift

THE Convair XC-99 has successfully completed its airlift (*Flight*, July 8th, p. 56) from Dover, Delaware, to Iceland. It flew 200 hours during the month and required only the changing of one engine. Original cargo loads, set at 300,000 lb, were exceeded by 79,000 lb.

Attachés at Brough

NAVAL, military and air attachés from nearly 20 countries inspected the Blackburn and General Aircraft Beverley at the makers' Brough factory last week. The visitors arrived in an R.A.F. Valetta at Leconfield, then travelled by road to Brough, where they were received by Mr. Eric Turner (managing director) and his colleagues. In addition to examining the big transport, the attachés visited the engine division. The final stage of their inspection was a flight in the Beverley from the airfield at Brough back to Leconfield.

Frank Murphy's New Post

RECENTLY appointed R.A.F. Liaison Officer, Flying, to Hawker Aircraft, Ltd., is S/L. Frank Murphy, D.F.C., formerly the company's chief production test pilot. The new appointment took effect from July 11th.

Hermann Oberth in the U.S.A.

THE doyen of the pre-war German Interplanetary Society, Hermann Oberth, now aged 66, is to work under Wernher von Braun in the U.S. Army's Redstone Arsenal on guided-missile development. About 100 other German rocket technicians are employed at Redstone, and most of them have become U.S. citizens within the last year.

Tenth Flying Doctor Base

AUSTRALIA'S tenth Royal Flying Doctor base went into service on July 1st at Derby, Western Australia. The new base, which cost £A18,000, will link cattle stations, mission settlements and other isolated communities in the lower Kimberley Hills. Lady Slim, wife of the Governor-General, Sir William Slim, was formally opening it yesterday. Another base in Western Australia, at Carnarvon, is nearly completed.

Doing the Honours

MOSCOW news-services have been giving considerable publicity to the visit to U.S.S.R. of Air Marshal S. Mukerjee, the Indian Air Force C-in-C. Among the many events organized in his honour was a big reception in Moscow at which were present, from the Soviet side, G. K. Zhukov, Defence Minister and Marshal of the Soviet Union; Air Chief Marshal Zhigarev; Army General A. Antonov; Air Marshal S. Rudenko; and Air Colonel-General I. M. E. Kolov.

RESTORED to flying trim by Mr. Frank G. Tallman, of Chicago, is this Sopwith Camel F.1, with 110 h.p. Le Rhône engine. Except for steel undercarriage struts, the machine is considered to be accurate in every detail.

THE AMERICAN SCENE

A Post-Conference Tour

By THE TECHNICAL EDITOR

THE recent Anglo-American Conference—the fifth to be organized by the Royal Aeronautical Society and the Institute of the Aeronautical Sciences—provided a welcome excuse for crossing the Atlantic and studying some of the chief American companies at first hand. Accordingly, as soon as the conference was completed, I left Los Angeles on a tour which encompassed the following plants: Convair, San Diego; Northrop, Hawthorne; Lockheed, Burbank; North American, Inglewood; Douglas, Santa Monica; Douglas, El Segundo; Republic, Farmingdale; Pratt and Whitney, Hartford; and Grumman, Bethpage.

There is, perhaps, no better way to acquire mental indigestion; but such a tour does afford a unique opportunity of contrasting the outward appearance of the American industry with that of our own. The following notes, therefore, are offered as first impressions, and as an introduction to the reports on individual companies, one of which follows on the next page; others will appear in succeeding issues.

Broadly speaking, it can be argued that the manufacturing plants of the American aircraft industry are more efficiently laid out than are our own. This arises largely from fundamental topography and economics rather than from any shortcomings on our part. For example, most British factories are older; and many were originally built so near to a town that, as the latter expanded, it prevented expansion of the factory. In America land has, in the past, been cheaper and more readily available than in Britain, and industry has been able to plan boldly for future expansion without taking too much of a financial risk.

Typically, the large American factory is a single-storey building covering up to several million square feet, with "non-productive" sections (offices for administrative, engineering, medical, and other staffs) ranged along one side. The more recent "facilities"—to use the usual transatlantic term—are windowless, air-conditioned structures which, curiously enough, seem very pleasant to work in. By contrast, our own factories are all too often a haphazard collection of buildings and hutments which "just happened," and which will have to be removed before any large-scale rebuilding can be undertaken. The American industry's method of accommodating its employees' cars deserves special mention; at least one factory has more square feet of "parking lot" than any British aircraft factory has of total floor space. This is a problem which will be increasingly faced as our own economic position improves; already it is estimated that the number of British factory-workers who drive to work has doubled since 1948.

Once inside an American factory it is not difficult to find features utterly alien to our own island. Major engineering installations, machine tools, handling equipment, and the like are generally familiar; and, in fact, an enormous amount of American equipment has long been employed in Britain. The most obvious difference lies in what might be termed the "housekeeping" of the plant. It seems fair, on reflection, to rate the overall cleanliness of American factories as better than our own. There is undoubtedly far more inter-departmental rivalry in this—and other matters—and varying degrees of "cleanliness ratings" are proclaimed week by week by prominently displayed signs in each shop—much as, in Service life, one hut or barrack block might be pitted against another. Such things are done in Britain, but only rarely.

Another fact which is not necessarily obvious is that there is scarcely a single major American aircraft plant in which an industrial artist or "psychological-use-of-paint" expert has not been given a free hand. The effect is not garish; grey, green, blue, orange and other colours are applied according to a national standard system, so that the worker knows immediately what does what, and which items are liable to catch him behind the ear if he fails to pay attention. (The theory behind this sort of approach is quite well known in Britain; but it has not been nearly so widely translated into practice.)

All waste is meticulously sorted—just as it is in American private homes—and, in fighter factories at least, a surprising proportion of the containers for swarf, chips and general scrap metal are now reserved for titanium.

Probably a reflection of the American character is the variety of boldly displayed slogans which strike one from every angle, both in the office and on the shop floor: "Lock up that classified document" . . . "His life is in your hands" . . . "You can't inspect quality into a product" . . . and even "It is safer to walk than to run." This last, one sadly reflects, would be superfluous in this country.

Every plant has an excellent canteen, but a considerable proportion—often a majority—of employees eat a quick sandwich meal in order to have time in which to play shuffleboard. This game is played on "pitches" neatly painted in every available space on the floor of the shop, and play is organized into leagues, with appropriate followings.

Another unfamiliar feature is the ubiquitous "dispenser," or slot-machine. Wherever one stands in an American plant, there will be a battery of dispensers within sight (if not within arm's reach) wherefrom one may purchase a variety of hot or cold drinks, various solid refreshments, gum, cigarettes and matches, and other commodities, all of which are considered more or less essential for a contented shop floor. Sometimes the dispensers are owned by an outside firm which makes a profit both on sales and by the rental of the machines; more often, the profit is split with a company welfare scheme; and in some cases the company itself owns the dispensers and all takings are redistributed to the employees by one means or another. The dispensers are very well patronized, without loss of company time, and something of the sort would probably be welcomed in Britain.

In spite of a widespread impression, particularly in North America, that the British industry is not good at mass-production, it is doubtful if American output per man-hour is more than 50 per cent greater than our own. Even this differential is largely brought about by factors other than individual ability to stick at the job. The typical working week parallels our own, although, of course, overtime is more remunerative in net financial gain. Many of the American factories (particularly those in which "Defense" contracts predominate) work two or even three shifts, although few work over the week-end. Shifts are so timed that there is never an unduly large influx or efflux of personnel at any given time.

A particularly important point is that, where calculations seem to show that a large capital investment will "pay off" in the foreseeable future, American firms are not reluctant to make such an investment. Several of the larger companies have spent literally millions of dollars in buying, or renting, such things as electronic calculating or data-processing machinery (not one installation, but dozens to each factory), and can prove that they are saving thereby. One feels that such an outlay would be made grudgingly in this country, and then only if someone else did it first. All too often we are prepared to spend a little money in half-doing something while remaining firmly entrenched against a big outlay, irrespective of what return can be shown on paper. A similar argument applies to major items of test-equipment. The opinion was expressed to me that no American manufacturer committed to development of supersonic aircraft would build himself a turbo-jet-driven tunnel; any saving in first cost would, it is asserted, be wiped out inside a year. It is, however, conceded that such tools are attractive where expected utilization is very low.

So much for broad impressions; on the following page is the first of several reports which outline most of the "unclassified" (i.e., non-secret) work currently being done by the companies visited. Other reports will follow in succeeding issues.

ADJUSTABLE-WING DOUGLAS?

IN a paper before the Hampton Roads, Virginia, section of the American Helicopter Society, Mr. J. D. Edwards, an engineer of the Douglas Aircraft Company, asserted that the most practical type of air transport for economical short-range operations would be a machine with an adjustable wing, capable of both vertical and forward take-off. Douglas studies, he said, had indicated that the helicopter, convertiplane and vertical riser were not now economically practical for short-range transport usage. In succession to the DC-3, he said, there was a need for a transport capable of carrying thousands of pounds at 250 or 300 m.p.h. from small airports. Having mapped out "an entire series" of rotary-wing vehicles to fit their concept of a V.T.O. transport, Douglas had made further studies, both technical and economic, before turning to—as Mr. Edwards termed it—"a variable-take-off concept." This meant that the wing would be adjusted for almost vertical lift from extremely short runways, or as a "regulation fixed wing" where runway length was not a problem. The longer the take-off run the better the payload and range. Mr. Edwards remarked, however, that Douglas's established programme for the DC-8 jet transport, the DC-6 and 7, missiles and several military types, precluded launching such a development "right now."

The American Scene . . .

LOCKHEED at BURBANK

UNLIKE the other major aircraft factories in the Los Angeles area, the headquarters of the Lockheed Aircraft Corporation are situated north of the city, in Burbank, adjacent to Hollywood. The main plant now has a floor area greatly exceeding 6,000,000 sq ft and more than 25,000 people are currently on the payroll. The Corporation also has an assembly plant and flight test centre at Palmdale, a Missile Systems Division at Van Nuys (both in California) and another huge aircraft-production plant near Marietta, Georgia (over 4¼m sq ft and 15,000 employees) which has now built many hundreds of Boeing B-47s and is in production with the C-130 freighter.

At present the predominant development programme in the California division is that for the F-104 Air Force fighter. Powered by an afterburning Wright J65, this aircraft is being kept more completely "under wraps" than any other machine now flying in the United States, although it is no secret that it is considered the fastest aircraft yet developed for combat purposes in any country in the world.

The following facts can be stated with authority. The first prototype made its maiden flight in February 1954; other prototypes have since flown and progress is rated "highly satisfactory." One machine was unfortunately lost as a result of an armament explosion and another was successfully landed after suffering damage during high-speed firing trials (empty cases from the gun armament were drawn into an intake, puncturing the internal tank and causing neat fuel to be drawn into the engine).

Lockheed consider the swept wing as a characteristic only of transonic aircraft. The F-104, being "highly supersonic," has a straight wing reportedly of no more than 22ft span and with edges literally like those of a knife. Dwarfing the wing is a great missile-like fuselage housing fuel and power unit, pilot, armament and equipment. Although the weight is less than that of a Sabre (the figure of 15,000 lb has been published), the wing-loading cannot but be high and performance at extreme altitude would seem to suffer thereby. It should, however, be recorded that a ceiling of 60,000ft has been quoted for this aircraft; and one of the Lockheed engineering test pilots, Tony Le Vier, has reportedly zoomed to 70,000ft from a maximum-speed run at medium altitude. The same pilot is also quoted as saying that he has flown the YF-104 "through the barrier" with his hands behind his head.

One point which may not be immediately apparent is that afterburners really begin to pay off at Mach numbers well above unity, and it seems probable that at about 35,000ft the reheat thrust exceeds the drag of the F-104 up to a Mach number of about two. On the other hand, the two curves must run fairly close together, so that the excess thrust available for acceleration cannot be large. A rocket would seem to be indicated, purely for acceleration purposes.

A large number of 104s are on order and it seems possible that the type may be in service by the end of next year. It has been suggested that later versions will be powered by the J79, a great new General Electric variable-stator engine, specifically developed for supersonic flight and already flying beneath a B-45. With such an engine, particularly with an afterburner, acceleration to the M=2 regime should be violent, although the problem of finding sufficient tankage may be made more acute. It will be interesting to see whether or not the U.S. Air Force can ever employ the basic F-104 design as an all-weather machine.

The following is the statement on the F-104 appearing in the Corporation's annual report dated December 31st, 1954. "Just 359 days after the go-ahead, we flew this supersonic day superiority fighter. Air Force orders later placed the F-104A in production, and I believe it will become one of America's first-line fighters in future years and provide us a long, steady production program. The more than 135 flights by two prototypes have shown exceptional performance. There is considerable military interest in F-104s adapted to other than day superiority uses."

Although not a native of California, the Lockheed C-130 Hercules freighter is a machine of outstanding technical merit, and has been well described in previous issues of *Flight* (such as that of December 10th last). Several Hercules have now come off the assembly line at the company's Georgia division and those now being built are powered with production Allison T56 engines which are currently giving something better than 3,500 e.h.p. The prototype happened to be at Burbank during our visit—undergoing an engine change—and the bold design and outstanding engineering of the whole airframe were very apparent. The main loading door under the rear fuselage (which, incidentally, does not taper in plan until the tailplane is reached) is hinged at its forward end and can be swung downward for loading, unloading and air-dropping. During these operations the undersurface of the rear fuselage aft of the door is hinged upwards and it is a remarkable fact that, although the entire door assembly withstands the cabin pressure differential of at least 6 lb/sq in, it provides unrestricted access to the entire fuselage cross section of 9ft by 10ft. In flight, opening of the door can hardly be detected by the pilot at any airspeed suitable for dropping.

Apart from the curious XFV-1 vertical-rising prototype, the only other new military machine is the T2V trainer now in production for the U.S. Navy. Developed from the well-known TV (U.S.A.F.=T-33), this curiously-shaped aircraft is the first production application of boundary-layer control in the form of blown flaps. The "supercirculation" thereby induced greatly increases the maximum lift coefficient during slow-speed flying and landing; at take-off, however, if full engine power is required, no compressed air is available to blow over the flaps. The T2V is fully equipped for carrier-operation and is considered the most highly developed jet trainer in the United States.

Production of the T-33 is still continuing, as also is that of the evergreen Neptune. When the prototype of the latter machine first appeared ten years ago, Lockheed did not expect that it would remain in production in 1955, nor that it would prove so amenable to the "beefing and stretching" process made famous by Lockheed airliners. Actually the Neptune has suffered little stretching, but has had plenty of weight increase and literally thousands of detail modifications.

Production is now running at the rate of about eight aircraft per month. All are generally designated P2V-7, although aircraft for the two chief customers, the U.S. Navy and the R.C.A.F., differ in a number of respects. The former, who have had well over a thousand Neptunes, are now receiving machines which strictly speaking are four-engined, in that a pair of Westinghouse J34 turbojets are carried in pods under the wings. These booster turbojets are employed during maximum-weight take-offs and during combat or any other occasion when climb or speed is particularly desirable; and, in spite of their considerable weight, the U.S. Navy's -7s are good for over 310 knots when new. The R.C.A.F. Neptunes, which are now replacing Lancasters and are also equipping new squadrons, have no turbojets, neither do they mount a dorsal turret; on the other hand, all -7s are equipped with a "stinger" tail housing magnetic airborne detection equipment.

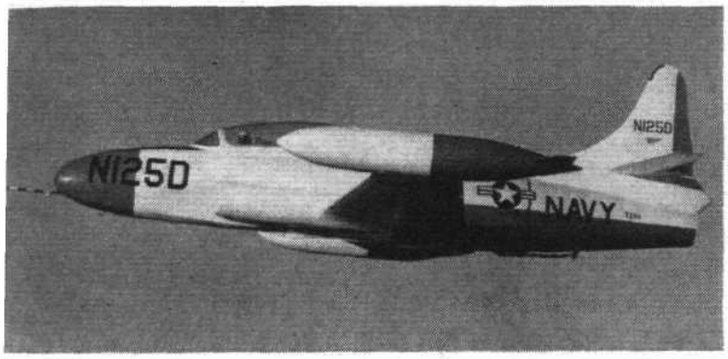
A successor to the Neptune is now in the works at Burbank but remains strictly classified. We ourselves saw an earlier projected Neptune successor in mock-up form although we understand that the present machine differs considerably both from the Neptune and earlier thoughts of a replacement.

The main Burbank factory is still full of Lockheed's "First

Although it is a product of Lockheed's Georgia division, the C-130 Hercules is briefly referred to in the accompanying text. If Allisons can develop a suitable airline unit in time, the civil Electra (right) will be powered by four engines basically similar to those of the C-130.

The P2V-7 for the U.S. Navy has Westinghouse J34 booster turbojets and a dorsal turret; neither feature is found on the otherwise similar machines being made for Canada.

A recent air-to-air view of the U.S. Navy T2V-1 trainer (below) showing the arrester hook. "Super-circulation," by means of flap-blowing, is to be fitted to all T2Vs.

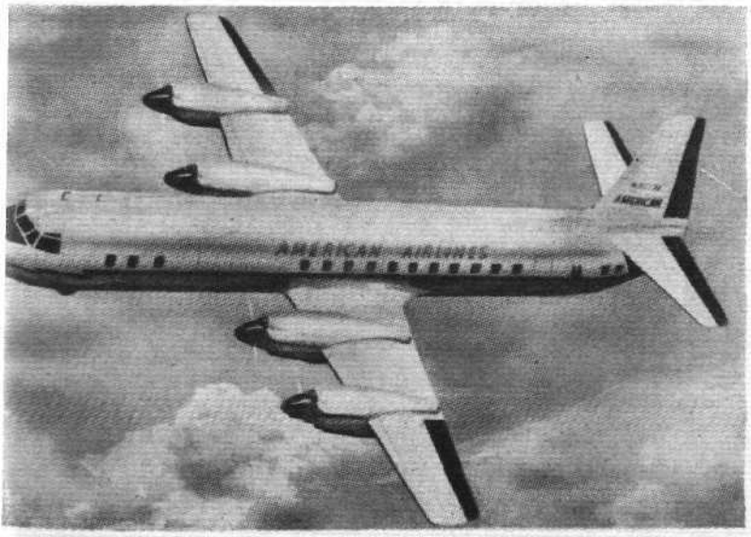


Lady of the Skies," the Constellation. The power and maximum weight of the present aircraft are now about twice the design values for the first machine. All production now is of the Super Constellation, the total output of between ten and eleven aircraft per month being divided between civil transports, military transports and "radar Constellations" which are being found very valuable by both the Air Force and Navy.

The major design effort is at present concentrated upon the Model 1649, which has already been ordered in some numbers by T.W.A. and Air France. This machine was evolved as a result of a comprehensive analysis of the whole long-range transport picture, during which complete redesign of the present 1049 series was examined. It was found that most of what Lockheed were seeking could be obtained by developing a revised wing and tail, and that the resulting aircraft could be got into production for about half the development cost of a wholly new machine. The 1649 will be powered by the EA-3 version of the Wright Turbo-Compound engine, and Lockheed calculate that its economics will beat those of the DC-7C on all the longest projected airline stages.

Although a considerable amount of valuable experience is being gained with four military Super Constellations powered by the 5,500 h.p. Pratt and Whitney T34 turboprop, civil aircraft powered with this engine are not now projected. One such machine, designated L.1449, would have flown within ten knots of the "never exceed" speed on the level. The new wing of the Model 1649 has raised the critical Mach number, making the basic airframe more attractive for eventual conversion to turboprop power. In passing, it may be noted that the T34-powered aircraft have regularly been flying at speeds of the order of 450 m.p.h.

As might be expected, the great 156ft span of the L.1649 wing confers an outstanding high-altitude performance and it seems logical that machines of this type should be developed for use as radar pickets, capable of doing a better job than the present WV-2 and RC-121D. While at Burbank, we saw early stages in the manufacture of 1649 wings in which the integral-machined skin concept has been carried one stage forward. Both upper and lower surfaces from root to tip between the spars are now being machined from single slabs of light alloy, with a corresponding reduction in numbers of parts, cost and weight. We also examined the L.1649A mock-up, from which the outstanding impression remains of great span, unusually acute dihedral and generous clearance between the inner airscrews and the fuselage.



There remains to be considered the Lockheed Electra, one of the most important, and most discussed, aircraft in the whole transport picture. As is now well known, the existence of the design was made public early in June, when an American Airlines order for 35 Electras was also announced. Northwest Airlines, and other operators, are reported to be in the process of working out contracts.

Broadly speaking, the Model 88, as the Electra series is known to its designers, is a replacement for the Convairs and—on many routes—for four-engined Douglases. It is, in fact, what Hall L. Hibberd (Lockheed vice-president, engineering) had in mind many months ago when he spoke of "a shiny new Viscount," although the two machines are so dissimilar in characteristics, timing and price that the Lockheed should not have much effect on Viscount sales.

The chief fly in the ointment in the development of the Electra is its powerplant group, and it may be as well to examine this first. Most published information on the aircraft has shown the engine as the Allison 501, or a later version of the same family. This is a single-shaft turboprop, basically similar to the military T56 (about 3,750 design e.h.p.) but with certain features incorporated to make it more suitable for airline use.

One of the chief disadvantages of the T56 from a civil viewpoint is that, owing to its high pressure-ratio (design figure, 9:1) the compressor characteristics are not suitable for running at less than about 90 per cent of maximum r.p.m. Actual figures are at present about 13,820 max. and 12,000 min. r.p.m., and work is in hand to reduce the latter to less than 10,000. Having heard a Convair YC-131C test-bed (T56) idling on the ground we can state that the high tip-speed results in noise which would not be welcomed by civil operators. Engine-handling, also, is not yet anywhere near as good as that of the free-turbine Proteus or single-shaft Eland.

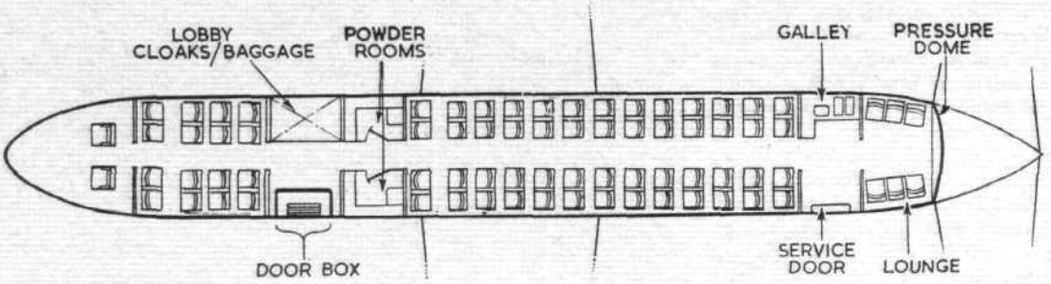
Knowing these things, Lockheed have refrained from making any definite statement upon their power units (for publication, at least). Allison are known to be doing a wholly new, split-compressor engine, Napier will have an excellent engine in the 4,000 h.p. Eland and Rolls-Royce are expected to produce an unbeatable engine in the RB.109. All of these could fit the Electra without too much trouble.

At present, the Allison 500 series is shown in all the publicity material, and we have had a sketch prepared showing how it will fit into the Electra nacelle. Unlike that of most Allison turboprops the reduction gear will lie below the engine axis, so that the main flow of air will come in above the spinner, and pass out cleanly above the wing. On the C-130 (in which a basically similar engine is fitted the other way up) the nacelles are underslung, and a deflector on each jet nozzle and titanium skin on the flaps in line with the effluxes has been necessitated. The Electra will have very large, double-slotted flaps continuous beneath the engines. Aerodynamically-boosted controls are specified.

Specified airscrews are paddle-blade reversing units (four blades) with a diameter of no more than 13ft 6in. As the clearance between the inner tips and the fuselage will, nevertheless, be but two feet, it seems that the Lockheed designers are finding themselves somewhat cramped in a span-wise direction. It was also consideration of airscrew/ground clearance which caused Lockheed to discard the well-engineered C-130 underslung engine installation.

The Electra wing will have a span of 95ft and an area of 1,200 sq ft (gross). As the maximum weight is at present fixed at 98,500 lb, the wing loading can be calculated as 82.2 lb/sq ft—a high figure for a machine not intended for operation on stages above

LOCKHEED AT BURBANK . . .

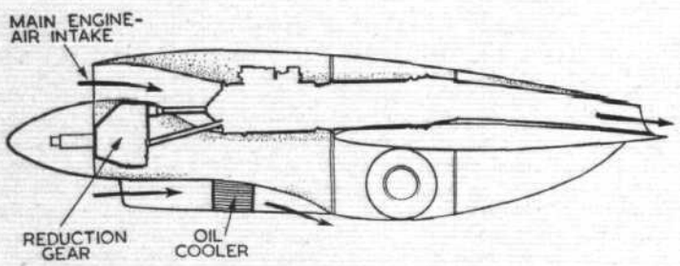


This typical Electra interior is, we believe, the first to be illustrated. American Airlines are thought to be considering a lay-out of this type. With a three-man flight crew one row of seats would be sacrificed, for a total of 64 plus lounge.

2,000 miles, although no higher than that now accepted on Super Constellations. Contrary to what might be thought, there is no flap blowing. Lockheed say, cryptically, that the Electra "will take off or land in less than 5,000ft," and this may perhaps imply that the balanced field length will be greater than this. It should be noted, of course, that for stages under 1,000 miles, the Electra would not need to exceed 90,000 lb. Acceleration should certainly be excellent; the heavier C-130 prototypes have recorded $\frac{1}{2}$g on take-off, getting 42,000 lb thrust from the YT56s, which are cleared for no more than 3,000 h.p.

Inside the wing will be integral tankage for about 3,480 gallons (4,178 U.S. gal) of fuel. The wing structure itself will be of an advanced form, and it seems fair to assume that as much integral stiffening as possible will be employed. The undercarriage will be a conventional tricycle, with twin wheels on each leg.

The interior layout shown has a number of unusual features. Four-abreast seating is specified, in spite of the very considerable fuselage diameter of 136in over most of the usable length (the same as the maximum diameter of an L.1049). The seats have been hailed as the widest ever planned for a standard airline transport.



Compared with the Allison T56 power unit of the Hercules, the Model 501 (or a development thereof) for the Electra is fitted the other way up, with the intake above the spinner.

The 101ft 4in fuselage will bear a differential pressure equal to that of the Viscount (8,000ft at 30,000ft). We discussed the vexed problems of fatigue with Mr. Burt C. Monesmith, vice-president and general manager of the California division. He stated that Lockheed were by no means convinced that tank tests were an answer and he asserted that no tank test was at present scheduled for the Electra. On the other hand, a very comprehensive structural testing programme is already in hand (we saw some of it) and a complete fuselage is to be blown up with air in a strong pen. The Electra windows are straight sided, with a four-inch corner radius; they are, in fact, larger than those of the L.1049, being 20in high by 16in wide.

We queried the use of rectangular doors. It transpired that Lockheed have adopted the possibly excellent idea of building an unpressurized box for the main door, the pressure door being a smaller assembly on the inner wall of the box (the box resembling, for example, a nose-wheel bay). Inside the box will fit the door and the integral 12-step stairway which will be built-in to each Model 188 production machine for American Airlines.

There will, in fact, be no prototype as such. The first machine will be the first Model 188 and will eventually go to American. Lockheed have set themselves a stiff task in establishing a first-flight date of October 1957 and delivery in August of the following year. They have further asserted that they will have 5,000 people working on Electra production by the end of 1958 and that the scheduled output one year later is to be 11 aircraft per month. We suggested that the programme—in its early stages, at least—was ambitious, and that the schedule might be upset by unforeseen engineering troubles. Lockheed countered by emphasizing that the Electra would be "simple, rugged and made of proven components," and that no undue trouble was anticipated. Clearly, several machines will be needed for certification, and it will be a fine achievement if services really do begin inside three years.

W. T. G.

HUNTING-CLAN HERALDRY

THE fourth British airline to apply for and receive a grant of armorial bearings from the College of Arms is Hunting-Clan Air Transport, Ltd.

Their shield is unique in many ways. In the first place, it is perhaps one of the few genuine coats in which the amalgamation of the companies is treated as if they were the parties to a marriage. It will be recalled that Hunting and Sons, Ltd., and the Clan Line Steamers, Ltd., were two distinct entities before they combined to form a third company. Now their separate house flags have been marshalled to form a quartered shield, in the manner adopted by the children of an heir married to an heiress.

The armorial bearings and (above) the badge.

The heraldic description of the armorial bearings is as follows:

Arms: Quarterly, first and fourth, gules, six barrulets argent, a mullet of seven points azure; second and third gules, on a lozenge argent, a lion rampant of the field, all within a bordure of clouds proper.

Crest: On a wreath of the colours, an owl gold; under the sinister wing, an arrow pointing to dexter azure.

Supporters: Dexter, an eagle with wings elevated and addorsed sable, beaked and membered or, armed and langued gules, holding in its sinister claw a staff gold bearing a banner of the first quarter. Sinister; a winged lion gules supporting a like staff bearing a banner of the second quarter.

Hunting-Clan have paid an additional fee for a grant of a badge by the Earl Marshal. It consists of two crossed house-flags "infiled with a circle of clouds proper".

URANIUM-SEEKING AUSTERS

GEOLOGISTS have suggested that there are over a million square miles of territory in Australia which may contain deposits of uranium. To produce the quick results which investigation of such a large area demands, survey teams are making considerable use of aircraft.

Complete reliability is essential, for much of the work involves flying within 50 to 60ft of the ground in order that the detecting instrument, the scintillometer, may operate at its maximum effectiveness. During their 1954 (April-September) survey programme, Mount Isa Mines, Ltd., flew 413 hours with Auster Autocrat and Aiglet aircraft chartered from Somerset Airways of Queensland. One particular area in which these aircraft operated consisted of broad rocky ridges projecting 20 to 50ft above valley floors and hemmed in by steep quartzite ridges.

The scintillometers are installed in the rear seats of the aircraft. Even when no uranium deposits are present they give a constant "background" of readings from radio-active rocks; and it was even found necessary to remove the luminous paint from the aircraft instruments.

Likely areas for prospecting, selected by geological evidence, are subdivided into blocks measuring eight miles by four; these can be covered by an Auster in two to four hours, flying on parallel lines 1,000ft apart.

ARE AIR FARES ARTIFICIAL?

Restricting the Independents

By R. J. CLARK

THE author of this provocative article is the commercial manager of a British independent airline. He wishes to emphasize, however, that the views expressed therein are personal and do not necessarily reflect those of his company.

WHY cannot we have lower air fares? We hear reports of privately run airlines being ready, willing and able to provide services at fares much lower than those at present in force. Are these just idle boasts? If not, why do not the companies act accordingly?

The answer lies in four words: International Air Transport Association. This body, to which virtually all the main national airlines of the world belong, decides the fares at which you and I are to be allowed to travel. No one would deny the desirability of a certain measure of control and standardization throughout the world's airlines—the situation might well become chaotic without it; but I.A.T.A., with its 500-odd resolutions and "recommended practices," is fast becoming hidebound, and the travelling public are suffering thereby.

Let us take, as an example, a flight from London to Gibraltar. Now, as these two points are both in British territory (at the time of writing) the fares for flights between them are not under the control of the Association. They are subject solely to the approval of the British Government. Looking at the *Air Guide*, what do we see? The normal first-class return fare, by B.E.A., is £66 9s; a purely academic point, this, as there are now no first-class services between these two places. Day tourist fare, also by B.E.A., £50 17s return *. But what is this, underneath? "Special" tourist fare, on services operated by Hunting-Clan, an independent company, £29—not much more than half the rate charged by the Corporation. *Yet, to ensure that Huntings do not collar too many of B.E.A.'s passengers they are restricted to a frequency of once-monthly.*

Now, if this admirable privately run airline is able to operate, we assume economically (a safe assumption with a concern which is not Government-owned) at such a low fare on such a limited frequency, the inference is that if they were allowed to step up their flights to seven a week—the number operated by B.E.A.—the resulting increase in aircraft utilization would enable them to lower the fare even more. Gibraltar would benefit, by receiving more tourists; you and I, as air travellers, would save a great deal of money. In fact, it is difficult to see who would not be better off—except, of course, B.E.A. But, B.E.A. is a nationally owned company, which means that you and I have an interest in it. Well, from the example quoted, that would seem to be a costly privilege, of a kind which I for one would gladly forgo.

This is not an isolated case. We have a similar set-up on the London-Nicosia (Cyprus) route, where Skyways' fare is £75 return compared with B.E.A.'s £108. Airwork and Hunting, operating to East and West Africa, quote fares ranging from £20 to £30 lower than those offered by B.O.A.C. And remember that such operations can take place only between points within the British Empire (if you will forgive the use of an old-fashioned term), where they are outside the jurisdiction of the I.A.T.A. This in itself produces some weird anomalies. For instance, if you wished to fly from London to Beirut and back, the cheapest way would be to take the Skyways service to Nicosia, then on by Cyprus Airways Dakota—total fare £89 8s return, compared with £124 4s on the B.O.A.C. direct service. That, as I have said, would be the most economical way. But would-be passengers are not allowed to follow it, for if they did so Skyways would undoubtedly be taking away traffic from B.O.A.C., and that would never do. So the poor passenger has to fork out another £34 16s to keep the Corporation (*his* Corporation) happy.

How Skyways are to prevent people travelling with them from buying a ticket to Beirut once they have arrived in Cyprus I would not know; but under the terms of their operating licence they are supposed to do so. They are not allowed to carry passengers bound for points beyond Cyprus whose combined fare would be less than the normal through fare by other airlines. Such things used to be known as restrictive practices.

How it is that these non-State-operated concerns can operate at such low fares? Two arguments are usually put forward by protagonists of the Corporations. The first is that the independents are using aircraft and equipment costing far less initially than those used by B.E.A. and B.O.A.C. The second is that they do not have to operate uneconomical so-called "social" services where the revenue from traffic is never likely to cover operating costs. Point No. 1 we must concede. After the war a large number of ex-Service aircraft were available at very low prices and many were bought and used by such companies, whose activities in those days were mostly confined to charter operations, as they were not allowed to run regular services. Most of these have now been replaced by post-war types, such as Vikings and Hermes—bought, oddly enough, from the Corporations. They have obviously cost much less than if they had been purchased direct from the manufacturer. But why should not the benefit of this be passed on to the public? In any case, it is as well to point out that the initial cost of an aircraft forms a relatively small part of its actual operating cost, which is comprised mainly of such things as petrol and oil, salaries of air crews, and ground staff, maintenance, and insurance.

The second point is not at all easy to accept. Whilst it is undoubtedly true that there are a number of such services operated by the Corporations, especially B.E.A., it is difficult to see how the losses involved can affect the overall position in any marked degree. In any event, it can hardly be considered just that a person flying from London to Rome or Paris should subsidize the flight of a passenger between Glasgow and Benbecula, or between Inverness and Lerwick. I would be the last to dispute the desirability of running such services; but would it not be fairer for the Government to subsidize them directly, on the basis of a guaranteed number of seats on each flight, rather than have the loss absorbed by other, more popular routes? Another "old faithful" trotted out each year by B.E.A. in their annual report is the "iniquitous tax" which must be paid on all petrol consumed on flights within the United Kingdom (flights to places abroad qualify for duty-free fuel). This can hardly be considered relevant, however, for two reasons: firstly, because it applies equally to the independent companies, many of whom operate internal services, and secondly because the resulting increase in operating costs should obviously be reflected in the fares for the services concerned, and should not be spread so as to affect other services.

By the way, it is sometimes implied that the independent airlines can operate at lower rates because their servicing is not as thorough as that of the Corporations. Such suggestions are groundless. Maintenance of public transport aircraft in this country is very rigidly controlled by the Air Registration Board, whose regulations, backed up by a strict inspection organization, are applied to private companies and Corporations alike.

It does seem, then, that if the private companies were given a little more scope, getting from A to B by air could be a lot less costly than it is at the moment. A most desirable objective; but when I think of that volume of I.A.T.A. resolutions I cannot see it happening. Yet there is no reason why the principle should not be applied to services within the United Kingdom and Colonies. Why not start by inviting Hunting-Clan to take over the entire operation of the London-Gibraltar services—unless, of course, B.E.A. are prepared to run them at the same fare? If they are, then let them do half each. This would introduce a spot of healthy competition into the business, which at the moment is sadly lacking, and would also give the travelling public an element of choice. If necessary it could be done on the basis that, after a year's operations, the most successful airline could take over the complete operation of the route. I may be old-fashioned, but I still think there is nothing like competition to improve efficiency. So what about it, Mr. Boyd-Carpenter?

* *Since this article was written B.E.A. have introduced a weekly "night tourist" service at £35 return, but this is still 20 per cent more than the Hunting-Clan fare.—R.J.C.*

EDUCATION IN TECHNICAL AUTHORSHIP

AT the request of the Technical Publications Association (London), a conference was held recently at the Coventry College of Art, to study the syllabus of new courses on technical authorship. The proposed courses—prepared by Mr. James Wilson, personnel training officer of the Standard Motor Co., Ltd.—were endorsed by the conference, and they are to begin next September. Each course will be held on Saturday mornings and on two evenings a week for ten weeks—a total instructional period of 60 hours.

It was also recommended that, in order to maintain a national standard, a diploma should be awarded for technical authorship. To this end a committee was elected to approach the Minister of Education.

Also under review were part- and full-time courses in technical illustration which have been running at the College since last September; the City and Guilds of London Institute have been approached to establish a national examination and certificate in this subject.

Escorted by Mig-17s is one of Russia's new turboprop bombers. Three were illustrated, approximately in plan view, last week. The Gloster Javelin FAW.1 at lower left (XA554) has a new, needle-pointed nose.

AIRCRAFT INTELLIGENCE

Great Britain

Folland. According to *Alata*, Folland Aircraft are designing a new fighter, armed with missiles and capable of Mach 2, with an all-up weight of 11,000 lb to 13,600 lb and powered by a split-compressor turbojet of small frontal area with a thrust of 9,900 lb.

Bristol Britannia Development. A new version of the Britannia, with thinner wings and tail surfaces, powered by "hot" B.E.25s, and having a cruising speed of Mach 0.78, is to go into production after 1960—according to an Italian journal. A tanker version of the present Britannia is also reported, and it is said that the R.A.F. would require 100 such machines.

South Africa

Canadair Sabre 6. It is reported from Pretoria that the South African Air Force will be equipped with Canadair Sabre 6 jet fighters. They will be based at Waterkloof, near Pretoria. The Sabre 6 is powered with the Avro Orenda turbojet.

U.S.A.

Engine Test Bed. The latest engine to be tested under the bomb-bay of a B-45 is General Electric's J79, destined for the Convair Hustler and later versions of the Lockheed F-104. The engine was first flown some weeks ago. With the J79 the F-104 will probably exceed Mach 2 and have a range of 1,800 miles.

Martin P6M. The second prototype of the Sea Master is nearing completion at Middle River, Maryland. The internal arrangement is reported to be different from that of the first prototype, which is due to fly very shortly.

North American T-28 Our drawing this week is of the standard aerobatic and instrument trainer of the U.S. Navy, the powerful T-28B. A new uniformity-scheme has resulted in the use of an Air Force designation; the type would otherwise have been the TJ-1. Present production is of the T-28C, equipped with a hook for deck-landing training.

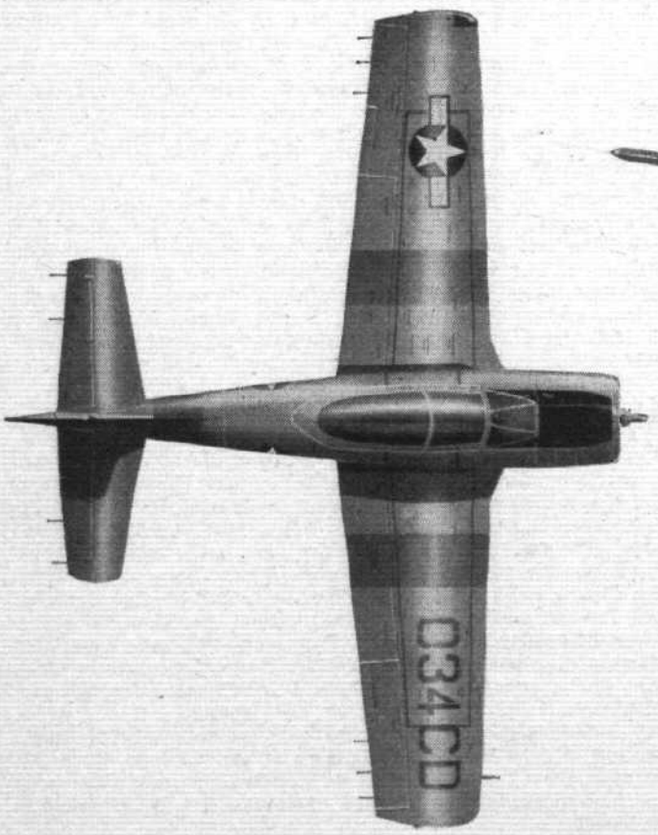
U.S.S.R.

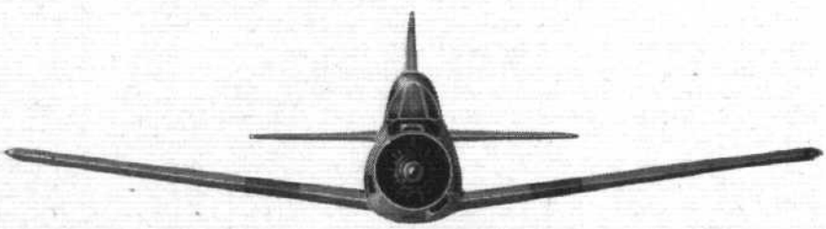
New Large Helicopter. A Russian commentator states that the new twin-rotor helicopters which made their first appearance at the recent Aviation Day celebrations at Tushino were designed by Yakovlev and not by Mil, like the smaller machines. He added that they have two engines, are capable of carrying several times the load of the Mil, and have civil possibilities.

France

Marcel Dassault Super Mystère. Examinations of recordings made during a test flight of this fighter show that it "largely exceeded" the present official world speed record in level flight at a height of 3,300ft.

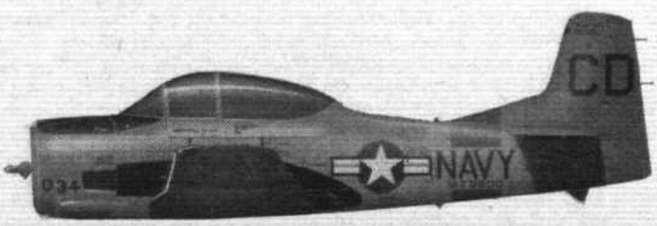
Sipa 1000 *Coccinelle.* This most interesting light two-seater first flew on June 11th and, having been exhibited at the Paris Salon, had accumulated 11 hours' flying time by June 28th. Already more than 250 are on order for aero clubs and private owners.





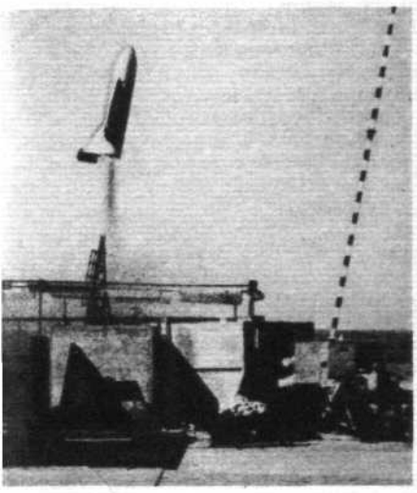
NORTH AMERICAN T-28B
(Wright R-2800 Cyclone)

Span	...	...	...	40ft 7½in
Length	...	...	...	32ft 11in



On the right, a Gannet joins company with a Swordfish over the Needles.

Below, a Fairey rocket-propelled V.T.O. test model at the instant of leaving its ramp at Woomera.



FAMILY OF FAIREYS

A Forty-year Retrospect

by H. F. King, M.B.E.

OUR salute to the Fairey Aviation Co., Ltd., on its fortieth anniversary is a survey of the company's amazingly prolific, varied and successful line of aircrat. Supporting the descriptive notes is a unique collection of photographs, mainly from Fairey's own archives, and many depicting machines never before illustrated. The occasion must not pass, however, without brief reference to the rise of the company itself, under its founder, chairman and managing director, Sir Richard Fairey.

In the early 1900s Dick Fairey was a diligent aeromodeller, and in 1911 he turned his attention to the full-scale machines at the old Aero Club flying ground, Eastchurch, Isle of Sheppey. There the Short brothers were busily building, flying and repairing; and there, too, was the headquarters of the Blair Atholl Syndicate working on tailless machines to the designs of J. W. Dunne. Young Fairey obtained a post with the Syndicate as manager and chief engineer, and under his direction four tailless Dunnes—one a monoplane, the others biplanes—were constructed. While thus employed he met Vincent Nicholl, Maurice Wright and F. G. T. Dawson, all of whom were later to join with him in building up the great Fairey organization.

Sir Richard Fairey, M.B.E., Hon. F.R.Ae.S., Hon. F.I.A.S.

From the Syndicate, in 1913, Mr. Fairey joined Short Brothers as chief engineer, and in 1915 founded the Fairey Aviation Co., Ltd., with a factory (a wooden shed) at Harlington, Middlesex—and a drawing-office in Piccadilly.

In the beginning the company constructed seaplanes to Short designs, but original Faireys were in prospect and Mr. Fairey acquired Admiralty sheds at Hamble Point, Southampton Water. On the same site erecting shops were established and a slipway laid down. The first pilot engaged was Sydney Pickles, who was testing the Fairey-built Shorts at Hamble late in 1915.

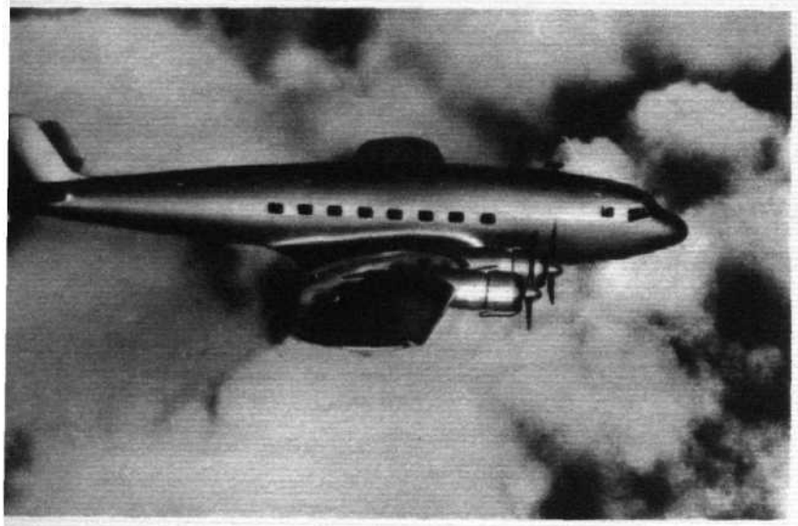
To enable them to fulfil a Government contract for a hundred Sopwith 1½-Strutter landplanes the company took over a new factory at Hayes, where the entire order was executed in just over six months. The 'Strutters were erected and flight-tested at Kingsbury aerodrome—long-since extinct.

The first Fairey aircraft to original designs, the F.2 twin-engined fighter, was first flown near the works, at Harlington, but the ground was unsatisfactory and permission was secured to use Northolt aerodrome. There, in the early 1920s, Lt-Col. Vincent Nicholl was to test the IIID landplane, Fawn and Flycatcher, and later still Capt. Norman Macmillan was to conduct the trials of Ferret, Firefly I, IIIF, Flycatcher II, Long-range Monoplane, Fox and Fleetwing. Today the new Gannet turbine-powered anti-submarine aircraft for the Royal Navy fly out of Northolt after assembly for pre-delivery testing at White Waltham.

Fairey's first seaplane was the Hamble Baby, an adaptation of a Sopwith design, but in 1916 they built for the Admiralty the larger Campania, of which a number of variants were developed and produced. From this branch of the family stemmed the Series III, and from this type in turn were developed the IIIA, B, C, D, F, Gordon and Seal. Production of these sturdy, versatile biplanes continued—in metal, and with various engines—until the 1930s; and, though the airframe was very much cleaned up, still the unstaggered two-bay wings stamped each successive machine as a "Type III."

The Atlanta and Titania flying-boats, built for the Air Ministry after the 1914-18 war, were in their day the world's largest; the sturdy little Flycatcher was one of the most popular fighters ever in British service; and the sleek Fox day bomber of 1925 outstripped contemporary fighters. Originally powered with the Curtiss D.12 engine (and utilizing other American techniques for which Mr. Fairey procured the rights) the Fox was progressively anglicized, and the later all-metal version, together with a metal development of the Firefly single-seater, secured important contracts from the Belgian Government. These led to the establishment, in 1931, of Avions Fairey as a Belgian subsidiary of the parent company. The history of that enterprising concern (wherein Mr. E. O. Tips has been most intimately and actively concerned) was recounted in some detail in *Flight* of May 2nd, 1952.

The Fairey technical staff were not slow to appreciate the virtues of the cantilever monoplane, and to this formula two Long-range Monoplanes were put to the test in 1929 and 1933. In the second



Model of the Fairey F.C.1 transport (four Bristol Taurus), fourteen of which were on order before the war terminated the project.

FAMILY OF FAIREYS . . .

of these S/L. Gayford and F/L. Nicholetts established a world's long-distance record of 5,340 miles by flying from Cornwall to Walvis Bay, South Africa. A cantilever wing was also a feature of the Hendon twin-engined night bomber, built in small quantities for the R.A.F. in the 1930s.

As for personnel, it must go on record that in 1924 Major T. M. Barlow had joined the company as chief engineer and supervised production of the Flycatcher and IIID. In the same year the company was officially approved by the Air Ministry for all stress calculations. In 1925 Mr. M. J. O. Lobelle succeeded Mr. F. Duncanson as head of the design section, and Mr. P. A. Ralli was appointed head of the technical department. Mr. C. R. Macmullin joined as assistant test pilot to Capt. Norman Macmillan.

Following Mr. Ralli's death in 1930, Mr. D. L. Hollis Williams, who had been mainly responsible for the design of the Long-range Monoplanes, succeeded him as head of the technical department. The dashing "Chris" Staniland became chief test pilot in 1932.

During 1935 the expansion programme for the R.A.F. led the company to take over the Willys-Overland Crossley Motor Works at Heaton Chapel, Stockport. This formed the nucleus of a group of satellite factories which, ten years later, was to total two million square feet in floor space. In 1934 Mr. R. T. Youngman succeeded Mr. Hollis Williams as head of the technical department, and in the same year was produced the forerunner of the Swordfish torpedo/spotter/reconnaissance aircraft—the beloved and never-to-be-forgotten "Stringbag."

In 1935 a tender was submitted to the Air Ministry for a medium bomber monoplane, which was to be ordered in great numbers as the Battle; and with Swordfish and Battle production under way, the technical team busied themselves with the Seafox, a light reconnaissance seaplane for operation from cruisers. A Seafox played an heroic part in the *Graf Spee* action off the South American coast. A "baby Battle"—the P.4/34 day bomber—was evolved into the Fulmer fleet fighter, and in succession to the Swordfish came the cleaner, more powerful, Albacore.

Notwithstanding their preoccupation with military designs, however, the company was able to turn its attention to the civil market, and in 1938 an order was placed for fourteen Fairey F.C.1 commercial monoplanes, with nosewheel undercarriage, pressure cabin and retractable Youngman flaps. Gross weight was to be 42,000 lb and, with four Taurus engines, estimated maximum speed was 275 m.p.h. Still-air range would have been 1,700 miles.

But the war intervened.

If Fairey machines built under contract by other firms (e.g., Barracudas by Boulton Paul and Swordfish by Blackburn) are included, war-time production totalled 6,673 aircraft, whereas for World War I the corresponding figure was 292. By 1950 the grand total had reached 12,782. Types in production during the war years were Swordfish, Albacore, Fulmar, Barracuda and Firefly. The far-ranging, and often heroic, exploits of these machines have yet to be fully chronicled; but it is only necessary to recall the epic victory at Taranto, when half the Italian fleet was crippled by eleven torpedoes launched by Swordfish, to exemplify their deeds in face of the enemy.

The early post-war years brought forth prototypes of the Spearfish carrier-borne attack aircraft and numerous derivatives of the Firefly; and the Firefly progressively became standard equipment in four navies and other military air services. In 1946 appeared the Stooge rocket-propelled radio-controlled guided missile, originally intended as a countermeasure against suicide bombers in the Pacific war, though in the event it proved a valuable vehicle for research and was the precursor of very advanced new weapons now under development by a special division of the company. A year later came the Gyrodyne helicopter, which established a world speed record for its class; and in 1949 the G.R.17, prototype of the turbine-powered Gannet which is today serving the Royal Navy as the world's most advanced carrier-borne anti-submarine aircraft. In 1947 also were flown V.T.O. delta-wing rocket models, built to explore the practicability of launching fighters from short ramps at low accelerations and reproducing the characteristics of the F.D.1 delta-wing fighter/research aircraft, first flown in 1951. In 1954 the Gyrodyne was converted for tip-jet propulsion to try-out certain features of the forthcoming 40/50-seat Rotodyne; and in the same year occurred the first flight of the F.D.2 supersonic delta-wing research aircraft—assuredly one of the fastest machines in the world.

In a speech at the company's last annual general meeting Sir Richard Fairey was able to tell shareholders that a Ministry of Supply contract had been awarded for an entirely new form of ultra-light helicopter, which he hoped would satisfy an Army requirement and might, in the longer view, interest the NATO powers also. He was also able to reveal that a second prototype of the Rotodyne, "with somewhat different internal arrangement," had also been ordered.

In the succeeding pages only incidental references are made to the long and successful line of Fairey airscrews, the experimental engines of the past, and the power controls of today. Of these, and other Fairy developments, however, it can be said that they are in the Fairey tradition—bold in design and built with integrity.

EARLY SEAPLANES

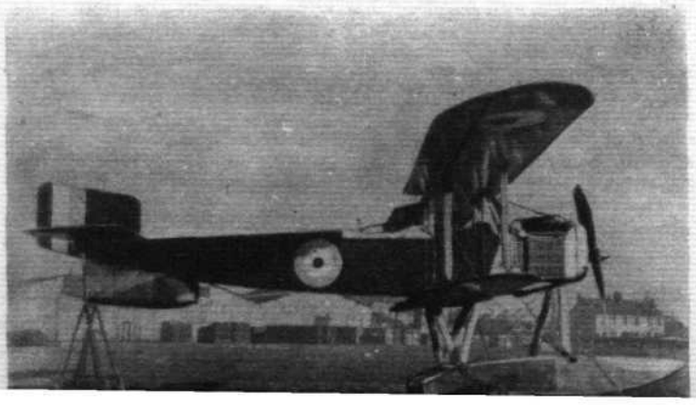
F.16 Campania This three-float patrol-and-bombing seaplane was so called because it was developed for service aboard the seaplane carrier of the same name. A two-seater with a Rolls-Royce Eagle engine, it was produced in some quantity and gave excellent service. The prototype was flown from the Isle of Grain to Scapa Flow by S/L. Maurice Wright, now a director of the Fairey company. The Fairey patent variable-camber gear was fitted, allowing an alighting speed of 42 m.p.h. Top speed was 82 m.p.h., gross weight 5,500 lb, and span 61ft 7½in.

F.17 Campania A modification of the F.16, with revised wing section and the Eagle V engine, giving 275 h.p. Top speed was increased to nearly 90 m.p.h.

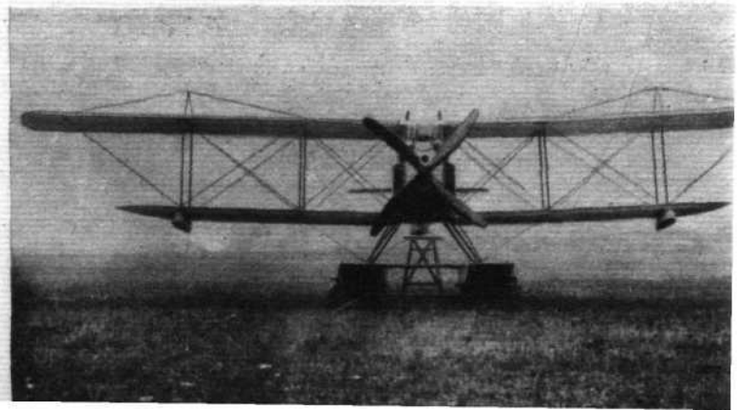
F.22 Campania So greatly in excess of production was the demand for the Rolls-Royce Eagle that this third variant of the Campania was produced with a 260 h.p. Sunbeam Maori II engine. Gross weight was 5,329 lb and top speed 84 m.p.h.

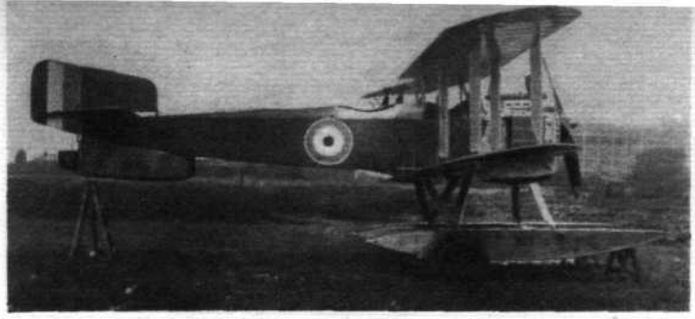
N.9 A single-bay biplane with a large overhang on the top wing, this machine has the distinction of being the first British seaplane to be catapulted (from H.M.S. *Slinger*). Intended for reconnaissance, it was a two-seater with a Rolls-Royce Falcon engine of 190 h.p. As with the Eagle, demand for the Falcon was very great, and this consideration explains why the N.9 was never built in quantity. Span was 50ft, maximum speed 90 m.p.h. at sea level, and armament one Vickers gun firing forward and a Lewis on a Scarff mounting.

N.9.



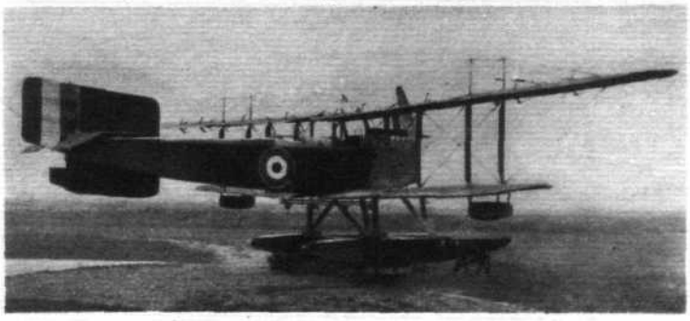
F.17 Campania.

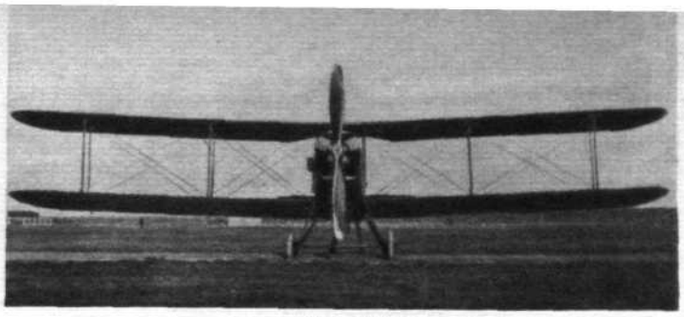




Type III.

Type IIIB.





Type IIIA.

Type IIIC.

FAMILY OF FAIREYS . . .

TYPE IIIs, GORDON, SEAL

Type III (N.10) This seaplane is regarded by the Fairey company as the true progenitor of the great line of Series III variants, which eventually included the Seal and Gordon. The first machine had the fuselage, undercarriage and tail of the N.9, but was fitted with wings of equal span (46ft 2in) and a 260 h.p. Sunbeam Maori in place of the Rolls-Royce Falcon. Span was 46ft 2in, top speed at sea level 103 m.p.h., alighting speed 41 m.p.h. and gross weight 4,160 lb. The original was delivered to the R.N.A.S. in April 1917 and remained in service after the Armistice. In May 1919 it was bought back by the Fairey company as a "disposal" machine and flew a newspaper service between Blackfriars and Thanet. In the summer of 1919 it was engaged on experimental work and was converted, with single-bay wings and Lion engine, as a Schneider Cup racing seaplane in September 1919. Early in 1920 it was remodelled as the Competition amphibian (see below), and it subsequently flew a ferry service between Southampton and Sheerness. It survived nine engines, but the fuselage, wings, tail, tail float and engine bearers remained unchanged throughout. The rear cockpit was progressively modified to carry one, two and three passengers.

Type IIIA A development of the Type III, with wheel or skid undercarriage, similarly powered, and likewise put into production. Top speed at sea level was 109 m.p.h., landing speed 40 m.p.h., and gross weight 3,694 lb. The IIIA was used for experiments with hydrovanes, for alighting on the sea.

Type IIIB This was a bomber seaplane with the same fuselage as the original Type III, but with an upper wing increased in span to 62ft 9in. The floats were of larger capacity and the gross weight was raised to 4,892 lb. Maximum speed at sea level was 95 m.p.h. and alighting speed 42 m.p.h. The engine was a Sunbeam Maori.

Type IIIC In this development the 375 h.p. Rolls-Royce Eagle VIII was installed. The wings were similar to those of the original Type III and the floats were those of the IIIB. The first machine of the type was delivered to Great Yarmouth in November 1918. Gross weight was 5,050 lb, maximum speed at sea level 111 m.p.h., and endurance 6 hr. Machines of the type equipped H.M.S. *Pegasus*, a ship of the North Russian Relief Force at Archangel in 1919, and for his services on that expedition F/L. L. Massey Hilton, now assistant managing director of the Fairey company, was awarded the D.F.C. Mounted on skis to enable it to operate from ice and snow, the series IIIC was used successfully by the P.O. Flygkompani of Barkarby, Sweden.

Competition Amphibian For a 1920 Air Ministry competition this amphibious version of the Type III was developed. The twin, single-step floats had long extensions aft of the c.g., so that they normally supported the whole machine; there was, however, a tail float which functioned only if the wings were folded on the water or if the main floats were punctured. Between the floats were retractable wheels, carried on a steel frame. Gross weight was 3,770 lb, top speed 118 m.p.h., and landing speed 54 m.p.h. The engine was a Napier Lion.

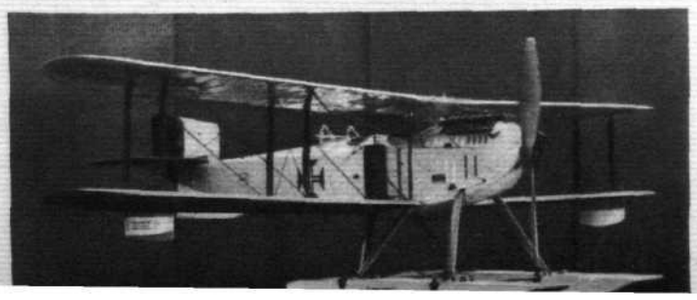
(Right) IIIC (Schneider Cup machine).

(Below) IIIC equipped with ski landing gear.

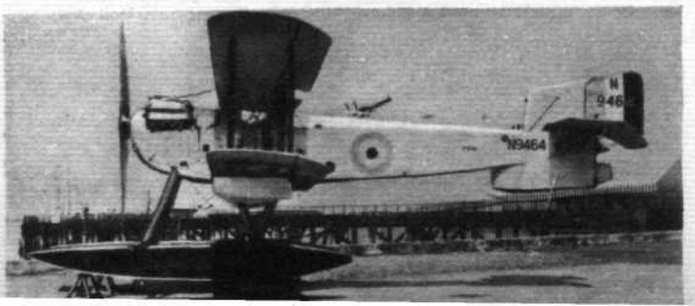
Competition amphibian.

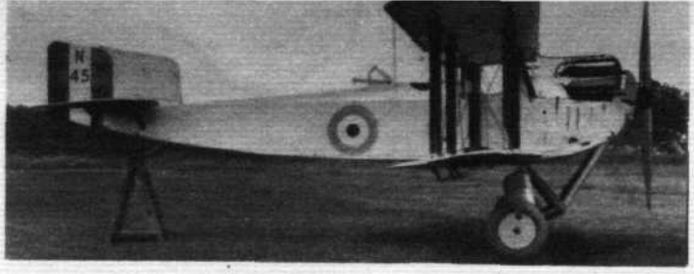
IIID The first Fairey IIID was built in 1920 as a three-seat seaplane for the Fleet Air Arm, powered with a Rolls-Royce Eagle VIII engine, though it was also built in numbers with the Eagle IX and Napier Lion V. From a description appearing in *Flight* of August 18th, 1921, it is learned that the fuselage was of the usual girder construction, with ash longerons and struts forward and spruce aft. The longerons were straight and non-tapered, so that the fittings were identical throughout the greater part of the fuselage. The fittings themselves were pressed out of thin sheet steel. Of I-section spruce, the wing spars were left

IIID (Rolls-Royce Eagle engine).

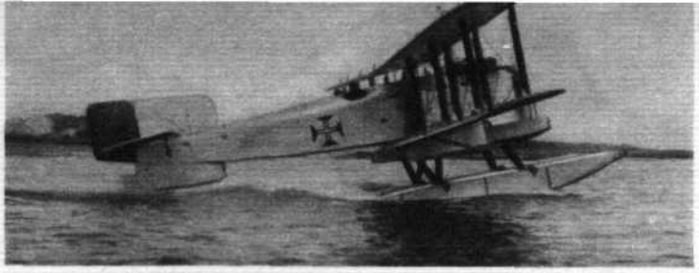


IIID (Napier Lion engine).

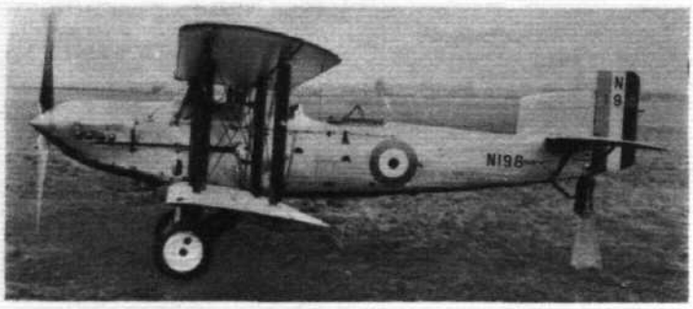




Type IIID (Napier Lion) landplane.

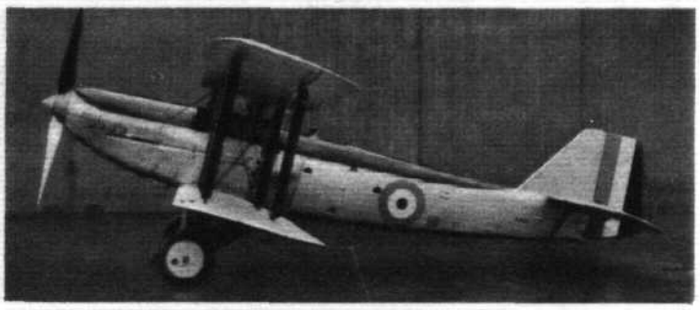


IIID Mk II "Transatlantic Load Carrier."



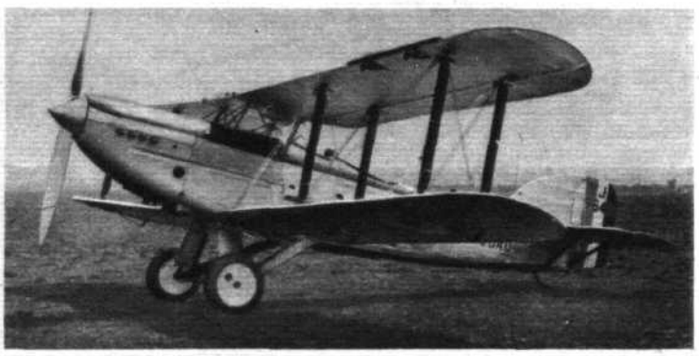
Type IIIF prototype.

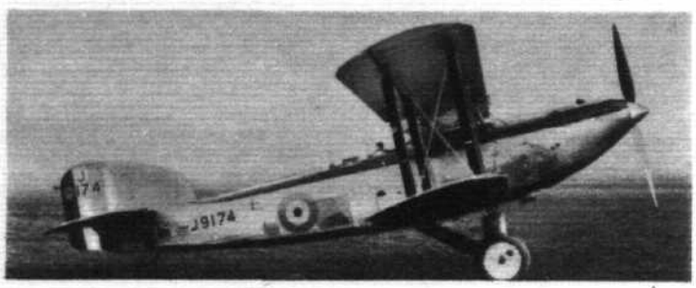
Type IIIF Mk I.



IIIF with experimental tail unit.

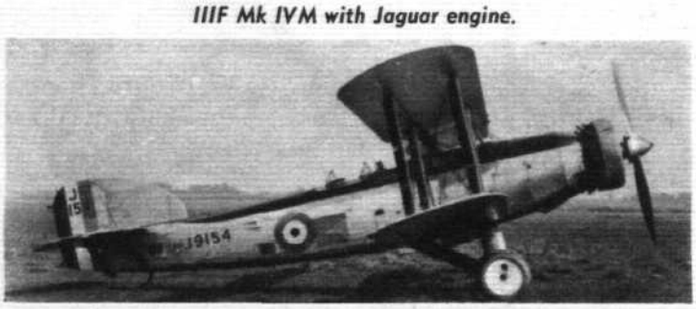
Type IIIF Mk IVM with Lion engine.





IIIF Mk IVM with Kestrel engine.

IIIF Mk IVM with Jaguar engine.



FAMILY OF FAIREYS . . .

solid, and were packed where necessary to take fittings. Ribs were of spruce, with lattice bracing in the form of spruce strips. The wooden floats had a small step, placed relatively far aft, and the tail float carried a water rudder, connected up to, and working with, the air rudder. Span was 46ft 1¼in, wing area 500 sq ft, gross weight 5,050 lb, petrol capacity 105 gallons, top speed 106 m.p.h., climb to 5,000ft 6 min 40 sec, ceiling 17,000ft. (Performance figures for the Eagle-engined machine.)

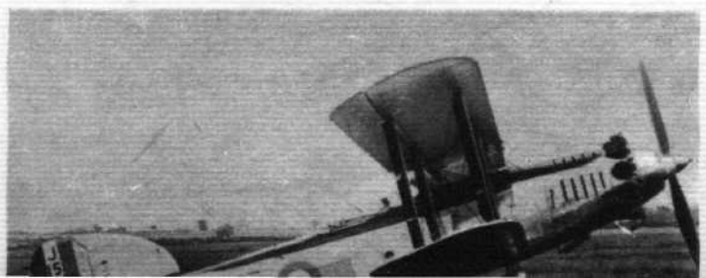
Variations were numerous. In addition to the three-seat F.A.A. seaplane there was a two-seat dual-control trainer version, a two-seat target tower, a three-seat F.A.A. machine with metal wings and boat-built floats, a three-seat ambulance for British Guiana, and passenger-carrying versions seating as many as five. Some machines had catapult gear and during 1925 an Eagle XV was installed.

The Lion-engined machine was supplied to the R.A.F. as a landplane with an oleo undercarriage, and IIIDs of various sorts were exported for service in Australia, Holland, Trinidad, British Columbia, and Portugal. With the R.A.F., IIIDs flew in landplane form across Africa, thence from Cairo to Cape Town, back to Cairo and on to England, as seaplanes. In 14,000 miles of flying there were no major repairs or replacements of any sort. To the credit of the Australian IIIDs was a flight around the continent. The first of the Australian machines was delivered in 1921. It was similar to the Fleet Air Arm pattern, was fitted with wireless, carried petrol for 550 miles at 100 m.p.h., and had hand-starting gear. Using the variable-camber gear it was possible to take off in 15 seconds. To suit Australian conditions the airframe was covered with a new combination of Cellon dope and aluminium varnish. The floats were enamelled white to minimize the internal temperature.

IIID Mk II Known by the foregoing designation, or as the "Transatlantic Load Carrier," was a special development of the Eagle-engined IIID, built in 1921 to the order of the Portuguese Navy for the purpose of flying across the South Atlantic ocean from Lisbon to the coast of Brazil. The extra wing bay increased the span to 62ft. Of the gross loaded weight of 7,250 lb disposable load was 3,100 lb. Top speed was 95 m.p.h. and landing speed 48 m.p.h. Initially extra fuel was carried in under-wing tanks, but was later transferred to the main floats. On March 30th, 1922, the machine flew to Las Palmas in 8 hr. The pilots were two Portuguese officers, Sacadura Cabral and Gago Coutinho. Weather caused a delay at Las Palmas, but on April 5th the IIID covered the 845 miles between Las Palmas and Sao Vincente (Cape Verde) in 9 hr. There were more delays due to weather, but on April 17th the machine reached Porto Praia. Thence it was intended to fly

Type IIIF Mk III for air survey.

IIIF IVM with Jupiter engine.



IIIF (Lion engine) for Chile.

IIIF (Pegasus) for Latvia.

on to the island of Fernando Noronha, 1,250 miles distant, but strong headwinds obliged a descent, after twelve hours' flying, near a Portuguese cruiser. This had been stationed, with such a contingency in mind, 250 miles short of Fernando Noronha. In alighting the undercarriage collapsed and the machine was wrecked. Eventually the flight was completed by the same crew on a standard IIID of the Portuguese Navy.

IIIF Mk I In 1926 appeared a very much cleaned-up development of the IIID and Ferret series, designated IIIF. In its Mk I form it was powered with a Napier Lion V engine and was a three-seater of composite construction (tubular metal fuselage, wooden wings). Four of the first six production machines were supplied to the R.A.F. for the Cape-Cairo flight of 1928. There was little Service experience with the type but the flight of over 11,000 miles was completed without trouble and to a pre-arranged timetable. Conversion from landplane to floatplane could be accomplished in one hour.

IIIF Mk II This mark was also of composite construction but had increased load factors and was powered with a Napier Lion XI engine.

IIIF Mk IIIM An all-metal version, with Lion XIA engine, for the Fleet Air Arm.

IIIF Mk IIIB Another all-metal machine for the Fleet Air Arm, also with Lion XIA engine, but with a strengthened fuselage, for catapulting, and other detailed modifications. A number were constructed *ab initio* as trainers, and thus had no superfluous fittings. These machines had duplicated flap controls.

IIIF Mk IVC A two-seater of composite construction, this was a general-purpose version for the R.A.F.

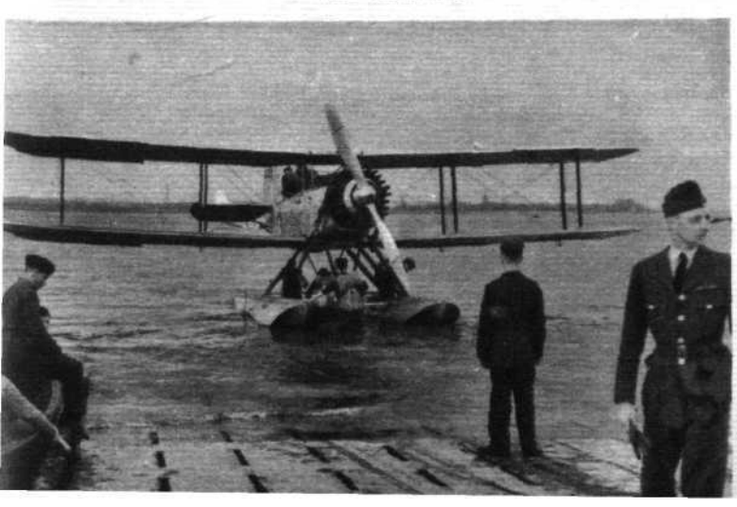
IIIF Mk IVM Another general-purpose variant, of all-metal construction, except that the fin and rudder had wooden ribs.

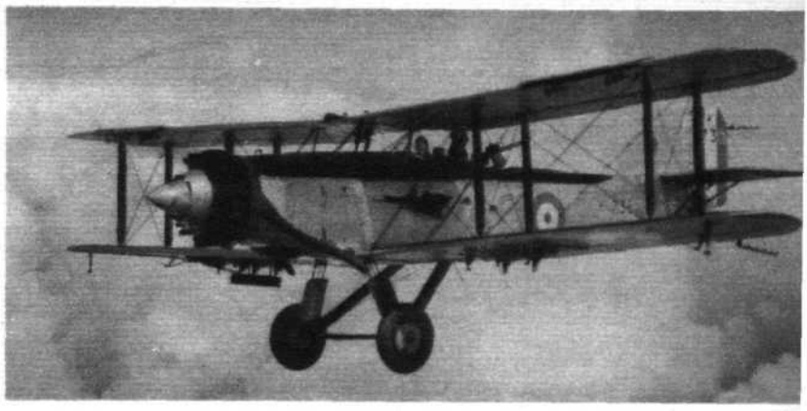
IIIF Mk IVM/A Construction of this mark was entirely in metal.

N.B. IIIFs of the Mks III and IV were the most prolific of the breed and, though normally powered with the Napier Lion engine, Mk IVs were fitted experimentally with the Jaguar VI, Panther IIA, Jupiter VIII, and Rolls-Royce F (Kestrel). For the Argentine Government a number of Mk IIIs were fitted with Lorraine Ed.12s, subsequently replaced by Panther VIs. More-or-less standard machines were supplied to the Irish Free State Air Corps, Chilean Naval Air Service and Greek Naval Air Service, and two Jaguar-engined three-seat survey versions of the Mk III were supplied to the Air Survey Company. Examples also went to Russia, China, New Zealand and India. Variants included not only trainers but communications aircraft; a flying test bed with Junkers Jumo diesel engine; another, Kestrel-powered, for silencing experiments; target-glider launchers (glider carried on the top wing); and target tugs. Other machines were fitted with experimental Handley Page slots. One had a special undercarriage for water-resistance tests at full scale; another reverted to the old tail float arrangement (with lateral wing floats in addition), and an experimental installation was made of a single central main float, again with lateral stabilizing floats. A IIIF with Kestrel engine was the first of all the Rolls-Royce test beds (October 1931).

In essence, however, there were only two basic types of IIIF—the general-purpose type and the Fleet Air Arm type. These differed principally in that the G.P. machine was a two-seater and the F.A.A. a three-seater, carrying a wireless operator in addition to the pilot and observer/gunner. In all types wheel and float undercarriages were readily interchangeable, and the wings were arranged to fold. The metal machines had corrugated drawn-tube spars with pressed ribs clipped on. All structural components and the great majority of parts were jig-built, assuring complete interchangeability. Armament was a fixed Vickers gun

Seal floatplane.





Gordon.

firing through a trough in the port cowling and a Lewis either on a Scarff mounting or—more generally—on a Fairey "high-speed" mounting, which allowed the gun to be stowed in the decking of the fuselage. A bomb load of some 500 lb could be carried beneath the wings, or, alternatively, extra fuel tanks could be similarly disposed. Typical figures for a IIIF landplane were: span 45ft 9in, length 32ft 6in, gross weight 6,041 lb, speed at 10,000ft 120 m.p.h., endurance 3-4.2 hr. The seaplane version was sometimes flown at gross weights as high as 7,200 lb. Some IIIFs, for export, had Seal-type tails. One such, with Pegasus IIIM, for Latvia, had a top speed of 153 m.p.h.

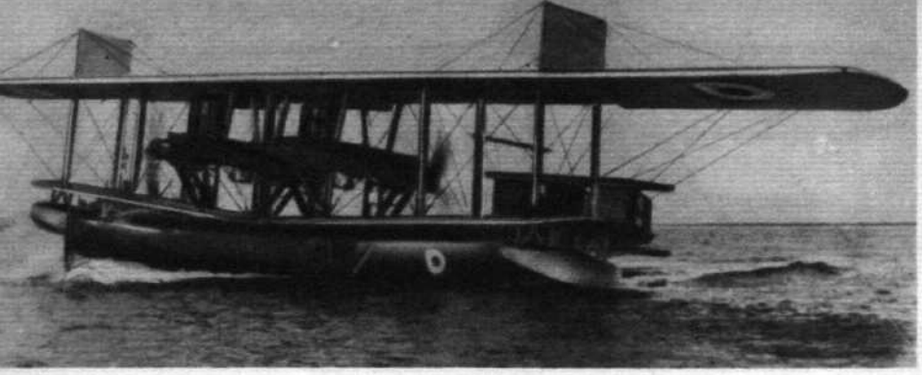
Fairie Queen Following trials with the Larynx pilotless aircraft, work was undertaken at the Royal Aircraft Establishment on the development of a radio-controlled target for the Royal Navy, and for this the Fairey IIIF formed the basis. Dihedral angle was increased and a special new automatic pilot was developed. With the aid of a fully automatic landing system several successful alightings were made, during 1932, in the English Channel. Three machines were built and the last was shipped to Gibraltar, where it was engaged by the guns of the Home Fleet for 1½ hours before alighting successfully in a rough sea. Eventually the machine was transferred to Malta, where it was shot down by H.M.S. *Shropshire*, of the Mediterranean Fleet.

Gordon I The foregoing name was allotted by the Air Ministry to the IIIF Mk V, a development with Armstrong Siddeley Panther IIA engine. The Gordon differed from the IIIF Mk IVB only in power plant, fuel and oil systems, forward fuselage, Vickers gun mounting (transferred to the outside of the fuselage), and certain details of the electrical system. Military load remained as before, typical bomb loads being two 230 or 250 lb bombs or four 112-pounders, plus, in each case, four 20-pounders. Gross weight was 5,906 lb and speed at 10,000ft 132 m.p.h. Gordons were sometimes operated on floats, were used for target-towing and, with a message hook, for army co-operation.

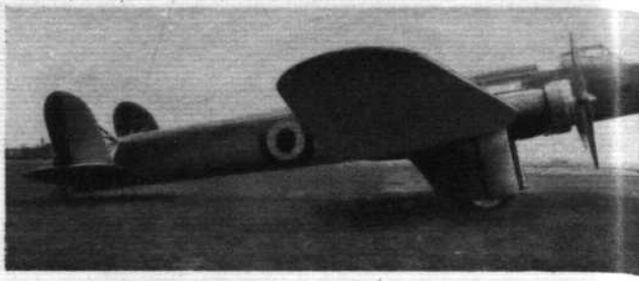
Gordon II This designation distinguished a modified Service-type Gordon, having a redesigned rear fuselage, Frise ailerons and a revised tail unit to harmonize control.

Seal The Seal was the Fleet Air Arm counterpart of the Gordon, and originally had the same type of tail unit, though for production this was revised, and a tailwheel fitted in the place of the skid. Ailerons were of the Frise type. A number of Seals were produced as trainers, and the type was flown experimentally in this country with a Panther VI engine in a long-chord cowling. Seals similarly powered were supplied to Argentina. The standard Fleet Air Arm Seal, with Panther IIA, had a top speed of about 140 m.p.h. and a ceiling of 17,000ft. Fitting of a float undercarriage lowered these figures to 128.7 m.p.h. and 13,900ft respectively. Endurance was about 4½ hr.

Seal.



Atalanta I.



Hendon I.
Hendon II (prototype).

FAMILY OF FAIREYS . . .

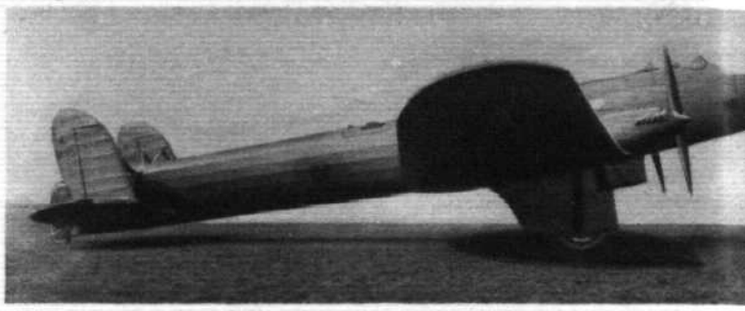
BIG BOATS

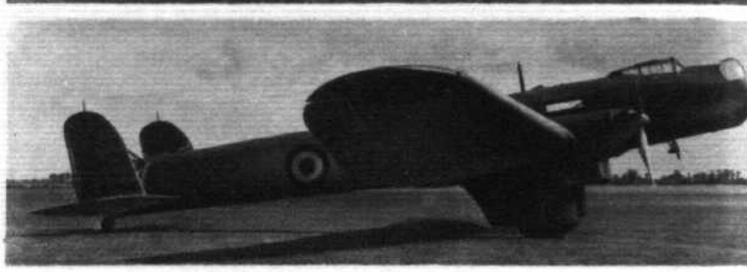
N.4 Atalanta and Titania In 1918 the Air Ministry formulated a requirement for three very large four-engined open-sea reconnaissance flying-boats—the largest of their kind in the world. The first, *Atalanta I*, was constructed by Dick Kerr and Co., a company of the English Electric Group, the hull having been built by May, Harden and May, to Linton Hope design. The second machine, *Atalanta II*, was never completed. The hull was Gosport-built to Nicholson design. The third machine, *Titania*, had a Linton Hope hull, built by Fyffes on the Clyde. All three were of wooden construction. *Atalanta* and *Titania* were essentially similar, but the former had Rolls-Royce Condor IA engines whereas *Titania* had Condor IIIs and Fairey patent variable-camber gear. The Condors were mounted in tandem pairs between the wings, with the radiators stacked above them; the wings themselves were of unequal span and carried vertical "screen" surfaces recalling those on the war-time Felixstowe "F" boats. Triple fins and rudders were boxed in by biplane horizontal tail surfaces. The crew numbered six. A brief specification of the *Titania* was: span 139ft, length 66ft, gross weight 31,612 lb, top speed at sea level 100 m.p.h., time of climb to 5,000ft 8 min, service ceiling 14,100ft.

NIGHT BOMBERS

Hendon I Never, we believe, previously published is the photograph herewith of the Hendon I night bomber, built in 1930 and powered with two Bristol Jupiter XF radial engines. This was the first cantilever monoplane night bomber to be built in Great Britain, and was of very advanced concept. Difficulties were experienced, however, with longitudinal stability, attributed to the baffling of the engines, which caused premature stalling of the wing.

Hendon II This was a developed Hendon I, re-engined with Rolls-Royce Kestrels, originally of the IIIS type, but for production machines (one R.A.F. squadron), Kestrel VIs were fitted. The cantilever wing was of very thick section and was claimed by the company to render the Hendon relatively insensitive to overload. It was of "twisted" design, ensuring that the tips remained unstalled long after the machine had started to sink. The bomb load (1,660 lb maximum) was stowed in the centre-section, and although the undercarriage was not retractable, it was very well faired, and the radiators were in housings immediately ahead of the "trousers." The primary structure was of steel throughout either in the form of tube or high-tensile drawn section. Duralumin and other alloys, however, were used for secondary members, ribs and fairings. Spar booms were in the form of square tubes built up of four corrugated sections of high-tensile steel, riveted together. Of special interest was the bracing of the outer mainplanes against torsion by means of "pyramids" constructed of steel tubes and streamline wires. Although on the prototype the gun positions and pilots' cockpit were open, on production machines they were enclosed. A cat-walk extended from the nose clear through to the gun position in the extreme tail. As an alternative to the bomb load the Hendon could carry 15-20 fully armed troops. Figures for the production aircraft, with Kestrel VIs, were: span 101ft 9in, length 60ft 9in, weight empty 12,773 lb, gross weight 20,000 lb, maximum speed 156 m.p.h. at 15,000ft, time of climb to 10,000ft 15 min, service ceiling 21,500ft, range with full load 1,360 miles.





Hendon II (production).

FOR LONG RANGE

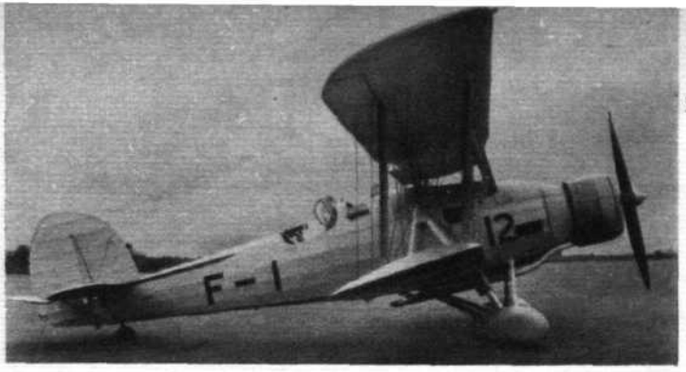
Freemantle Although the Fairey company themselves spell the name of this aircraft with one "e," an official document of 1925 renders it with two. The machine was in any case a long-distance seaplane, designed with an eye to the requirements of the Civil Aviation Department of the Air Ministry, but suitable also for long-range patrol or reconnaissance. At one time it was intended that the machine should make a flight round the world. A 4/5-seater, it was the largest aircraft of its type, having a span of 69ft 2in. The engine, a Rolls-Royce Condor, was cooled by a radiator mounted on the top wing. In addition to the two main floats and tail float, outboard stabilizing floats were fitted. The main fuel tanks were in the floats and the cruising range with standard tankage was about 1,100 miles. The cabin was heated and contained wireless equipment. Top speed was 108 m.p.h. and gross weight 12,550 lb.

Long-range Monoplane Mk I A machine of singularly striking appearance and very high efficiency, this first Long-range Monoplane was built to Air Ministry order for an attempt on the world's long-distance record for a flight in a straight line. It had a high cantilever wing wherein the patented triangular system of internal bracing was used. Construction was of wood. The fuselage contained a cabin provided with Triplex windows. The pilot's seat had pneumatic upholstery and a pneumatic bed was provided in the cabin; for the navigator there was a comfortable seat and a folding table. Said the original Air Ministry description: "An instrument has been evolved to ensure that if the machine goes off its course inadvertently, either vertically or directionally, a hooter sounds in the pilot's ear."

Freemantle.
Long-range Monoplane Mk I.

Long-range Monoplane Mk II.

G.4/31 Mk I.

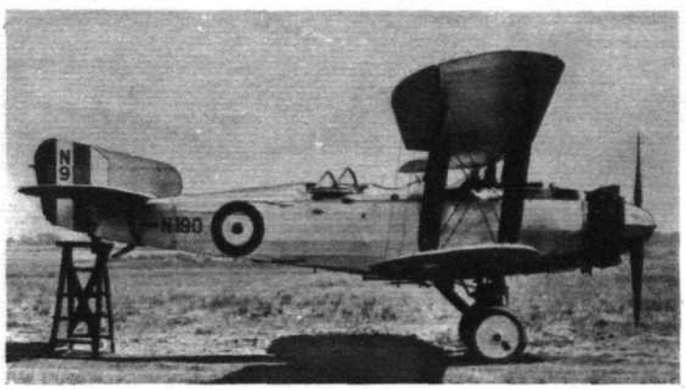


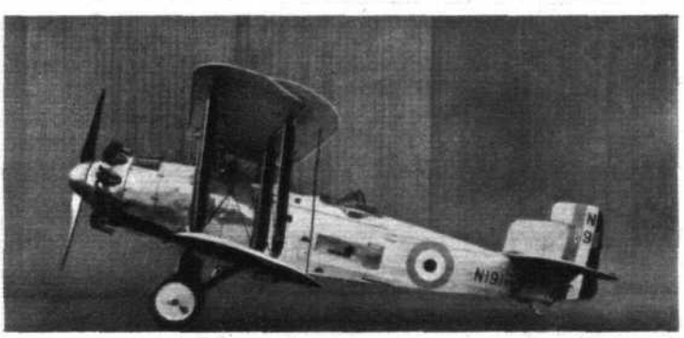
G.4/31 Mk II.
Ferret I.

Over a thousand gallons of fuel were carried in the wings for the Napier Lion engine, the compression ratio of which had been slightly raised and the carburettor specially tuned. The fuel was gravity-fed to a collector tank under the cabin floor. A wind-driven pump, which could quickly be extended from one side of the fuselage, was fitted for safety. There were two oil filters, one of which could be cleaned while the other was functioning. The undercarriage was of divided-axle type, of very wide track, with the wheels mounted on roller bearings. Span was 82ft and length 48ft 6in.

On April 24th, 1929, piloted by S/L. A. G. Jones-Williams, M.C., and F/L. N. H. Jenkins, O.B.E., D.F.C., D.S.M., the machine took off from Cranwell and headed for India. On the following day it landed at Karachi, having covered 4,130 miles in 50 hr 48 min. The goal, however, had been Bangalore, and the length of the flight was insufficient to beat the existing record. Nevertheless, the aircraft was the first to fly non-stop from England to India.

Long-range Monoplane Mk II During 1931 a developed version of the Long-range Monoplane was constructed. It differed from the former machine in having wheel fairings and—a most significant feature at that time—an automatic pilot. Between February 6th and 8th, 1933, this second machine, flown by S/L. O. R. Gayford, D.F.C., and F/L. G. E. Nicholetts, A.F.C., flew non-stop from Cranwell to Walvis Bay, South-West Africa, in 57 hr 25 min, the distance being 5,340 miles. This flight constituted a world's record, which stood until August 1933, when the Frenchmen Codos and Rossi achieved 5,638 miles (New York to Rayak, Syria).



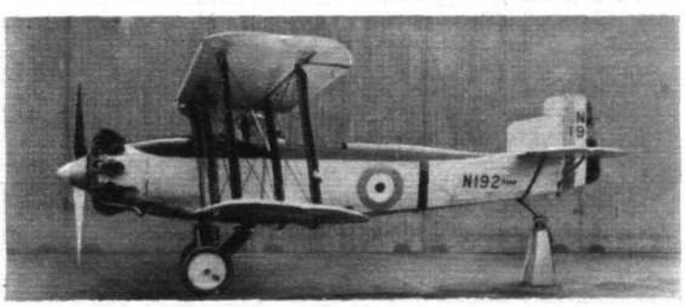


Ferret II.

FOR GENERAL PURPOSES

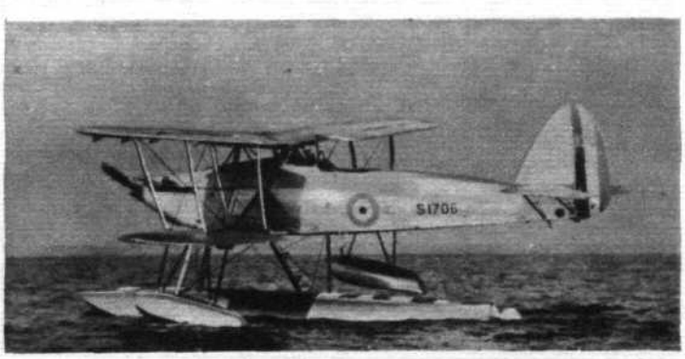
G.4/31 Mk I The G.4/31 specification called for a sturdy, capacious general-purpose aircraft, suitable for use as a torpedo bomber or dive bomber. It was to be able to operate from improvised airfields, even in the tropics, and to have provision for a very wide range of service equipment. To the stated requirements Faireys built a massive single-bay biplane with wings of unequal span. The top line of the fuselage swept up sharply behind the engine to afford the pilot the best possible view from his high-placed cockpit, in line with the trailing edge of the wing. Forward of the cockpit was a cabin, entered through side doors. A hook for picking up messages was fitted in addition to the bomb and torpedo carriers. Pilot's armament was one fixed Vickers gun, and for the observer there was a single Lewis gun, on a Fairey high-speed mounting. The engine was a Bristol Pegasus IIM.

G.4/31 Mk II This version of the G.4/31 was fitted with an Armstrong Siddeley Tiger IV engine. All-up weight was 8,790 lb and span 53ft.

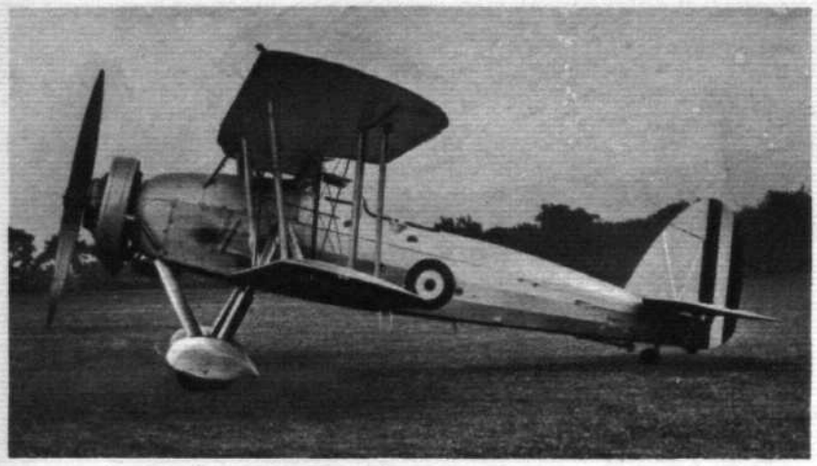


Ferret III.

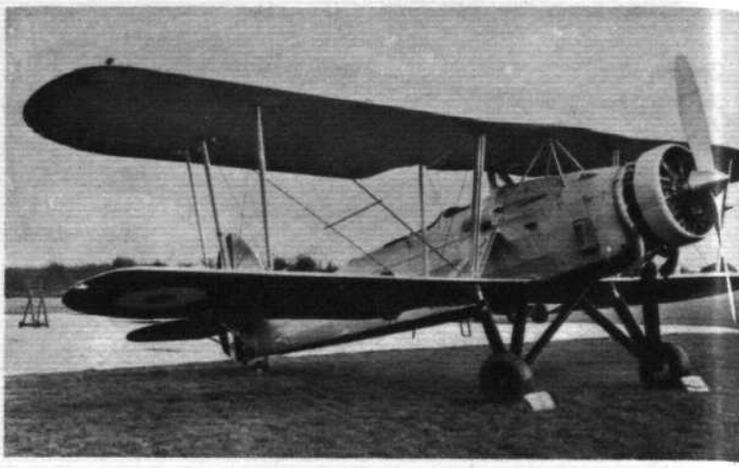
S.9/30 as landplane.
Seafox as landplane



S.9/30 as floatplane.
Seafox as floatplane.



T.S.R.1 (Pegasus).



T.S.R.1 (Tiger).

FAMILY OF FAIREYS...

FLEET SPOTTING AND RECONNAISSANCE

Ferret I The Ferret (1925) was the first Fairey product to have an all-metal main structure, though the covering was fabric. It was designed for fleet reconnaissance and was a three-seater. Special attention was paid to interchangeability and the engine was an Armstrong Siddeley Jaguar. The Ferret resembled strongly the various Series IIIs, but the mainplanes had a slight stagger. It appears that the missing "Series IIIE" was this aircraft.

Ferret II A development of the Mk 1, with Bristol Jupiter engine. The arrester gear was still in the form of catch-hooks attached to the cross-axle undercarriage.

Ferret III A cleaned-up Ferret, also with Jupiter. Whereas on the earlier Ferrets the rear gun mounting had been of the Scarff type, on the Mk III it was of the Fairey high-speed pattern.

S.9/30 The primary structure of this two-seat fleet spotter/reconnaissance aircraft was of stainless steel, and proved extremely satisfactory in service trials. As an alternative to the wheel undercarriage, with its low-pressure tyres, a single central float, with lateral under-wing stabilizing floats, was fitted. The Rolls-Royce Kestrel IIMS engine was evaporatively cooled, the wing condensers being in the top wings.

Seafox Officially classed as a light reconnaissance aircraft, the Seafox appeared in 1936. Aerodynamically it was a highly conventional aircraft, but speed performance was not a requirement. The prescribed duties were spotting and reconnaissance after the machine had been catapulted—from the smaller type of naval catapult then in service—from a cruiser. The two-bay wings were of equal span and all-metal construction, with fabric covering. The fuselage was, somewhat unusually, a metal monocoque structure, with Z-section frames covered with Alclad panels. Except for the cockpit cutaways and drain holes the fuselage was completely sealed. The observer was provided with a transparent cockpit enclosure and his gun was on a Fairey mounting. The pilot's cockpit was open (his duties when being hoisted aboard demanding freedom of movement) and he had no gun. A feature of particular interest was the engine—a 395 h.p. Napier Halford Rapier VI 16-cylinder H-type air-cooled unit.

Swordfish III.

Swordfish on floats.

Span was 40ft, length 35ft 5½in, folded width 14ft, weight empty 3,805 lb, gross weight 5,420 lb, top speed 124 m.p.h. at 5,850ft, service ceiling 11,000ft, cruising endurance 4.15 hr.

TORPEDO BOMBERS

T.S.R.1 As a private venture, to Specification S.9/30, Faireys submitted a radial-engined machine capable of operating not only as a spotter or reconnaissance aircraft but as a torpedo bomber also. It materialized in 1933 as the T.S.R.1 and was first flown from the Great West Aerodrome by F/L. Staniland. A sturdy two-bay biplane it had wings of unequal span and chord, and the pilot was placed high to give him a good view for attack. Initial tests were promising, but late in 1933 the prototype developed a flat spin from which Staniland could not recover. He baled out, but was blown into the rear cockpit, from which he made a second jump—from the other side of the aircraft—this time successfully. The T.S.R.1 was tried with the Armstrong Siddeley Tiger and Bristol Pegasus engines.

T.S.R.2 This second version, which was ready in the spring of 1934, had an extra bay let into the fuselage, and to compensate for this insertion the upper wings were slightly swept back. The type was adopted in 1935 as standard Service equipment under the name Swordfish.

Swordfish I This designation was later applied to the early production Swordfish, the first of which appeared in 1936. The wing structure consisted of two built-up spars of steel strip, with steel drag struts and Duralumin ribs. Ailerons were fitted on all four wings. The fuselage was essentially a rectangular steel tube structure. The engine, a Bristol Pegasus IIIM, was installed in a Townend ring. For spotting and reconnaissance duties the crew numbered three, but for torpedo work only two were carried. Twin metal floats were interchangeable with the land undercarriage. Alternative to the single torpedo the Swordfish could carry bombs up to a maximum weight of 1,500 lb.

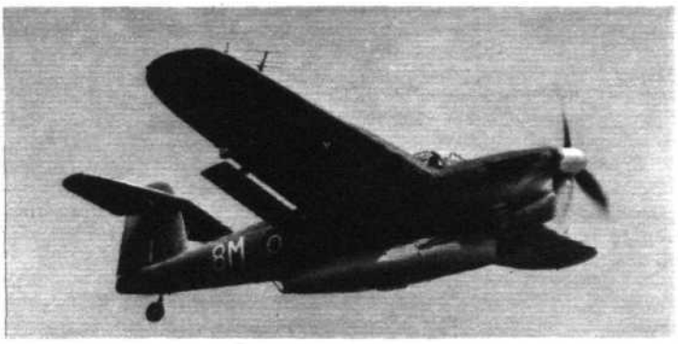
Swordfish II This designation distinguished the Swordfish as with special lower wings to enable R.P.s to be launched. The R.P. load was eight 60 lb H.E. or 25 lb armour-piercing projectiles. Depth charges were another possible load. Figures for the Swordfish II were: span 45ft 6in, length 35ft 8in, empty weight 4,700 lb, gross weight 7,510 lb (as torpedo bomber landplane), top speed 138 m.p.h. at 5,000ft, rate of climb 1,220ft/min, service ceiling 19,250ft.

FAMILY OF FAIREYS...

Swordfish III This was the last of the Swordfish variants to be built in Great Britain and was distinguished by a ventral radome. The engine was the Bristol Pegasus 18 or 30. As all machines of the mark were built by Blackburn, the name Blackfish became common during the war years. Production ceased in mid-1944. A number of machines of the type were fitted with JATO and some with the Leigh light.

Albacore.

Barracuda (prototype).



Barracuda II with lifeboat.

Swordfish IV A version of the Swordfish, for use in Canada, with enclosed cockpits.

Albacore The Albacore was intended as, but never became, a Swordfish replacement. It was a clean three-seater biplane, with a neatly cowled Bristol Taurus sleeve-valve two-row engine, originally Mk 2, later Mk 12. The fuselage was of metal monocoque construction and had a lengthy cut-out, above which was built the cockpit enclosure. The pilot had a fixed Browning gun and there were two Vickers gas-operated guns in the rear cockpit. Maximum bomb load—carried beneath the wings—was 2,000 lb. When 803 Albacores had been built production ended in 1943. In the Western Desert Albacores were extensively used as flare-droppers. The following figures apply to the torpedo bomber landplane: span 50ft, length 39ft 10in, weight empty 7,250 lb, gross weight 10,460 lb, maximum speed 161 m.p.h.

Barracuda I To Specification S.24/37 Faireys drew up designs for a monoplane torpedo bomber to be powered by the Rolls-Royce Exe engine. Development of this unit was subsequently dropped, and the design was revised to take the Merlin. The first prototype, flown in December 1940, differed notably from subsequent machines in having the tailplane set low. Production Barracuda Is were powered with the Merlin 30 engine. The wing was set shoulder-high and had stressed-skin Alclad covering. Hydraulically operated Fairey-Youngman flaps were fitted externally, and could be raised to a negative angle as a dive brake. Especially interesting was the undercarriage, the main wheels of which retracted upwards and outwards into wells in the wing. The 18in torpedo was carried externally, and provision was made for bombs, depth charges or mines under the wing. The crew comprised pilot, observer/navigator and gunner/radio operator. Armament was two Vickers K guns in the rearmost position. Span was 49ft 2in, length 40ft 6in, folded width 18ft 3in.

Barracuda II A development with Merlin 32 engine, driving a Rotol four-blade airscrew. Maximum speed was 220 m.p.h.

Barracuda T.R.III An anti-submarine variant with Merlin 32 engine but with a fairing beneath the fuselage to house A.S.V. Mk 10 radar.

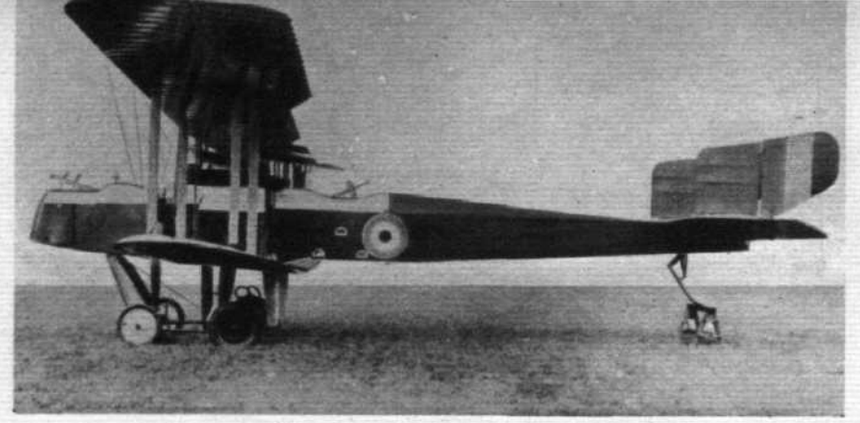
Barracuda 4 Proposed designation for a Griffon-powered development, which became the Mk 5.

Barracuda T.R.5 In this type the Rolls-Royce Griffon VII engine was installed, with a notable increase in performance. Wing span was increased by 4ft and the tips were squared. Internal fuel capacity was augmented, as was the area of the rudder and fin. The airframe was stiffened up, the electrical system revised, and provision was made for carrying radar in a quickly detachable unit on one wing. The crew numbered two and the forward-firing armament was one 0.5in Browning gun. Span was 53ft 2in, length 40ft 3in, maximum speed 244 m.p.h. at 10,000ft. The Barracuda 5 was put into production but was never extensively used.

Spearfish T.B.D.1 The Spearfish was intended as a successor to the Barracuda, to Specification 0.5/43. The first example was built in 1945. A production order was in hand in Stockport, but in the event only five machines were flown. The first had a Bristol Centaurus 57 but later machines had the Centaurus 58. The airscrew fitted was a five-blade constant-speed Rotol, but at one time it was proposed to fit a special reversible-pitch airscrew to act as a dive brake. The crew numbered only two. The pilot had two 0.5in Browning guns and two similar guns were mounted in a remotely controlled Frazer-Nash dorsal turret, behind the rear cockpit. Internal provision was made for an 18in or 22in torpedo, four 500 lb bombs, one 2,000 bomb, or four depth charges. Attachment points for R.P.s were provided under the wings, and there was a retractable A.S.V.15 scanner in the rear fuselage. Span was 60ft 3in, weight (with 2,000 lb of bombs) 21,082 lb, maximum speed 292 m.p.h. at 14,000ft, service ceiling 25,000ft, endurance 5.3 hr.

Barracuda 5 (before tail revision).

Spearfish.



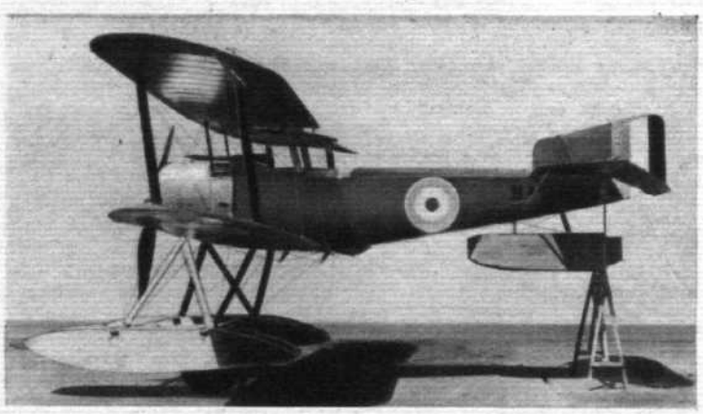
F.2 twin-engined fighter.

FAMILY OF FAIREYS . . .

FIGHTERS AND DERIVATIVES

F.2 The works number F.1 had been applied to a batch of wings, but the designation F.2 distinguished a three-seater heavy fighter and general-purpose aircraft, built in 1916. The engines were two Rolls-Royce Falcons of 190 h.p. each, and the wings were arranged to fold. Speed at sea level was 93 m.p.h., landing speed 38 m.p.h., endurance 3½ hr, and gross weight 4,880 lb. Armament was two Scarff-mounted Lewis guns, and the undercarriage was of the four-wheel, tail-up type, to lessen the hazards of night landings on rough ground. Span was 77ft, length 40ft 6in.

Hamble Baby A development of the Sopwith Baby twin-float fighter/bomber seaplane, this little Clerget-engined machine (1917) was the first to have the Fairey patent camber gear, allowing a relatively heavy wing loading with an efficient section. The type was built by Fairey and Parnall, and as the "Hamble Baby Convert" was flown also as a landplane. With the 110 h.p. Clerget engine (the 130 h.p. Clerget was also fitted) the seaplane attained 98 m.p.h., climbed to 6,500ft in 25 min and weighed 1,946 lb all-up. Span was 27ft 10in and length 23ft 4in. Standard armament was one Lewis gun, firing through the airscrew arc, and provision was made for two 112 lb bombs.



Hamble Baby.

Pintail.

Pintail I The genesis of the Pintail is as confusing as it is interesting. The most recent list of Fairey aircraft types issued by the makers ascribes the designation Pintail Mk I to a two-seater amphibian with retractable wheels between the floats, built in 1920 and powered with a Napier Lion engine. It is remarked that this was the first post-war Fairey design. Certainly a Pintail was shown at Olympia in 1920, under its original designation Fairey XXI; but this particular machine, which bore the Fairey works number F.339, was a pure seaplane, and had no landing wheels whatsoever. It is tolerably certain that this same airframe was later fitted with retractable landing wheels which, when raised, were positioned between the floats.

Flight's original description of the Fairey XXI runs as follows: "The two main points of interest in the Fairey seaplane are the unit type of construction and the variable camber wings. The engine and its mounting and housing form one unit, the cockpits, the top plane centre section, main float struts, etc., the second unit, and the rear portion of the tail the third unit. The second feature is the variable camber . . . The variation of camber and, incidentally, of incidence, is effected by having the whole trailing portion of the plane hinged along the rear spar. The trailing edge is operated by a wheel mounted in the pilot's cockpit, and can be pulled down or up at will. Of course, the outer portion of the trailing edges is a separate unit, and can move independently of the rest, as an ordinary *aileron*. An innovation of this form of variable camber machine is the interconnection of the control wheel for the camber with that of the tail trimming . . . A novel feature is the absence of any vertical fin above the tail plane. The object of this is to give a free field of fire to the rear gunner, and it is accomplished by having the tail plane mounted high up, and by making the body unusually deep at the back. The general effect, as regards appearance, is to make the machine somewhat reminiscent of various German seaplanes used during the war."

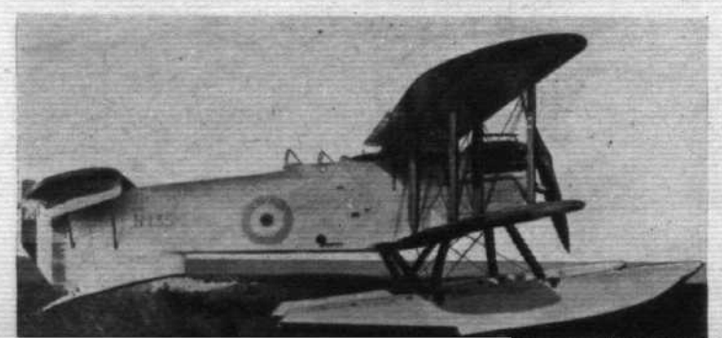
Pintail II The Fairey company state that this designation was allotted to a version of the Pintail, of 1921, having retractable wheels outside the floats and a lengthened fuselage. No photograph, however, is available of such an aircraft, although a wheeled version of the Pintail, bearing the Fairey works number F.340 and the Service serial number N134, is reproduced here. The wheels appear to be housed in the floats themselves.

Pintail III There seems to be no doubt that this version bore the Fairey works number F.341 and the Service serial number N135. The floats at one time had horizontal surfaces affixed to their forward ends. Certainly the fuselage was lengthened, and the wheels were within the floats. Span was 40ft, gross weight 4,700 lb.

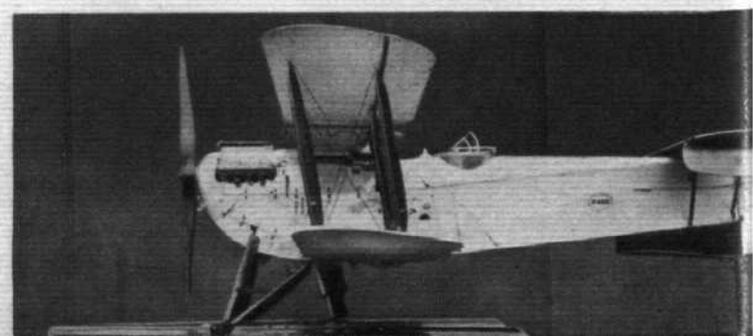
Pintail IV This designation does not appear on the current Fairey list, but a contemporary photograph, of 1924, which is captioned by the makers themselves "Pintail Mk IV," shows a long-fuselage machine with an oleo float undercarriage, having fixed wheels within the floats and a raised top wing. The Fairey works number is F.480. This appears to be the version as supplied to Japan.

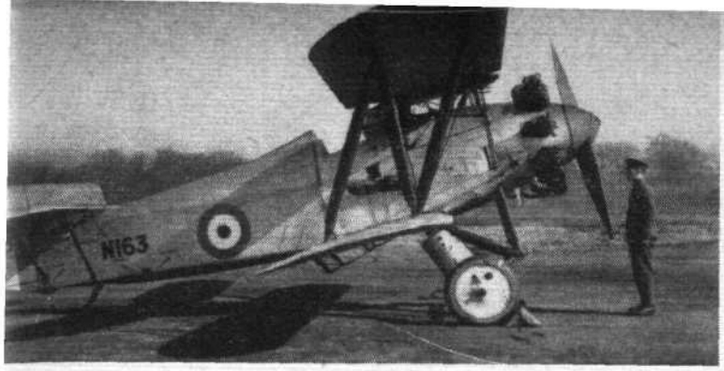
Flycatcher I The Flycatcher, first flown in 1922 by Lt. Col. Vincent Nicholl, D.S.O., D.S.C., was a single-seat fighter developed specifically for the Fleet Air Arm. The first prototype was flown both with Armstrong Siddeley Jaguar and Bristol Jupiter engines, but the Jaguar—Mks III and IV—was standard in all production machines, of which over 200 were built. The Jupiter-engined version was at one stage fitted with cylinder "helmets." The very sturdy wheel undercarriage comprised two oleo legs, from the bottom ends of which radius rods ran forward to the apices of vee-struts. This gear could be replaced with twin floats of a number of different patterns and of wood or metal construction, in certain of which wheels were fitted, thus rendering the machine amphibious. The rearmost float-struts embodied shock-absorbers. Deck-arrester gear was in the form of metal jaws which engaged fore and aft wires. The wings were of wooden

Pintail III.



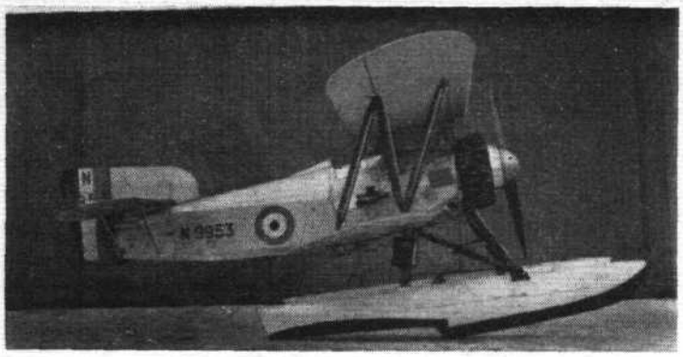
Pintail IV.





Flycatcher I (Jupiter).

Flycatcher I (Jaguar).



Flycatcher I floatplane.

Flycatcher II (Mercury).

construction and had Fairey patent camber-changing flaps; whereas the lower planes were flat, the upper ones were set at a marked dihedral angle. The central part of the fuselage was of steel-tube construction, but the rear part was of wood, and was set at a characteristic "cocked-up" angle. Two 0.303in Vickers guns were mounted externally on the fuselage sides, and provision was made for four 20 lb bombs, with which the Fleet Air Arm pilots of the '20s and early '30s made excellent practice in converging dive-bombing attacks. Flycatchers were issued to Nos. 401, 402, 403, 404, 405, 406 and 407 Fleet Fighter Flights, and were operated extensively with wheels and floats in many parts of the world. In any of its forms the Flycatcher was extremely manœuvrable, and pilots reported that they could feel the movement of the oleo float struts in steep turns, bunts and inverted turns. Span was 29ft and the gross weight of the landplane slightly over 3,000 lb. The landplane's speed at 5,000ft was 134 m.p.h., landing speed 55 m.p.h., and time of climb to 10,000ft 8 min 38 sec. Service ceiling was 20,600ft. The float undercarriage reduced the speed by 7 or 8 m.p.h. and the service ceiling to 18,760ft, for the maximum flying weight was raised by some 600 lb.

Flycatcher II This second mark of Flycatcher was a totally different aircraft, being of all-metal construction and of wholly revised outline. It was, in fact, more closely akin to the Firefly I. The specified engine was the Bristol Mercury, but trouble with this unit caused it to be changed for an Armstrong Siddeley Jaguar. The first flight was made by Capt. Norman Macmillan on October 4th, 1926. Gross weight was 3,150 lb and wing loading 11.4 lb/sq ft. (N.B.—Although the foregoing designation is applied by the Fairey company to the aircraft described, an official document of 1925 lists "Flycatcher I and II, Jaguar or Jupiter," suggesting that the difference in power plant in the earlier Flycatcher may at one time have been signified by a change in mark number.)

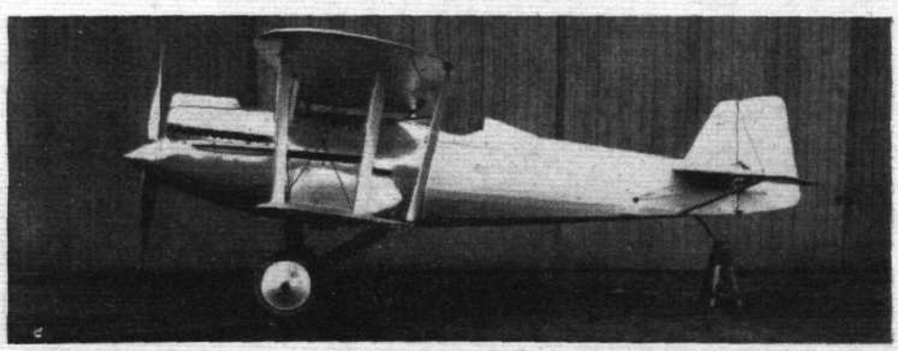
Firefly I The Firefly I was a private-venture single-seat fighter in the Fox I tradition, being powered with an imported Curtiss D.12 (Fairey Felix) direct-drive unsupercharged engine of 430 h.p. The first flight was made by Capt. Norman MacMillan on November 12th, 1925, and the machine appeared, in Service markings, in the New Types Park at the R.A.F. Pageant at Hendon in 1926. Of composite construction, it had a small retractable radiator, interconnected with wing radiators and was armed with two Vickers guns which fired through troughs in the fuselage sides. Gross weight was 3,616 lb, wing loading 13.3 lb/sq ft, and maximum speed 188 m.p.h.

Firefly IIM This intercepter fighter, which differed greatly from the Mk 1 Firefly, was entered for the Air Ministry's intercepter fighter competition held in

Flycatcher II (Jaguar).

1929, wherein the ultimate victor was the Hawker Fury. Of all-metal construction (signified by the "M" in the designation), it differed notably from the earlier Firefly in having heavily staggered wings. The engine was a Rolls-Royce F.XIS (Kestrel IIS), originally with interconnected retractable radiator and wing radiators, but latterly with a fixed underslung radiator. Extensive modifications were made during the course of development to the undercarriage, tail, fuselage and wings. Ailerons of high-aspect ratio were fitted on all four wings, and tailplane incidence was variable.

The main fuel tank held 40 gallons and a gravity tank 12 gallons, and by a special arrangement of the ammunition boxes the two Vickers guns were unstaggered, as was common at the time. Hot air from the radiator was used to heat the cockpit, and a pilot could use his bare hands for writing at 21,000ft with an outside temperature of −34 deg C. With an airscrew intended primarily for speed performance, the maximum speed was 217 m.p.h. at 13,000ft and 193 m.p.h. at 26,300ft. With a "climb" airscrew a height of 19,700ft was



Firefly I.

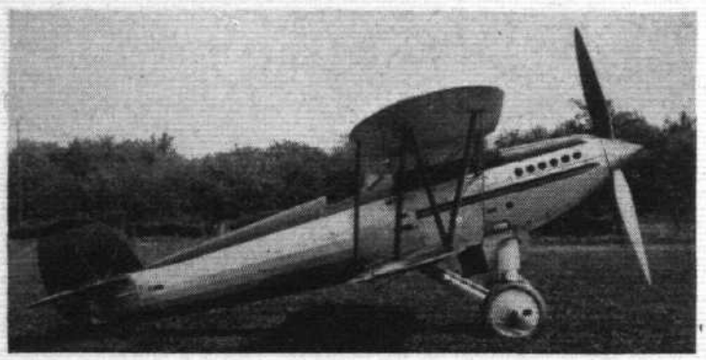
FAMILY OF FAIREYS . . .

reached in 10 min 9 sec if the throttle "gate" were used; but if the supercharger were brought in at once the same height was attainable in only 8 min 6 sec. With the "climb" airscrew maximum speed was 200 m.p.h. at 13,000ft.

The prototype was demonstrated at the R.A.F. Display of 1930, and although it was known at the time that the Firefly had been unsuccessful in the Air Ministry competition, foreign visitors evinced great interest. A fighter contest was then being held in Belgium, and a chance remark at Hendon gave the Fairey directors the idea of sending the Firefly across to Belgium to be demonstrated by F/L. Chris Staniland. Such was the impression made that further demonstrations were requested, and after sixteen Belgian pilots had tried the machine a final test was imposed, namely a terminal velocity dive with the machine carrying recording instruments. Of the competitors still in the running only Staniland agreed to make the test, and its successful completion was the deciding factor in the adoption of the Firefly by Belgium. Eventually a contract was placed for 45 machines, with the stipulation that Belgian labour should be employed for the assembly of the greater part. The Fox IIM day bomber was likewise adopted, and in 1931 the Avions Fairey company was formed for the construction of Fireflies and Foxes. During 1932 thirty-six Fireflies were delivered from the company's Gosselies works (previously a batch of five British-built Fireflies had been delivered from Harmondsworth), and two dozen more followed in 1933, bringing the total to 60 machines. In the official Belgian acceptance tests the Firefly showed a maximum speed of 223 m.p.h. at 13,120ft and climbed to 19,680ft in 10 min 55 sec. Span was 30ft 5in and length 24ft 2in. One Belgian-built machine had redesigned wings and tail unit as shown on this page.

Firefly IIM in original form.

Firefly IIM modified.



Belgian Firefly IIM.

Belgian Firefly IIM modified.

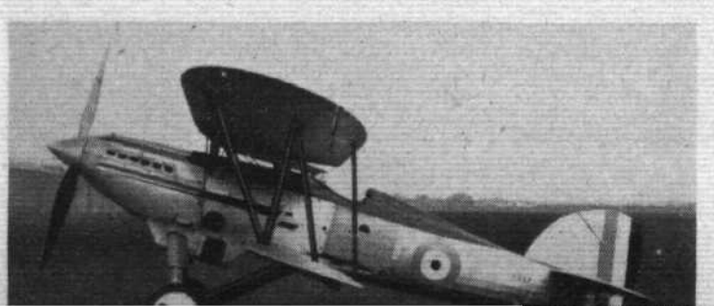
Firefly IIIM This was the naval counterpart of the Firefly IIM, and differed in having wings of greater area, provision for a float undercarriage, strengthening for catapulting, and more comprehensive equipment. It was entered for the competition which was won by the Hawker Nimrod. The engine was a Kestrel IIS, and, in addition to the two Vickers guns, provision was made for four 20 lb bombs. Wheel brakes were fitted. Span was 33ft 6in and length 25ft 6in. Top speed was about 200 m.p.h. and the machine was highly manœuvrable even as a seaplane, as demonstrated when it was being used as a Schneider Trophy hack during 1931.

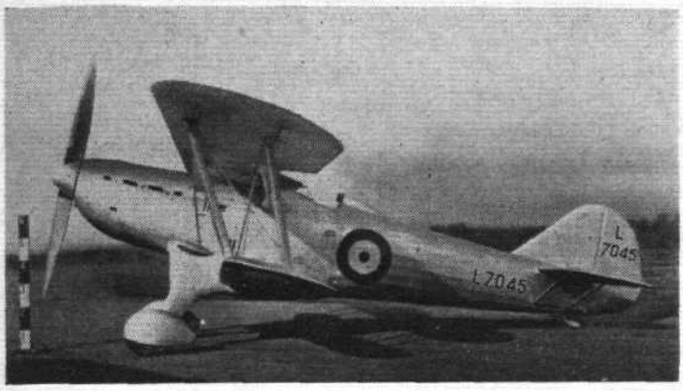
Fleetwing A two-seater fleet fighter/reconnaissance aircraft built (to Specification O.22/26) for the competition which was eventually won by the Hawker Osprey, the Fleetwing followed the design of the Fox II, but was fitted with a moderately supercharged engine (Rolls-Royce F.XIIMS). Armament was one Vickers and one Lewis gun, and there was provision for four 20 lb bombs in addition to radio and a camera. The airframe was stressed for catapulting, and the wheel undercarriage was interchangeable with twin floats. Span was 37ft, length 29ft 6in.

Fantôme and Féroce The Fantôme was designed, and built in 1935, for a competition organized by the Belgian Government with a view to procuring a replacement for the Firefly IIM. The specification demanded a top speed of at least 248 m.p.h., a duration of 2 hr at eight-tenths full power, and an armament of one 20 mm gun and four rifle-bore guns. In design the Fantôme was an extremely clean biplane, with two semi-cantilever undercarriage legs and faired wheels. The engine was an Hispano Suiza 12Ycrs, with a 20 mm cannon firing through the airscrew hub at the rate of 450 rounds a minute, and there were four Browning guns, two in the top cowling and two in the lower wings. Provision was made for four 10 kg bombs, for wireless and full day and night fighting equipment. The entire airframe was of metal construction with fabric covering. Ailerons were fitted to the top wings only. The first machine was destroyed in an accident at Evère, but four sets of all fittings had been made and the remaining three sets were sent to Belgium to assist and expedite the production of Fantômes for further entry in the competition. The delay in some degree coincided with a change in the specification; but in the meantime the Russians had learned that Faireys had produced an outstanding fighter and had ordered two examples. These were built in Belgium under the name

Firefly IIIM floatplane.

Firefly IIIM.

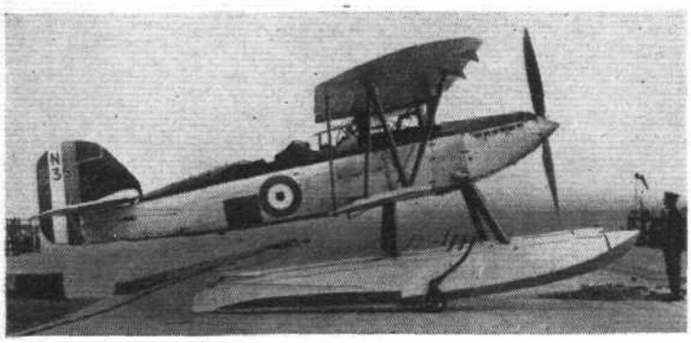




Féroce.

Fleetwing.

Fleetwing floatplane.



Féroce, and were crated for shipment to Russia. The third machine, also built in Belgium, was delivered to England for Air Ministry trials at Martlesham Heath. Span was 34ft 6in, length 27ft 6in, gross weight 4,120 lb, maximum speed at 13,120ft 270 m.p.h., landing speed 59.6 m.p.h., climb to 13,120ft 5 min 40 sec, duration 2 hr.

Fulmar I The Fulmar was a fighter development of the P.4/34 light bomber, and was remarkable in that, although a two-seater, its armament of eight 0.303in Browning machine guns was fixed to fire forward from the wings. The machine was built to Specification O.8/38, and was powered with a Rolls-Royce Merlin VIII engine, a medium-supercharged unit rated at 1,010 h.p. at 6,750ft and giving 1,080 h.p. for take-off. It was put into production for the Fleet Air Arm and was ordered also for the Royal Naval Air Service of Denmark, to be built at the Royal Naval Dockyard, Copenhagen. The war, however, prevented the Danish scheme from being put into effect. The existence of the Fulmar was kept a close secret until it was mentioned in Parliament late in 1940. Of flush-riveted, stressed-skin construction, it had fabric-covered control surfaces, a wide-track, inward-retracting undercarriage, and folding wings. The radio operator/observer was seated far aft, under a flush transparent enclosure. Span was 40ft, length 40ft 6in, and height 14ft.

Fulmar II This mark of Fulmar was distinguished by a Merlin XXX engine, rated at 1,240 h.p. at 7,250ft, and by its tropical equipment. Gross weight was 9,672 lb. In all, 602 Fulmars, of both marks, were built. In his book *Find, Fix and Strike,* Terence Horsley writes of the Fulmar thus (and his opinions would be shared by most pilots of the type): "At the time when a decision had to be made there was insufficient evidence that the development of new navigational aids was far enough advanced to merit the risk of using a single-seat fighter. A second seat for a navigator was still the only certain way of bringing the fighter back in bad weather. While there was a probability that new devices which could be operated by the pilot would be sufficiently advanced in a few years' time, it would have been a sorry business had the single-seat fighter been chosen only to discover that, after all, the new equipment failed to live up to expectations. So the Fulmar was chosen, and there is little doubt that the choice was inevitable." He adds: "There was never anything wrong with the Fairey Fulmar. It was a fine aeroplane, manœuvrable, with a good take-off, a moderate climb, and plenty of endurance. It satisfied the demands for a navigator's seat and several wireless sets considered essential for Fleet work. It merely lacked the fighter's first essential quality—speed."

A Fulmar II, registered G-AIBE, bearing the Fairey works number F3707 and powered with a Rolls-Royce Merlin 30F engine, is still serving today as a communications aircraft and "hack" for its makers. This very handsome machine was exhibited at the Royal Aircraft Establishment, Farnborough, on the occasion of the recent Golden Jubilee.

Firefly F.1 The name Firefly was revived for a two-seat naval fighter, to succeed the Fulmar, built to Specification N.5/40. It was powered with the new Rolls-Royce Griffon engine and, like the Fulmar, was required to have forward-firing armament only. The first prototype was flown in December 1941. Fairey's own production totalled 297 and General Aircraft,

Fulmar.

Firefly I.

Ltd., built 132. The wings of the Firefly F.1 were folded manually and embodied retractable Youngman aerofoil flaps which could be swung down and set to "take-off," "cruising" or "landing" positions. The Griffon II engine drove a Rotol three-blade constant-speed airscrew and was fed from self-sealing tanks in the fuselage and auxiliary tanks in the leading edge of the centre section. Armament was four 20 mm British Hispano guns. Span 44ft 6in, length 37ft 7in.

Firefly F.R.1 This version carried ASH radar in a nacelle under its Griffon II or XII engine. In all, 376 F.R.1s were built.

Firefly T.1 (prototype).

Firefly F.R.4 (Top right).

Firefly N.F.2.

FAMILY OF FAIREYS . . .

Firefly N.F.1 Generally similar to the F.R.1, but with night-flying equipment (e.g., flame dampers) and other special installations.

Firefly F.1A This designation denoted the F.1 converted to F.R.1 standard by the fitting of ASH radar.

Firefly T.1 A conversion of the F.1 for operational training duties. The cockpits were so arranged that the rear seat (instructor's) was 12in above the level of the forward (pupil's). Provision was made for two wing-mounted 20 mm guns, though these were fitted in only nine of the thirty-four aircraft built. The T.1 was adopted by the Royal Navy as a deck-landing conversion trainer.

Firefly T.T.1 A target tug suitable for towing banner or sleeve targets for air-to-air or ground-to-air practice. The target was streamed on 7,000ft of cable from a windmill winch. Deliveries were made to Sweden and Denmark.

Firefly N.F.2 This was the first of the night fighter Fireflies, chronologically preceding the N.F.1. It had a longer fuselage and an A.I. radome was mounted close inboard on the leading edge of each wing. Provision was made for fighter/reconnaissance as well as night fighting equipment.

Firefly T.2 A weapons trainer, generally similar to the T.1, having a 20 mm gun in each wing and a gyro gun-sight in each cockpit. Under-wing provision was made for bombs, rockets or auxiliary tanks. Supplied to the Royal Navy.

Firefly F.3 This designation was to apply to a development of the Firefly F.1 having a Rolls-Royce Griffon engine of the 61 series, with revised cowling. A trial installation of such an engine was, in fact, made in a Firefly I.

Firefly T.3 A development of the F.R.1 (but without the raised rear cockpit) for the training of naval observers. The rear cockpit was equipped with a wide range of radio and radar.

Firefly F.R.4 This mark incorporated a number of important new features. Thus, the engine was a Rolls-Royce Griffon 74, cooled by radiators mounted on the inboard sections of the wing, forward of the leading edge, and driving a four-blade Rotol airscrew. The wing-tips were "clipped," the fin area increased, and provision was made for an auxiliary fuel tank beneath the port wing and a radar nacelle under the starboard wing. A built-in air-filtration system was brought into operation by the selection of "undercarriage down." In addition to the standard armament of four 20 mm guns, the Firefly F.R.4 carried the following alternative loads under each outer wing: one 45-gal tank, one 90-gal tank, 1,000 lb (or smaller) bomb, or eight 60 lb (or smaller) rocket projectiles. Variations of these loads were possible; thus, in addition to eight 25 lb rocket projectiles, two 500 lb bombs could be handled; alternatively, four 60 lb R.P.s could be carried in addition to two 90-gal tanks. The production version of the Mk 4 was 70 m.p.h. faster than the Mk 1 and 40 m.p.h. faster than the Mk 3, having a top speed at 14,000ft of 386 m.p.h. Climb to 10,000ft took 7 min 9 sec, and range, with standard tankage, was 735 miles. Span was 41ft 2in, length 37ft 11in, and normal all-up weight 13,450 lb. The prototype had old-type wings and tail.

Firefly N.F.4 Under this designation a number of F.R.4s were converted for night fighting.

Firefly T.T.4 With the addition of an M.L. winch under the centre section, the F.R.4 became a glider tug with the foregoing designation.

Firefly F.R.5 Externally there is little difference between this mark and the F.R.4, but there are changes in internal equipment.

Firefly N.F.5 In this version the basic radar and radio gear of the F.R.5 is retained. Additionally there is a radio altimeter and provision for a tail-warning device.

Firefly A.S.5 This variant has the same radio and radar installations as the F.R.5 but has provision for carrying sonobuoys beneath the wings and fuselage.

Firefly T.5 Under this designation a number of Firefly F.R.5s supplied to the Royal Australian Navy have been converted for training duties by the Fairey Aviation Co. of Australasia Pty., Ltd. Top speed is about 360 m.p.h.

Firefly A.S.6 Generally similar to the A.S.5 but without gun armament and equipped specifically for anti-submarine operations. Today this is the most prolific version.

Firefly A.S.7 This three-seat unarmed anti-submarine aircraft has a completely revised installation for the Rolls-Royce Griffon 59 engine. The most notable feature is the deep "beard" radiator. The long-span Mk 1 wings are reinstated and provision is made for three seats (the rear cockpit accommodates two radio operators), and for sonobuoys and other under-wing loads. The tail unit is completely redesigned. The Firefly A.S.7 was intended as an interim anti-submarine aircraft pending availability of the Gannet. Only a few were built.

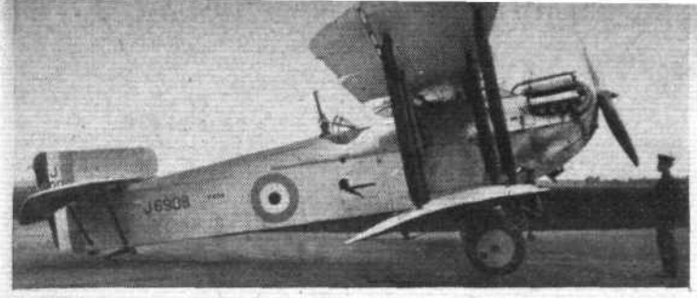
Firefly T.7 Similar to the A.S.7 but adapted for the training of observers. The deck-landing gear is deleted as the aircraft is intended for operation only from shore bases.

Firefly 8 A radio-controlled target drone aircraft, generally similar to the Mk 7. Machines of this type are being extensively used in connection with guided-missile tests. A radio-controlled automatic pilot, in conjunction with electric actuators for the throttle, airscrew, flaps and arrester hook, enable the machine to be operated without a human pilot. Fairings at the wing-tips house recording cameras.

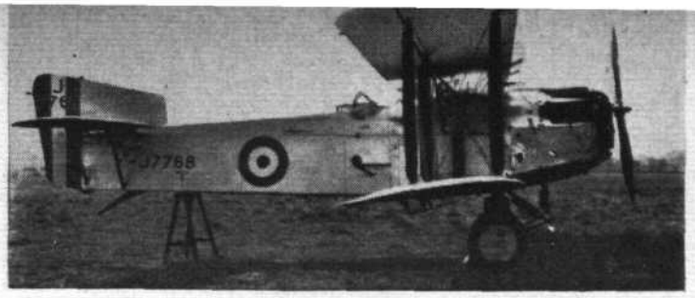
Firefly A.S.6.

Firefly T.7.

Firefly 8.



Fawn II.



Fawn III.

FAMILY OF FAIREYS . . .

DAY BOMBERS—AND DERIVATIVES

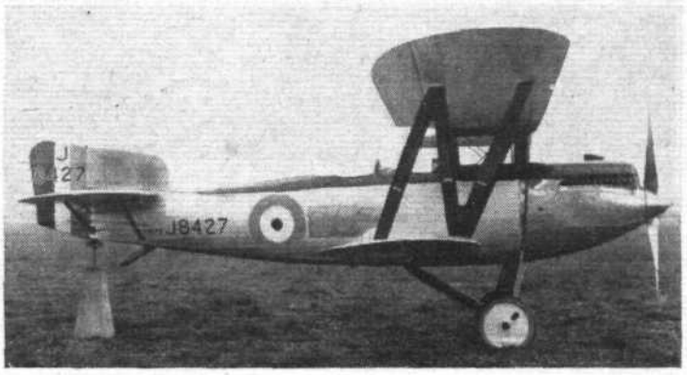
Fawn I Structurally and aerodynamically the Fawn (1923) was a landplane development of the Pintail, intended as a day bomber or long-reconnaissance aircraft. It was, in fact, designed as a replacement for the D.H.9A though, as Sir Richard Fairey himself has pointed out, the specification (D. of R. 3) asked for a speed 6 m.p.h. less. The engine was a Napier Lion II and the undercarriage resembled that of the Flycatcher. The two-bay wings were unstaggered.

Fawn II This was the R.A.F. production-type Fawn, with lengthened fuselage and Lion V engine. Gross weight was 5,870 lb, speed at 10,000ft 108 m.p.h., time of climb to 10,000ft 17½ min, service ceiling 13,850ft and endurance 5 hr. At one time lateral radiators were fitted, but a chin-type installation was standard. Massive fuel tanks were carried on the top wings. Fawns, with ladders attached, were used for parachute dropping at Henlow. Undercarriages and parts were built by Hawkers.

Fawn III Fairey records describe this machine as having the Napier Lioness experimental supercharged engine, but no photograph is available of a Fawn with this power plant, which was an inverted unit. That reproduced herewith shows a supercharged Lion driving an adjustable-pitch metal airscrew and having lateral radiators.

Fox I In 1923 Mr. Fairey saw Lt. David Rittenhouse, of the U.S. Navy, win the Schneider Cup in a Curtiss seaplane at a speed of 177.38 m.p.h. Greatly impressed, he took steps to secure British rights for the Curtiss D.12 engine, the wing radiator, Curtiss-Reed metal airscrews, and high-efficiency wing sections. These he applied to a single-bay biplane of original design and of extremely clean lines which emerged, early in 1926, as the Fox two-seater day bomber. It is necessary only to compare the photographs of the Fox I with those of the various Fawns to gauge the technical and military significance of the new design.

Sir Richard recalled this year that when work started on the Fox there was no more than £7,000 in the Fairey "kitty." This, he said, increased over a period to £23,000, but by the time the Fox had made good its promise (and, with increased wing area, had flown at 156 m.p.h.) all had gone. It was then that Lord Trenchard came to the rescue with a contract, and the circumstances of this have been told by Capt. Norman Macmillan, who tested the prototype. Lord Trenchard attended a demonstration at Andover, following which he walked with Macmillan to ask questions. Such were the answers that the great "Boom" returned to the tarmac and told Mr. Fairey that he had decided to order



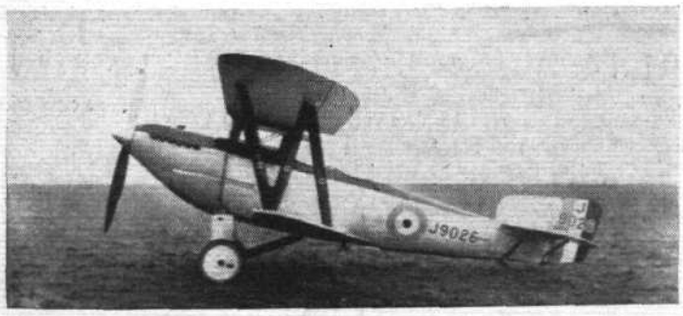
Fox I (D.12 engine).

enough Foxes to equip a squadron. The chosen unit was No. 12, based at Andover, and in subsequent exercises the Foxes of 12 Squadron repeatedly eluded opposing fighters.

The Fox owed its success not only to the features already mentioned, but to its small dimensions, light weight, submergence of all exterior fittings, the positioning of the fuselage relative to the wings, cockpit arrangement and absence of complicated fuel and other systems. Another factor was the provision of the Fairey "high-speed" gun mounting for the rear Lewis gun. The wings were of wood, with built-up box spars, and were covered with diagonally laid fabric. The tailplane also was of wood. Similarly, the rear fuselage was built of ash and spruce, and had swaged bracing rods. The central portion, however, was of metal construction, and to this the wings, engine bearer, rear fuselage and undercarriage were attached. In addition to the rear gun there was a Vickers firing through a trough in the port engine cowling. The D.12 engine gave the Fox a top speed of 153.5 m.p.h. at 6,500ft, 150 m.p.h. at 10,000ft, and 140 m.p.h. at 15,000ft. The 15,000ft level could be attained in 21½ min. The bomb load was two 230 lb or four 112 lb bombs. Span was 38ft, length 28ft 3in, and gross weight 4,120 lb.

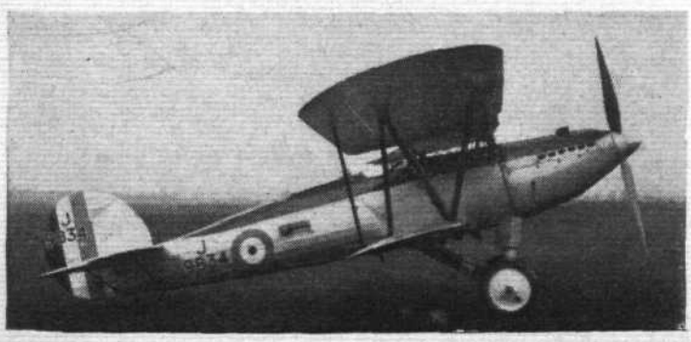
Fox Is were progressively re-engined with the Rolls-Royce F.XIB (Kestrel IB) unsupercharged engine, and one such machine was used for testing an experimental steam-cooling system with leading edge condenser. Some Foxes served out their time as trainers at Cranwell.

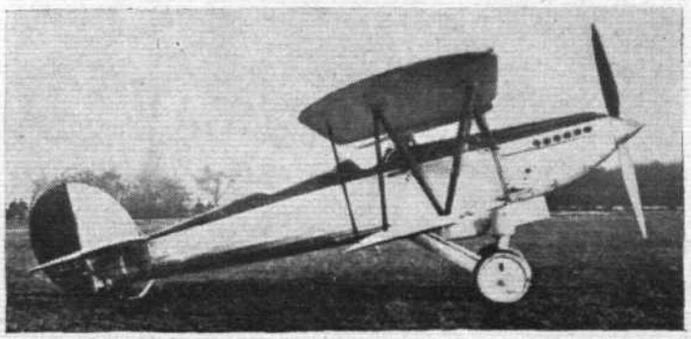
Fox IIM The second mark of Fox was a very different machine



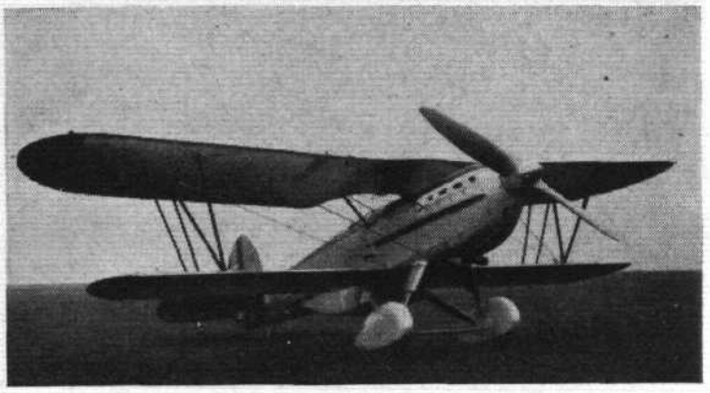
Above, Fox I (Kestrel). Below, Fox IIM (prototype).

Above, Fox I (steam-cooled Kestrel). Below, Fox IIM (Belgium).





Fox Trainer.



Fox VII (Mono Fox or Kangourou).

FAMILY OF FAIREYS . . .

from the first. Notably it was of all-metal construction, with a fuselage of steel tubes and wings having main spars of high-tensile steel strip drawn to double-lobe section and riveted to webs which were stabilized by angle plates. Armament and equipment was the same as that of the Fox I, the total military load being 1,087 lb. The engine was an unsupercharged Rolls-Royce F.XIB (Kestrel IB), which gave a top speed of 152 m.p.h. at 10,000ft, 145 m.p.h. at 15,000ft, and a time of climb to 15,000ft of 16¼ min. With the supercharged Kestrel IIS engine the Fox II was supplied to Belgium (where it was built by Avions Fairey), Peru and Switzerland. Supercharging greatly benefited performance; thus, top speed was 188.8 m.p.h. at 16,400ft and ceiling 28,860ft.

Fox IIIM Similar to the IIM, but with two fixed, forward-firing guns instead of one.

Fox Trainer Powered with an Armstrong Siddeley Serval radial engine of 360 h.p. and weighing 4,296 lb, this instructional version had a top speed of 138 m.p.h. The designation Mk III has also been applied to this type.

Fox IVM Similar to the Mk III, but with provision for a twin-float undercarriage.

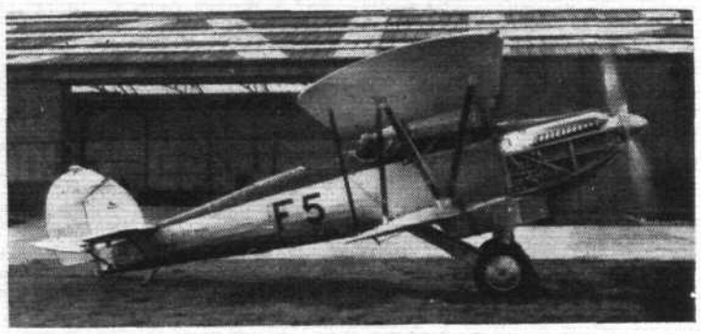
Fox VI Developed by Avions Fairey, this high-performance two-seater fighter/reconnaissance aircraft was powered with a Hispano-Suiza 12 Ydrs engine, had twin front guns, faired undercarriage, a cockpit enclosure, and numerous other refinements. The increased power enabled the machine to take off in 60 yd and to attain a speed of over 220 m.p.h. at 13,000ft. A height of 19,860ft was attained in well under 8½ min. Ninety-four aircraft of this type were built.

Fox VII A single-seat fighter development of the Fox by Avions Fairey, this was alternatively known as the Mono Fox or Kangourou. The last name arose from the location of a large ventral radiator well aft. Armament was six machine guns—four in the upper wings and two in the fuselage.

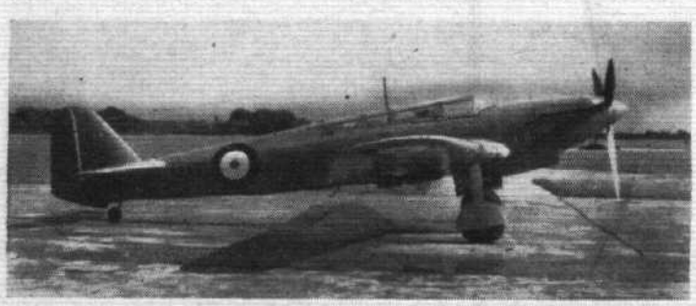
P.4/34 In every way a worthy successor to the Fox, this light day bomber, first flown in 1937, was of extremely clean design and of such high performance that, as earlier recounted, it was developed into a fighter. The first prototype had the Rolls-Royce Merlin I or II engine, and the second, on which were mounted experimental Fairey-Youngman flaps, had the Merlin X. The machine was stressed for dive bombing and carried a 500 lb load externally. Span was 47ft 4½in, length 40ft, weight empty 6,405 lb, gross weight 8,787 lb, top speed (Merlin II) 284 m.p.h. at 17,200ft, stalling speed 55 m.p.h., service ceiling 29,600ft, and range 1,000 miles.

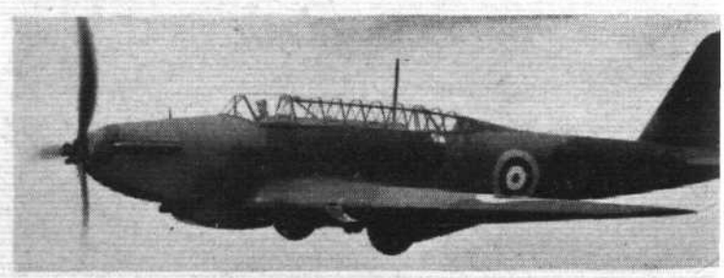
Battle The Battle was a two-seat medium bomber, built to Specification P.27/32 and was eventually produced, to a total of 2,419 aircraft, by Fairey and by car manufacturers participating in the "shadow factory" scheme. The wing was of two-spar construction, and though the spars were of girder type at the roots, they became flanged beams as they neared the wing-tips. Split trailing-edge flaps extended from aileron to aileron. The slender fuselage was of oval section and made in two portions; forward of the pilot's cockpit it was of tubular construction, but the rear part was a metal monocoque with Z-section stringers. The undercarriage was semi-retractable; the Rolls-Royce Merlin III engine was cooled by a ducted radiator; and the pilot had a single fixed Vickers gun. The observer had a Vickers gas-operated gun on a special Fairey mounting, and as a result of war experience a third gun was added to fire through the floor. Bombs of about 1,000 lb total weight were carried within the wing and dropped through trapdoors. Span was 54ft, length 52ft 2in, weight empty 6,647 lb, gross weight 10,790 lb, speed at sea level 210 m.p.h., speed at 15,000ft 257 m.p.h., climb to 15,000ft 13 min, service ceiling 25,000ft, and maximum range 1,000 miles.

During 1940, Battles were hotly engaged in bombing and reconnaissance work and figured in many gallant and bloody actions. Numerous examples were converted into trainers, with the designation Battle (T) and many of these had two separate cockpit enclosures. Others were adapted as target tugs, but the most interesting of all were those modified for testing new engines. Among these were machines with the Rolls-Royce Exe and Griffon, the Fairey P.24 (24-cylinder, double-banked, driving two three-blade coaxial airscrews independently), Wright Cyclone, Bristol Taurus and Hercules and Napier Dagger and Sabre. The P.24-engined Battle was shipped to America during 1939 after being extensively flown in this country.



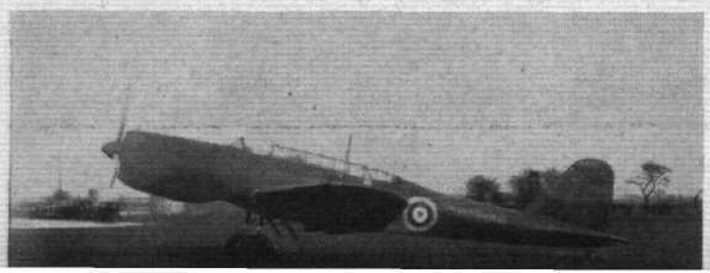
Fox (Fairey Prince engine).

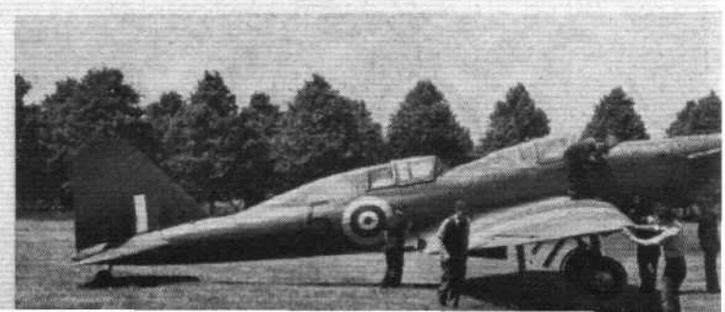


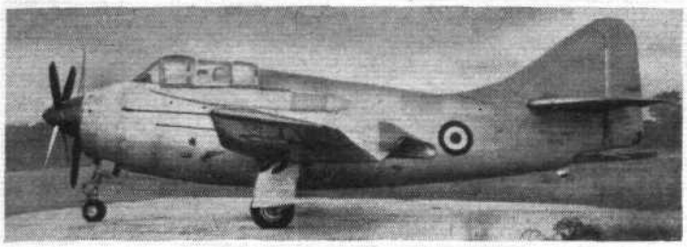


Above, P.4/34. Below, Battle test-bed for Napier Dagger engine.

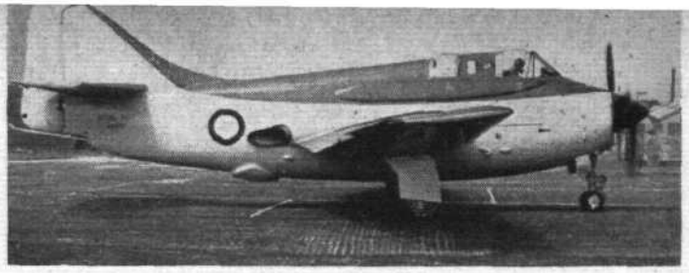
Above, Battle. Below, Battle Trainer.







GR.17 (first prototype).



GR.17/45 (second prototype).

GR.17/45 (Gannet A.S.1) third prototype.

ANTI-SUBMARINE SPECIALIST

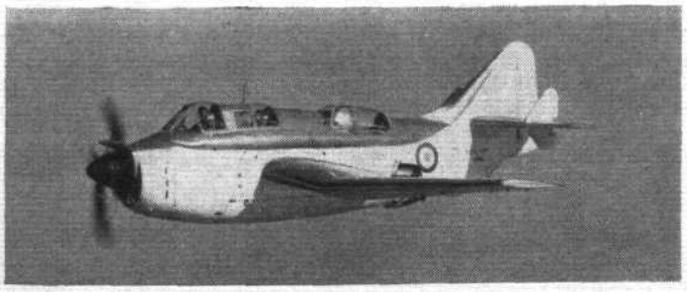
Gannet A.S.1 The Gannet three-seater, turbine-powered, carrier-borne anti-submarine aircraft, as now in squadron service with the Royal Navy (and on order for the Royal Australian Navy) is a much-developed version of prototypes built to the GR.17/45 specification. The company received a prototype contract on August 12th, 1946, and on September 19th, 1949, the first GR.17/45 was flight-tested by the company's chief test pilot, G/C. R. Gordon Slade, at Aldermaston. A company statement concerning the GR.17/45 runs: "It must be emphasized that this aircraft only vaguely resembled the present Fairey Gannet. During the course of the design, developments in armament, radar and operational techniques took place, and, as a result, the Naval Staff modified their thinking and asked for a three-seater version with altered armament and other changes. These changes were simulated in the third prototype, which flew on May 10th, 1951. Between these two dates intensive development and flying took place, and on June 19th, 1950, a prototype Fairey GR.17/45 was landed on the deck of H.M.S. *Illustrious*, at sea. On its first deck landing trials this machine made 27 take-offs and landings in one day under varying conditions of take-off distance, ship speed, and so on. This development work was continued and the three GR.17/45 prototypes made over 250 deck landings. In October 1953 this work culminated in the first production Gannet making a trouble-free series of intensive deck landings, a considerable number of these in poor weather and at night."

In amplification of the foregoing it may be remarked that the first prototype GR.17/45 was at one period fitted with a dummy rear cockpit. The second machine (VR557) was, like the first, a two-seater; but while the third (WE488) was under construction it was not known whether the radar operator would face forward or aft. The rear cockpit was, therefore, equipped with two seats to cover both possibilities. Another modification, introduced on the first prototype and succeeding machines, was the fitting of two auxiliary fin surfaces on the tailplane. This measure circumvented an increase in main-fin height.

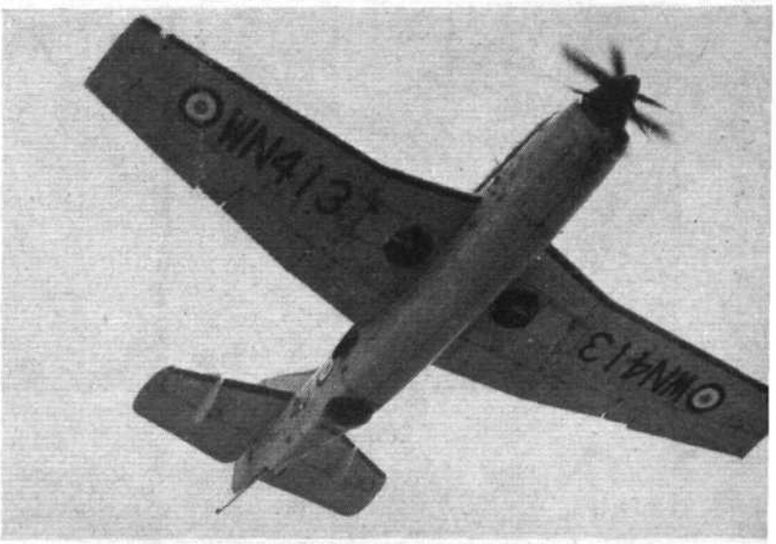
A key feature of the Gannet is the Armstrong Siddeley Double Mamba turboprop consisting (as did Fairey's P.24 piston engine of the pre-war years, experimentally flown in a Battle) of two independently operating units, driving independent airscrews. Thus, a Gannet pilot can command a power of the order of 3,000 h.p. for take-off and attack, and is able to cruise economically with one half of the engine shut down and its airscrew feathered. Should either half of the engine fail, the remaining half still gives sufficient power to return to base. The Double Mamba is installed beneath the pilot's cockpit, has a chin-type intake, and the outlet orifices are astern of the aftermost crew station. The reasons for the choice of the Double Mamba must go on record. First, it conformed to the Admiralty policy to avoid carrying petrol aboard aircraft carriers. The twin unit was selected in the knowledge that specific fuel consumption of a turboprop increases with throttling; and a further consideration was safety. Furthermore, as the Gannet would normally cruise with one half of the engine shut down, the life of the complete power plant would be prolonged. It was also appreciated that the low noise level would benefit operational efficiency, and that cumbrous flame damping would not be necessary as with highly boosted piston engines. In point of fact, no flame is visible from the rear of the Gannet at night. For tropical use water/methanol injection is being developed as standard.

The mid-mounted wing of the Gannet has a double fold, which enables the width, with wings folded, to be kept down to a figure of 13ft 9in. The height of the aircraft with wings spread is only half an inch more. The rotatable radome housing can be mechanically lowered, for anti-submarine search, astern of the rear cockpit, but is normally retracted into the fuselage. Attack weapons, including, it may be presumed, homing torpedoes, are stowed within the very capacious weapons bay, and provision is made for sonobuoys or other stores beneath the wings. Equipment is provided for accelerator launching, and the deck-arrester hook is of the sting type. A structural description is not permissible, but it can be said that the aircraft is built according to the new Fairey method of "envelope jigging."

Span is 54ft 4in and length 43ft. All-up weight is more than twice that of the Swordfish.

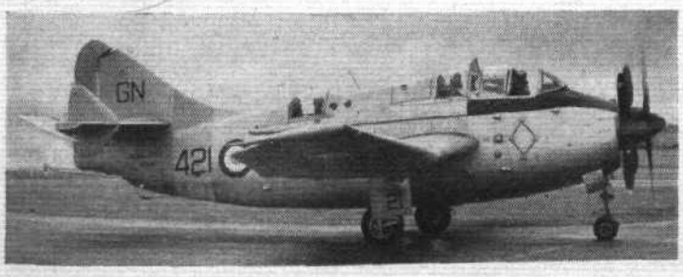


GR.17/45 (Gannet A.S.1) third prototype, with auxiliary fins.



Gannet A.S.1—a recent production aircraft.

Gannet T.2.



Gannet T2. This is a specially developed version to provide advanced training for Gannet crews in weapon- and engine-handling. The pupil is in the foremost seat, with the instructor in the No. 2 cockpit, wherein all pilot controls are duplicated. In the Gannet A.S.1 this second cockpit is normally occupied by the observer/navigator. For communications work the No. 3 cockpit is adaptable to carry either a radio operator or two passengers.

Gyrodyne.

Jet Gyrodyne.

FAMILY OF FAIREYS . . .

ROTARY WINGS

Gyrodyne Fairey's entry into the rotary-wing field was marked by the first flight of the Gyrodyne on December 7th, 1947. This was a high performance 4/5-seater, designed along novel lines, and on June 28th, 1948, flown by S/L. Basil Arkell, it established a helicopter speed record of 124.3 m.p.h. Powered with an Alvis Leonides engine, the Gyrodyne had no anti-torque rotor, but instead a two-blade airscrew was mounted at the end of the starboard stub-wing. This same screw enabled the machine to be flown as an Autogiro and, as the main blades were always within the auto-rotative pitch range, engine failure would not entail rapid action on the pilot's part. The first prototype was destroyed in an accident and the second was converted to the Jet Gyrodyne (see below). Rotor diameter of the Gyrodyne was 52ft, empty weight 3,450 lb, gross weight 4,800 lb.

Jet Gyrodyne This conversion of the second Gyrodyne has been built to investigate problems associated with tip-jet propulsion. The original three-blade rotor has given place to a large two-blade structure, and the Leonides engine drives compressors which supply air through the hollow metal blades to Fairey pressure-jets at the tips. For cruising, the greater part of the power is transferred to two pusher airscrews at the tips of the stub wings.

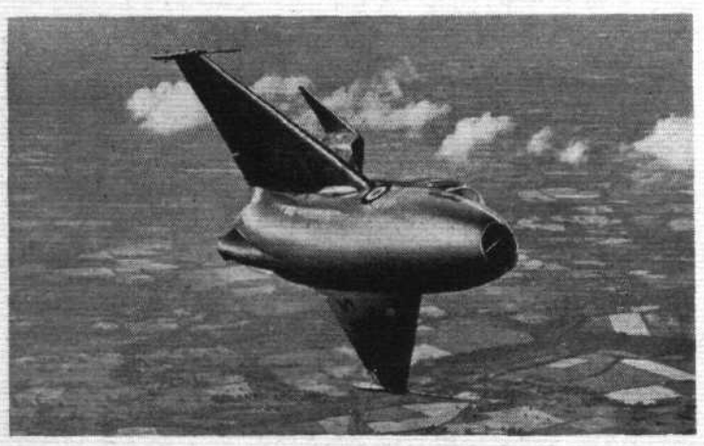
Rotodyne The Rotodyne is expected to offer "a direct transportation challenge to the Douglas Dakota." Two prototypes are under construction and each will be powered by two Napier Elands. The single rotor will be of 90ft diameter and have four blades with Fairey pressure-jet units. The fixed wing will be of 47ft span, economical speed at least 150 m.p.h., and still-air range about 250 nautical miles. It should be possible to maintain height at maximum weight with one engine stopped.

Model of Rotodyne.

DELTAS FOR RESEARCH

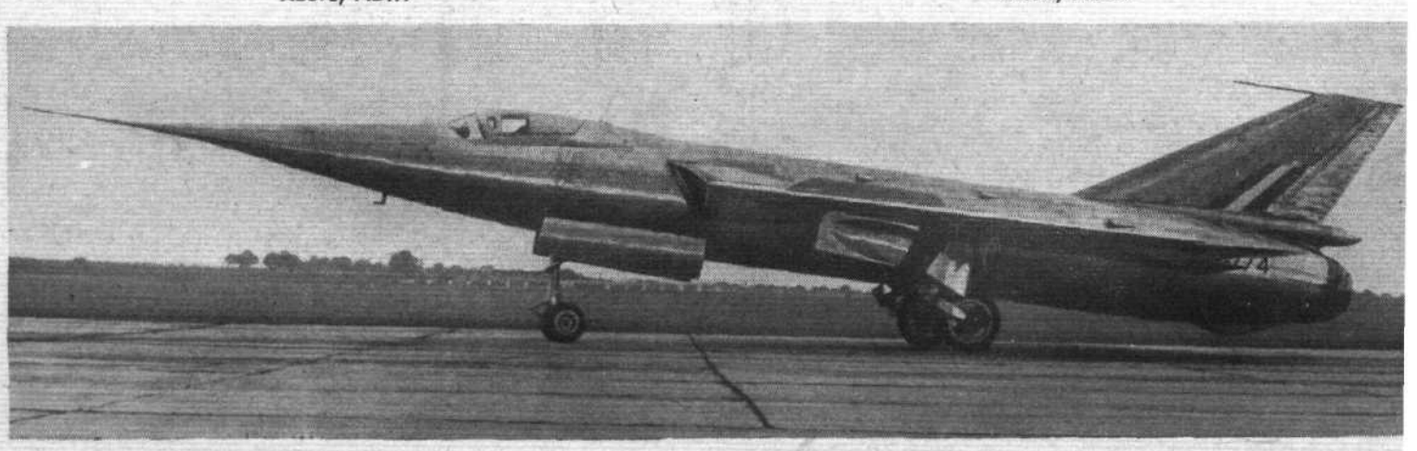
F.D.1 This tiny delta, first flown at Boscombe Down on March 12th, 1951, by G/C. R. Gordon Slade, was built to investigate the possibilities of V.T.O. fighters, though the F.D.1 itself has a retractable-wheel undercarriage. Powered with a single Rolls-Royce Derwent engine, it has provision also for rocket power, though this has never been fitted. A tailplane is carried on top of the large fin; elevons and air brakes are mounted on the wing; there is a drogue parachute to reduce landing speed; and provision for anti-spin parachutes at the wing-tips. An extremely high rate of roll is attained, due in part to the span of only 19ft 6½in. Length is 26ft. 3 in. On page 119 is a picture of the Fairey V.T.O. model, in all essentials a replica of the F.D.1. Power is supplied by two chambers of a Fairey Beta I liquid-fuel rocket unit.

F.D.2 Another research delta, though differing sharply in layout from the F.D.1, this machine has no tailplane, has a fuselage of extremely fine aerodynamic form, and is powered with a Rolls-Royce Avon turbojet with provision for reheat. Remarkable are the hinged nose (by means of which the pilot is assured of a good forward view for take-off, landing and taxying) and the retraction of the wheels into the extremely thin wing. The F.D.2 is capable of high supersonic speeds and at the moment is almost ready to fly again after an emergency landing by its pilot, Mr. Peter Twiss, at Boscombe Down in October last year.



Above, F.D.1.

Below, F.D.2.



This smartly styled DC-3, pictured last week on a morning flight from the Channel Isles to its home base at Croydon, is one of ten operated by Transair, Ltd. The aircraft are employed largely on inclusive-tour flights (as 32-seaters) and on scheduled newspaper services to the Continent. Transair have ordered two Viscount 800s for delivery in 1957.

"Flight" photograph

CIVIL AVIATION

GOOD FIRST QUARTER FOR B.O.A.C.

AT the end of last week Sir Miles Thomas, speaking to overseas travel agents in London, indicated that B.O.A.C.'s profits for the first three months of the current financial year (which began on April 1st) were £158,000 better than for the corresponding period last year. This, he said, was due in part to the increased fleet of aircraft which was now available.

B.O.A.C.'s chairman took the opportunity of commenting on the "restricted hotel accommodation in Britain." This was particularly true of London, he said, where the lack of suitable accommodation for visitors was handicapping B.O.A.C. and other travel organizations.

CYPRUS TROOPING CONTRACT

THE firm of Skyways, Ltd., whose successful "Colonial coach" service to Cyprus is flown by Yorks, has been awarded an important Air Ministry contract to transport troops and their families to Cyprus in Hermes aircraft. At least 12,000 people will be carried in the 12-month period, and the contract is valued at over half a million pounds. The route to be followed will be different from that for the Crusader service which operates through Malta. The trooping aircraft will take off from Stansted and call at Rome and Nicosia. Operations are to begin on August 1st.

Since they began their trooping operations, Skyways have carried more than 100,000 Servicemen and their relatives to various places in the Middle East, Africa and Far East.

Satisfactory though the new Cyprus contract is, it seems unfortunate that work of this sort can be given for only 12 months; the contract is described as renewable after the first period. Skyways have also made application for an increase in the frequency of their Crusader service to Cyprus.

U.K. TRAFFIC STATISTICS

STATISTICS covering the operations of the Corporations and their Associates during the financial year 1954-55 (which ended on March 31st last) were issued last week-end by the Ministry of Transport and Civil Aviation.

United Kingdom airlines provided 325 million ton-miles on their scheduled services, an increase of 6 per cent over the previous year, and total traffic rose by 5 per cent to 207 million revenue ton-miles. Passengers carried numbered 2,501,000—a 14 per cent increase—and they flew 1,537 million passenger miles (6 per cent increase). Freight ton-miles increased by 11 per cent, and mail ton-miles by 2 per cent.

The grounding of Comets and the withdrawal of B.O.A.C. from the South American routes accounts for the relatively small increase of capacity and traffic overall, particularly so far as B.O.A.C. is concerned. The total traffic carried by B.O.A.C. fell by 2 per cent, but a 10 per cent increase in utilization of aircraft, resulting in an average of 2,595 hours per annum, enabled the Corporation to limit the fall in capacity. On its Eastern routes, B.O.A.C. carried 4 per cent more traffic, and the increase in freight on these routes was 10 per cent. The total of passengers carried was 281,000.

B.E.A. were able to offer 20 per cent more capacity on their international services and 10 per cent on their domestic services, and this was accompanied by a reduction of 8 per cent in hours flown and 3 per cent in miles flown. These figures are largely a result of replacement of Vikings and Dakotas by Viscounts and Elizabethans. Total traffic carried rose by 19 per cent, and passengers numbered 1,874,000. Freight traffic increased by 14 per cent, and mail by 12 per cent, and the overall load-factor went up from 64 per cent to 65 per cent.

For the independent airlines the increase of capacity was 40 per cent, and of total traffic carried 39 per cent. Scheduled services were introduced on 8,000 miles of new routes, and associated services were operated over a network of 26,000 miles. Passengers numbered 345,000, a 41 per cent increase, and freight traffic was up by 13 per cent.

NATIONAL AIRLINES EXPANSION PROGRAMME

NATIONAL AIRLINES have adopted a four-year development programme, a first step in which will be the purchase of both turboprop and turbojet aircraft. The president, Mr. G. Baker, declined to indicate the number or type of the new aircraft, but he said that the expansion programme would cost $95,000,000 (£33,900,000). This figure will include new office buildings and maintenance facilities.

In America, not unnaturally, the DC-8 is being discussed as the probable turbojet aircraft for National, and it has been announced that several more DC-7s will also be bought.

ENGLISH-ENGINED ELECTRA?

ON Monday of this week two of the principal executives of Lockheed, Robert E. Gross (president) and Hall L. Hibbard (vice-president, engineering) announced in London that they had completed a tour of British sources of turboprops suitable for the forthcoming Electra transport (page 116).

After visiting Bristols, Napiers and Rolls-Royce, Mr. Gross said: "It has been a most interesting week. We would like to be able to offer our new Electra with a choice of powerplant, British or American. Time-phasing is an all-important factor and we have been inquiring into possibilities.

"We at Burbank believe in reciprocal trade and we believe strongly in it. This country has been very kind to us at Lockheed. They have supported us and encouraged us over the years and if we can reciprocate that support by offering a British engine in the Electra, we would find it most gratifying."

CEYLONESE AIRLINE PLANS

REOPENING of international air services from Ceylon may result from recent discussions in Colombo between the local civil aviation authorities and executives of three rival airlines—B.O.A.C., K.L.M. and T.W.A. The national airline, Air Ceylon, operated a scheduled service between London and Sydney *via* Colombo from 1950 to 1953, using two DC-4s provided by Australian National Airways (part-owners of Air Ceylon). The service was suspended some two years ago for three reasons: heavy losses, lack of traffic and the DC-4s' inability to compete with aircraft of the larger airlines—particularly B.O.A.C.'s Comets, which were then flying between London and Colombo.

According to a report from Colombo, the agreement permitting a foreign airline to operate the Ceylonese international services will include the following conditions: "(1) All available Ceylonese aviation personnel and engineers to be employed by the airline accepting the offer; (2) The airline concerned can operate under

CIVIL AVIATION. . .

its own name along the routes obtained under the agreement, providing it pays landing, parking and hangar charges; (3) The financial basis of the agreement will be on a "division of revenue" basis and not on a commission basis. This will cover profits derived from both passenger and freight traffic; (4) The right to possess 51 per cent of the shares to be retained by the Ceylon Government, if and when it decides to do so."

The proposed service will extend from Tokyo to London *via* Colombo, with a branch route to Melbourne and Sydney. There will also be a South-East Asian service, originating from Colombo and operating *via* Calcutta, Rangoon, Bangkok and Singapore.

LUGGAGE IN THE CABIN

SEVERAL airlines now favour the practice of permitting passengers to carry with them on to their aircraft luggage which would normally be stowed in baggage holds, thereby reducing both journey time and aircraft turn-round time. As yet, however, comparatively few airliners have the requisite cabin stowage space; Lufthansa's Convair 340s are the first European-operated airliners to feature a "carry-on" luggage bay, and the Viscounts for Capital Airlines will be the first British-made aircraft to be so equipped.

American Airlines are making use of the space—measuring 21in × 13in × 8in—beneath the seats of their DC-6s and 7s. To enable passengers to check whether their baggage will fit into this space, "carry-on testers" of similar proportions have been installed at all A.A.'s ticket counters. If the bag fits it is marked with a seal obviating the necessity for future testing.

M. Anselme Vernieuwe.

SABENA APPOINTMENTS

A LEADING personality in Belgian civil aviation is M. Anselme Vernieuwe, central figure in the recent reorganization of Sabena's commercial and operations direction. While retaining his control of operational matters, M. Vernieuwe has also taken charge of the company's commercial activities. In his new responsibilities he will be assisted by M. Valentin Pacco, director of sales, and M. Marc Stainier, the new director of operations. All three executives flew as pilots on war-time operations with the R.A.F. M. Vernieuwe, who flew Lancasters, joined Sabena after the war and was instrumental in inaugurating the company's transatlantic services. He regularly flies all types of aircraft including the company's S-55s; he was the first licensed helicopter pilot in Belgium.

CHANGES AT WOLVERHAMPTON

FORMERLY divided between Wolverhampton and Derby, all maintenance, repair and operational activities of the Air School's Group are now to be centred at Derby. The reorganization will be completed on August 14th with the closing of the flying school and club at Wolverhampton. The latter airport will in future be managed by Don Everall Aviation, Ltd., though Dakotas and Rapides of Derby Aviation, operating scheduled services to Jersey, will continue to call there; other points on this route are Nottingham, Derby and Elmdon, Birmingham, where Derby Aviation have recently opened a new passenger and freight office.

NEW SERVICES APPROVED

THE M.T.C.A. announce Ministerial approval, after consideration of the Air Transport Advisory Council's recommendations, of the following scheduled air services:—

Air Kruise (Kent) Ltd.—An inclusive tour between Lydd-Hamburg (technical stop)-Copenhagen until September 30th, 1955.

Hunting-Clan Air Transport, Ltd.—Inclusive tours between London Airport and Dublin (until August 27th, 1955) and London and Bilbao (until September 30th, 1955).

Starways, Ltd.—An internal service between Liverpool (Speke) and the Isle of Wight (Bembridge) *via* London Airport until October 31st, 1961; an inclusive tour between Liverpool (Speke) and Exeter until October 31st, 1955.

Transair, Ltd.—Inclusive tours between London (Croydon or Gatwick) and Hamburg and London and Basle until September 30th, 1955.

BREVITIES

IN a statement amplifying the recent announcement of Mr. C. O. Turner's appointment as general manager and chief executive of Qantas Empire Airways, Sir Hudson Fysh emphasizes that he (Sir Hudson) has not retired from full time work for the airline. The rapid growth of the company, he said, made it necessary for the position of managing director to be dispensed with and the accompanying function of chief executive to be established as a separate appointment; Sir Hudson will carry on as full-time chairman of the board with appropriate responsibility for policy matters.

* * *

Kuwait National Airways announce a change of name, effective from July 1st, to Kuwait Airways.

* * *

Propellers approved for use on civil aircraft are listed in *Notices to Licensed Aircraft Engineers and to Owners of Civil Aircraft*, No. 4, issue 17, published by the A.R.B. on July 1st.

* * *

The seventh T.A.A. Viscount, VH-TVG, will be named *William Hovell* after a British sea captain who explored Australia in the early part of the nineteenth century. Registrations of the new three T.A.A. Viscounts will be VH-TVH, VI and VJ, but names have not yet been chosen.

* * *

From August 7th the Civil Aviation Flying Unit at Stansted will use Doves for all instrument-rating-renewal flight tests. Consuls will continue to be used for initial instrument-rating tests until October, when it is expected that these checks will also be carried out with Doves.

* * *

Occupation of B.O.A.C's new headquarters at London Airport neared completion on July 11th, when Sir Miles Thomas and other senior executives of the Corporation moved there from Airways House, Brentford. All B.O.A.C.'s London activities, other than city-centre ticket and terminal facilities, are being concentrated in the new H.Q., which can house 4,000 employees —nearly a quarter of the Corporation's total world staff.

* * *

T.W.A. have applied to the Civil Aeronautics Board for an extension of their present routes from Bombay and Colombo to Manila *via* Bangkok. The airline points out that approval would mean additional traffic for the other U.S. flag carriers, since T.W.A. would connect with North West Airlines at Manila (providing, in effect, a round-the-world route) and with Pan American at Bangkok, where passengers would be able to transfer for flights to Tokyo and Hongkong.

* * *

Some 50,000 passengers were carried on T.C.A. Viscounts in the three-month period following the introduction of the aircraft to scheduled services on April 1st this year. During that period the Canadian Viscounts flew at a passenger load factor of 81.5 per cent, compared with 72.6 per cent on all other T.C.A. flights. On the Toronto to New York route the number of Viscount passengers during the period was 30,378—a 32.6 per cent increase over the number carried in the corresponding quarter of 1954.

Pictured at Blackbushe, by the steps of his Viking, VK500, is King Hussein of Jordan; the King is, incidentally, a qualified pilot. With him are (left) Col. J. Dalgleish and (centre) Mr. P.C.F. Morgan, managing director of Eagle Aircraft Services, Ltd. The Royal Viking was supplied to the Arab Legion Air Force by E.A.S, who maintain the aircraft on its visits to this country.

The president of United Air Lines, Mr. W. A. Patterson, has said that his company expects to have at least 20 jet airliners in service by 1960. Earlier reports had linked the name of United with the proposed DC-8, but the latest Patterson statement implies that an order for the Boeing 707 is likely—provided that the U.S.A.F. would permit Boeing to build military and civil versions simultaneously.

* * *

Ferryfield, the privately owned Silver City Airways terminal at Lydd, Kent, completed its first year of operations on July 13th. Traffic handled there during the year included 88,621 passengers and 54,032 vehicles—figures which are expected to be exceeded by nearly 100 per cent in the second year. Silver City Airways claim that Ferryfield "without doubt handles more freight than any other airport in the world."

* * *

The Civil Aeronautics Board have revoked the operating authority of North American Airlines with effect from September 15th. For several months this company has been making frequent transcontinental flights with high-density DC-6Bs at fares well below those charged by the regular, certificated carriers. The C.A.B. said that North American Airlines had "deliberately embarked upon an involved scheme to operate a regular scheduled transcontinental air transport business without a certificate of public convenience and necessity or other appropriate operating authority."

Swissair announce the appointment of Mr. John Elliott as their Press representative in the United Kingdom. Mr. James Walker, who has previously handled both Press and public relations activities for the airline in this country, remains in charge of public relations.

* * *

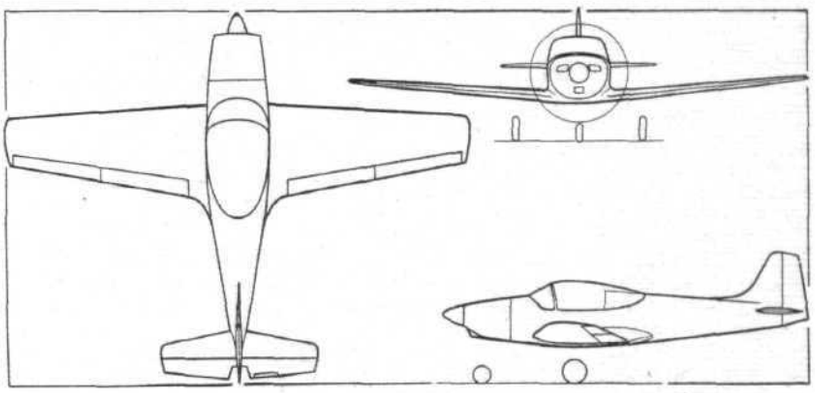
In a recent news-item concerning the experimental turboprop Elizabethans we quoted figures from the *B.E.A. Magazine*, which credited the Napier Eland El.4 with a take-off output of 3,765 e.h.p. We now learn from D. Napier and Son, Ltd., that the figure 3,765 refers to the shaft horse-power rating of the El.4; the corresponding e.h.p. rating (which takes into account static thrust from the jet pipe) is 4,000. A later version, the El.5, will deliver 4,200 e.h.p. at take-off.

* * *

T.W.A. announce the completion of a five-year programme of modifying all their 32 Constellation 049s to 81-seat tourist configuration. A second modification now in progress at the airline's Kansas City overhaul base, involves restyling the interiors of T.W.A.'s 12 L.749s; seating capacity is being reduced from 57 to 55 and furnishing is being altered to match that of the 20 new L.1049Gs now going into service. Operating more Constellations than any other airline, T.W.A. also have ten L.1049s and the 27 L.749As used on international services. In addition to the 101-strong Constellation-series fleet, T.W.A. operate 50 Martin 4-0-4s.

LIGHT AIRCRAFT IN THE NEWS

Italian and Japanese Newcomers



The three-view drawing shows the clean lines of the little Italian F.8 Falco two-seater described below.

THE latest design by the Italian engineer Stelio Frati is the F.8 Falco, which made its first flight on June 15th. A side-by-side two-seat, low-wing monoplane with retractable tricycle undercarriage, it is powered by a Continental 90 h.p. engine.

According to a makers' specification, its performance is high considering its power; and it is fully aerobatic. It is of all-wood construction, with plywood skin. The undercarriage retraction mechanism is mechanical, the nosewheel steerable, and flaps are mechanically set to either 15 deg for take-off or 45 deg for landing. Just over 19 gal of fuel are carried in a tank located in front of the cockpit and immediately behind the engine fire-wall. Back-type parachutes are provided for in the seating arrangements and, to facilitate escape with the aircraft in any attitude, the single-piece tear-drop canopy slides rearwards.

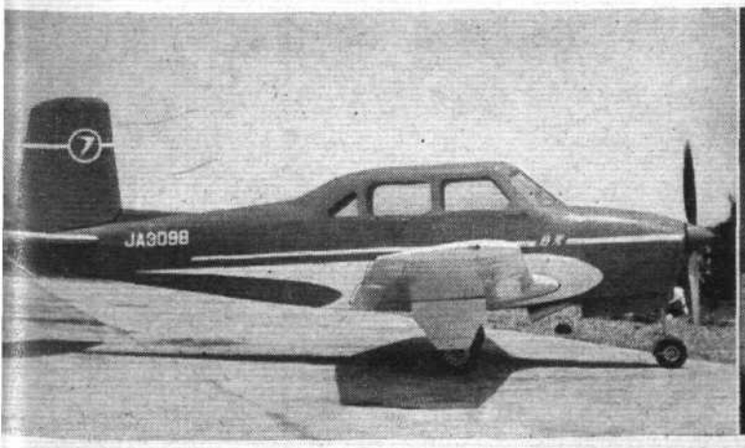
As the photographs show, the Falco's lines are very clean. The wing has two main wooden box-spars and a false third spar carrying aileron and flap hinges; both these latter surfaces are plywood-covered. The wing and the forward fuselage form an integral unit to which the rear fuselage, with its integral tail surfaces, is bolted. Tailplane and fin are both two-spar units carrying fabric-covered elevator and rudder. The fuselage and fixed tail surfaces, also, are plywood-covered.

Equipment includes primary blind-flying instruments and a variometer, grouped to the left of the panel, with V.H.F. radio to the right and a magnetic compass on the central windscreen pillar. Throttle, mixture control, carburettor hot-air selector and cabin-heat-control are positioned centrally below the panel. Undercarriage handle and flap and hydraulic wheel-brake levers are between the two seats, while the trim wheel is to the left. A baggage locker is provided behind the pilots' seats.

The wing aerofoil section is a laminar-flow N.A.C.A. profile with the maximum thickness at approximately 40 per cent chord. Thickness/chord ratio is 12.5 per cent at the root and 10 per cent at the tip with a washout of 3 deg.

Maximum speed of the F.8 at sea level is 180 m.p.h., stalling speed 46 m.p.h., and ceiling 15,500ft. Take-off and landing runs are approximately 150 yd and 100 yd respectively with a maximum all-up weight of 1,415 lb. Span, length and height are respectively 25ft 8in, 21ft, and 7ft; and wing area is 107.5 sq ft.

Japan's first post-war liaison aircraft (left) is the Fuji LM-1, derived from the Beech Mentor. (Right) The Falco, described above.



SERVICE AVIATION

Royal Air Force and Fleet Air Arm News

Queen Mother at Hawkinge

FLYING by helicopter from Buckingham Palace, the Queen Mother, accompanied by Air Chief Commandant the Duchess of Gloucester, last week visited the W.R.A.F. Depot at Hawkinge. She was received by the Lord Lieutenant of Kent, Lord Cornwallis, Air Marshal Sir Victor Groom, A.O.C.-in-C. Technical Training Command, and G/Off. M. H. Barrett, Station Commander.

During the visit the Queen Mother inspected a parade and watched displays of parachute packing, photographic processing, flight information and planning, and physical training.

The Chief of the Air Staff

IT is announced that the Queen has approved the extension of the appointment of Marshal of the Royal Air Force Sir William F. Dickson, G.C.B., K.B.E., D.S.O., A.F.C., as Chief of the Air Staff until December 31st, 1956.

No. 26 Squadron Standard

AFTER visiting the 8th K.R.I.H. at Luneberg last week, the Duke of Edinburgh flew his Heron over to Oldenburg on July 12th to present a Standard to No. 26 Squadron (S/L. J. A. G. Jackson, D.F.C., A.F.C.). He was received by Air Marshal Sir Harry Broadhurst, C-in-C. 2nd T.A.F., and the Station Commander, G/C. D. C. Stapleton.

After the parade the Hunters flew over in formation and the Duke tried out the 30 mm Aden guns in the butts. The Duke's departure was the occasion of the first royal escort by Hunters, which went with him as far as the Dutch frontier.

The C.F.S. Reunion

LAST Friday evening, at C.F.S.'s present home at Little Rissington, Glos, the Central Flying School Association held its 43rd anniversary reunion dinner.

This function loses nothing of its outstanding character as the years go by, and it is quite surprising how many of the very early members still make the annual pilgrimage—often flying in the face of medical and other advice so to do. An absentee much missed was Lord Trenchard; the president, Air Marshal Sir John A. E. Baldwin, in proposing the toast of "The Association," explained that "Boom" had had to go to hospital for treatment of a minor ailment. A message had been sent wishing him "a speedy return to full voice" and looking forward to his turning up at the 44th reunion.

In beginning his reply to Sir John's toast, the Commandant, A. Cdre. G. J. C. Paul, D.F.C., gave a genial welcome to all past members, saying that the reunion had now become the climax of the C.F.S. year and was much looked forward to. In his report he referred first to the Harvard's going out of service, paying tribute to the quality of the aircraft and comparing it with perhaps the most famous trainer of all time, the Avro 504. The School was, he said, now happy with the Provost and Vampire, and he had a word to say on the possibility of a jet basic trainer. During the past year, also, the School had been operating helicopters. He broke the news that W/C. Dodd, late C.F.I. at Little Rissington, had been selected to command the first Vulcan O.C.U.

Giving some figures, A. Cdre. Paul said that over the last twelve months the Examining Wing had visited 29 different countries ("all intentionally"), and the School had turned out 310 instructors and 16 helicopter pilots, and had flown 1,800 members of the A.T.C. and C.C.F. During the same period there had been five A.F.C.s., one A.F.M., one M.B.E., one B.E.M., nine Queen's Commendations and five commendations from the C-in-C.

The Commandant finished his speech by referring to C.F.S. as the one place in the R.A.F. devoted to an art and men; "the flying instructor," he said, "has more influence on the future of men in the R.A.F., in a missionary kind of way, than has anyone else."

The Chief of the Air Staff, Sir William F. Dickson, who at short notice had taken Lord Trenchard's place, spoke of "the thrill of having anything to do with C.F.S.," and referred to the School as the heart of flying. He expressed his regret at Lord Trenchard's absence and impressed upon the company how very diligently the "Father of the R.A.F." still kept in touch with the broad issues of the Service. "He insists," said Sir William, "that the current Chief of the Air Staff should report to him at least once every week."

In reference to the coming press-button age Sir William said that manned flying would go on for a very long time and that he could assure his listeners that they would be just as important in the future as in the past. Of helicopters he observed that he was not against them, but "money could only be spent once." Helicopters were, he said, noisy beasts. Two more points from his speech were that the Jet Provost looked to be the right pattern for the future and that Hunters would shortly be going to C.F.S.

The Duke of Edinburgh presents the Standard to No. 26 (Fighter) Squadron at Oldenberg; the bearer is F/L. D. A. V. Clark.

Queen Elizabeth the Queen Mother inspecting a parade during her visit to Hawkinge last week.

M.E.A.F. Re-organization

CHANGES in the Command structure of the Middle East Air Force are taking place due to the redeployment of R.A.F. forces in the Middle East in accordance with Britain's agreements with Egypt and Iraq. The Command is to be divided into two regional groups subordinate to the Headquarters in Cyprus of Air Marshal Sir Claude Pelly, its Commander-in-Chief.

One group, Air Headquarters Levant, which is to be responsible for the northern areas of the Command, will have its headquarters at Nicosia in Cyprus, and Headquarters British Forces, Aden, will continue to control R.A.F. units in the southern part of the Command—in Aden Colony and Protectorate, along the South Arabian coast, in Kenya and the Sudan. To the southern group's area of responsibilities has now been added the Persian Gulf staging posts of Bahrein and Sharjah, previously under the control of the Air Officer Commanding, Iraq.

Following its progressive transfer to Cyprus, Air Headquarters Levant will, by

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the middle of next year, absorb the present Air Headquarters there and control R.A.F. units in Iraq, Jordan, Cyprus and Libya. It will also be responsible for R.A.F. interests in Egypt when withdrawal from the Canal Zone is complete. Headquarters, No. 205 Group, now in charge of the run-down programme in the Zone, will then be disbanded.

The final R.A.F. nucleus in Iraq will include a small headquarters element overseeing R.A.F. technicians remaining there, and controlling R.A.F. operational units visiting Iraq under agreement. It will also have a mandate for R.A.F. aspects of joint training and planning with the Royal Iraqi Air Force, and the build-up of R.A.F. forces in war as provided for by the Agreement.

This regrouping of Middle East Air Force responsibilities will have the effect of placing under one command the predominantly "air control" areas of the southern part of the Command. Additionally it will bring under one command those airfields in the northern area which would form the axis of re-inforcement in the Middle East in time of war.

Sword of Honour for Henlow

THE Air Council have approved the annual award of a Sword of Honour to the Technical Cadet of each Senior Entry at the Royal Air Force Technical College, Henlow, Beds., who, on passing out, is recommended as having distinguished himself in study, sport and general influence while at the College. The sword will be retained by the winning Cadet, whose name will be engraved on the blade.

The first presentation of the Sword of Honour will be made to the winning cadet of the 1952 Entry, which passes out at a ceremonial parade at the College on July 22nd. The reviewing officer at this parade will be Air Chief Marshal Sir John W. Baker, Controller of Aircraft, Ministry of Supply.

This award brings the R.A.F. Technical College in line with the Royal Air Force College, Cranwell, where for many years a Sword of Honour has been awarded to the best all-round flight cadet of each entry.

Aden re-inforcements from the Canal Zone. (Top) A Daimler scout car of the Life Guards awaiting loading into a Hastings. (Lower) Land-Rovers and trailers belonging to the 1st Battalion Seaforth Highlanders packed ready for transport by Valetta aircraft.

Half-yearly Promotions

BELOW is concluded from page 104 the half-yearly list of promotions.

Flight Lieutenant to Squadron Leader: A. R. Gordon-Cumming (sen. 1st Jan. 1955); M. T. H. Adams, D.F.C.; S. J. Machej, D.F.C.; R. S. Kingsford; P. D. Petrie, D.F.C.; R. C. Instrell, M.B.E., D.F.C.; W. K. Prosser; B. S. J. Piff, M.B.E.; J. A. Bland; D. O. Miller; B. J. L. Greenland; M. G. Harris, D.F.C., D.F.M.; U. L. Burberry; T. A. Dicks; N. G. Alderdice, D.F.C.; A. Wright; M. R. S. Cunningham; J. E. W. Teager, A.F.C.; R. E. Tickner; C. P. Norfolk; K. H. Perry, D.S.O., A.F.C.; H. G. Garwood; W. McClymont; M. R. Burroughs; B. W. Culpin, D.S.O., D.F.C.; L. C. Boys; A. D. Woodcock; J. Castagnola, D.S.O., D.F.C.; D. J. T. Sharp, D.F.C.; A. Bilbrough, D.F.C.; H. Adamson; B. C. Redman; J. S. J. Hamilton-Martin, A.F.C.; N. E. Wilkins, D.F.C.; W. J. Geenty; J. T. Newboult, A.F.C.; G. E. Davies, D.F.C.; E. Brewin; H. T. Murley, D.F.C., A.F.C.; A. Campey, A.F.C.; B. D. Hanafin, D.F.C.; F. Reeve; J. Wilson; I. M. Harper; R. S. Salmon; R. H. C. Hustwith; W. J. H. Roberts; F. Barnes; H. G. M. Haines; B. W. Lofthouse; W. J. Hurley; D. J. Dorbet; J. A. Cline; J. N. B. Unwin; W. G. Smith; A. Phillips; C. J. Tedder; A. Harper; J. W. Scoble; H. Broadmeadow; R. Burns; S. R. Harris, D.F.C.; D. K. Routledge; D. Pine; R. W. Payne; S. B. Simpson; C. F. Green, A.F.C.; J. R. Yates; S. S. Douglas; F. W. Lister, D.S.O., D.F.C.; T. C. Gledhill; J. W. Everitt; P. G. P. Henson; F. W. Sledmere, A.F.C.; C. H. Parry; L. C. Maynard; P. G. Adams, D.F.C.; P. J. Fry, D.F.C.; J. L. Dell; K. Fry, D.F.C.; E. M. E. Michael; R. S. Nichol; W. J. Stacey; J. B. Mahoney; A. Maisner; P. P. Walker; A. W. Ringer, A.F.C.; K. C. D. Nixon, A.F.C.; P. H. L. Scott, A.F.C.; H. G. Norton; D. R. Corley; G. Wrigley; R. B. Davidson, D.F.C.; A. Steedman, A.F.C.; P. D. Menzies; A. D. Dick; N. S. Mingard, D.S.O., D.F.C.; J. R. Tanner; R. D. Roe; J. T. Freeman, D.F.C., A.F.C.; R. Reeve; S. V. Holloway, O.B.E.; C. J. W. Herold; H. W. Bennett, D.F.C.; J. H. Ratcliff, D.F.C.; L. C. Young; H. M. Jackson; D. F. J. Tebbit; J. W. Vick, D.F.C.; H. F. Shaw; J. F. L. Cowe.

J. C. Crossby; F. R. Boalch; S. J. Pooley; E. J. L. Robb; J. K. Pilcher-Clayton; D. T. Stanley; E. W. Bilbo; A. Moor; C. F. L. Turner, B.E.M.; R. H. Vernon, A.F.R.Ae.S.; D. P. Dunn; E. J. Cashman; R. Lewis; W. A. Wildman; W. A. James; A. V. J. Hicks; J. Edwards; J. N. Williams; T. France; P. F. Christopher, D.F.C.; L. F. Shaw; G. K. King; J. Spence; W. A. Beedie, A.F.R.Ae.S.; A. R. R. Scourfield; F. A. Battley; D. D. Barber, M.B.E.; K. A. Young, D.F.C.; M. C. Pulleyblank; S. W. Sarll; G. G. Brown; E. H. Briggs, A.M.I.E.E.; T. Thomas; J. A. Gerrard; B. K. Morris; G. Wood; J. Allan; A. G. Godfrey; P. J. Kitchin; D. Perry; L. S. Martin; D. J. Barnes; J. A. M. MacBean, M.V.E.; J. M. Railton; B. Trodd, A.F.R.Ae.S.; S. M. Russel; G. Connelly; D. A. Walker-Arnott, B.Sc., A.C.G.I.; L. R. Matthews; A. A. R. L. M. Morris, B.Sc., Dip. El.; C. V. Haines, A.F.C.; A. W. Dawson; K. G. Chamberlain, D.F.C.; J. T. Ellison; E. Anslow, D.F.C.; G. H. Louden; J. Irvine; H. C. Brown; R. G. Neate; D. J. Park, D.F.C.; H. C. Robinson, M.B.E.; H. B. Hogg; V. B. Farningham; E. J. Midlane; J. E. Janes; E. F. V. Sherwell; W. J. De Bois, D.F.M.; G. R. Groom; W. Smith; S. C. W. Lock, D.F.C.; W. A. J. Iles; H. C. Southgate, M.B.E.; H. J. Horner; L. Pearman, M.B.E., M.M.; V. H. Wagg; F. J. Tomblin; J. W. A. McCarthy; R. Pixley; G. N. Zeylmans, R.A.F. Regt.; W. McC. Smith, R.A.F. Regt.; P. O. E. Randell, M.M., R.A.F. Regt.; S. Arnold, R.A.F. Regt.; B. Stevenson, R.A.F. Regt.; D. G. L. Coley, R.A.F. Regt.; D. A. Koster; B. D. Godsell;

Flt/O. to Sq/O.: L. M. Brown, W.R.A.F.

The Commandant of the R.A.F. Staff College A.V-M. D. Macfadyen and Mrs. Macfadyen receiving Air Chief Marshal Sir Francis Fogarty and Lady Fogarty at the annual garden party held at the college on July 9th. The function was attended by some 400 guests.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

First Jet Over the Pole

SOME time ago there appeared in an issue of *Flight* a paragraph on the need for accuracy in the claiming of achievements in aviation. I think you used the example of the Trent Meteor *versus* the Convair XP-81, in the question of which one first flew on turboprop power.

The reason for this letter is that I believe the claim that the Canberra *Aries* was the first jet aircraft to fly over the North Pole is wrong.

I have a news clipping taken from *The Daily Telegraph* sometime during 1953, which states: "Achievements by Boeing B-47 six-jet bombers, including the first jet flight over the North Pole, were disclosed yesterday by the U.S.A.F."

The flight was made from an air base in Alaska, circling the North Pole and returning.

Leicester. P. DONOGHUE.

[Asked for confirmation, the U.S.A.F. inform us that the flight in question was made on an unstated date in 1952, though the news was not released until about a year later. The B-47, commanded by Col. Richard C. Neeley, is stated to have taken off from Eielson A.F.B., near Fairbanks, Alaska, and to have circled the Pole. The *Aries* flight was made across the Pole from Bardufoss, Norway, to Fairbanks, and claimed as "the first jet trans-polar flight."—Ed.]

Early Service Airships

From Lord Ventry

SOME additional facts concerning the photograph, on page 12 of your July 1st issue, of the car of *Beta II:* The pilot shown is the then Lt. S. J. N. Fletcher, R.F.C., and the observer the then Lt.-Cdr. N. F. Usborne, R.N.; in the foreground is Sgt. Barnes, R.F.C., an airship pilot.

This ship, with a 43-50 h.p. Clerget, had a speed of 37 m.p.h. The photograph shows her starting for the 1912 manœuvres. She made a forced landing some 30 min after—the rudder control carried away—but without damage.

The old *Beta* had a 35 h.p. Green and a speed of 27 m.p.h. This ship was *Baby* enlarged, and flew for the last time in August 1913. *Beta II* first flew in September 1912, and after seeing service in Belgium in the winter of 1914-15 finished up as a school ship at Barrow, her car finally being slung under an S.S. envelope.

Bournemouth, Hants. VENTRY.

"History and Secrecy"

IN your issue of May 20th, "Subtype" raised the question as to which aeroplane is entitled to be called "British Army Aeroplane No. 1," Cody's or Dunne's?

To answer this question, I must start at the beginning. In the spring of 1903 Cody flew in his man-lifting kites over the fleet at Portsmouth at 1,000ft and published an article about his experiments in the July 1903 number of *Pearson's Magazine*. In this article he called his kite an aeroplane, and stated that he intended to play a part in the conquest of the air, and "would achieve heavier-than-air powered flight if only he had a suitable engine."

In the following year he demonstrated his kites to the Army at Aldershot, and this so impressed the War Office that he was employed by them as "kiting instructor." He immediately asked to be allowed to instal an engine in a kite, but was refused permission. Instead he designed the understructure, control surfaces and powerplant in the first military airship, *Nulli Secundus I*. He built at least four types of gliders—one tailless—and Royal Engineer officers flew them at Burn Hill, Caesar's Camp, Aldershot, from 1904 onwards.

In 1906-7 Cody obtained the first of the 12 h.p. Buchet engines later used by Dunne. Fitting a kite with this engine, front elevators and an undercarriage, he flew it in 1907 for 4½ minutes on Farnborough Common. This was the first pilotless petrol-engined flight in England. He then obtained permission to build British Army Aeroplane No. 1, which made the first flight in this country on May 16th, 1908, and the following year flew for over an hour across country, creating a world record.

When Lt. J. W. Dunne came to the Balloon Factory he experimented secretly, and Mr. Percy Gurr was appointed his assistant. His glider was built in pieces in the factory and assembled behind locked doors by Dunne and Gurr. At that time I was employed at Aldershot Station by the L. and S.W.R., and personally arranged the transport of the Dunne gliders to Blair Atholl, where they were tested in secret conditions, the place being guarded by the Duke of Atholl's private army.

L. D. L. Gibbs flew the monoplane glider and landed on his dangling legs, there being no undercarriage. The biplane glider was fitted with skids and Col. Capper (the late Sir John Capper) made one soaring glide in it; but it never flew with power at Blair Atholl as it crashed when being launched. It was fitted with two 12 h.p. Buchet engines driving two metal propellers, the drive being by heavy flat leather belts driving factory-type pulleys. The engines gave endless trouble and never developed more than 8 h.p. each; one or other always stopped as soon as they were running together. They were afterwards fitted to the *Baby* airship and the same thing happened again. In the autumn of 1908 the Dunne 2 was fitted with a 25 h.p. R.E.P. engine still driven by flat leather belts—one crossed—but it never really flew, although it is said that it hit a mound and bounced for forty yards; Mr. Gurr tells me that it did not fly at all.

The Marquis of Tullibardine, later the Duke of Atholl, wrote an amusing letter to a friend in which he describes how he was tied into the machine and taken to the top of a 2,000-ft cliff, with the intention of diving over the top, "as we were certain that the thing would fly if we could only get it high enough. Just before starting I looked down and saw a white spot beneath me. On turning my glasses on it I saw that it was a doctor spreading out a groundsheet and getting his appliances all ready. But an all-wise providence blew the machine over and we never started."

I think that disposes of the claim that a power flight was made in 1907, and as Cody made his historic flight in May 1908—before Dunne had fitted his R.E.P. engine—the honour of being named "British Army Aeroplane No. 1" must rightly be given to Cody's machine.

J. W. Dunne has never received the honour his great work deserved. Like Cody, he was "sacked" by the War Office just when success was within his grasp, and there is little doubt that had he been—again like Cody—given an engine of sufficient horsepower his machine would have made a wonderful military aeroplane.

Given a proper engine his machines flew, and flew well, and were the most stable aeroplanes in the world. Surely he also should be given the credit for inventing the principle of the "swept-back" wing now used by every country in the world?

Virginia Water, Surrey. G. A. BROOMFIELD.

Sky-Shouting

WE read with interest your leading article [July 1st] on advertising by loudspeakers on aircraft. For many years we have been active in the field of aerial advertising. We have towed posters, flying saucers and "giant packs" and have flown over London with "CHEERS, WINSTON" in flaming red neon. Every summer round the coasts of Britain our aircraft display various slogans for national advertisers.

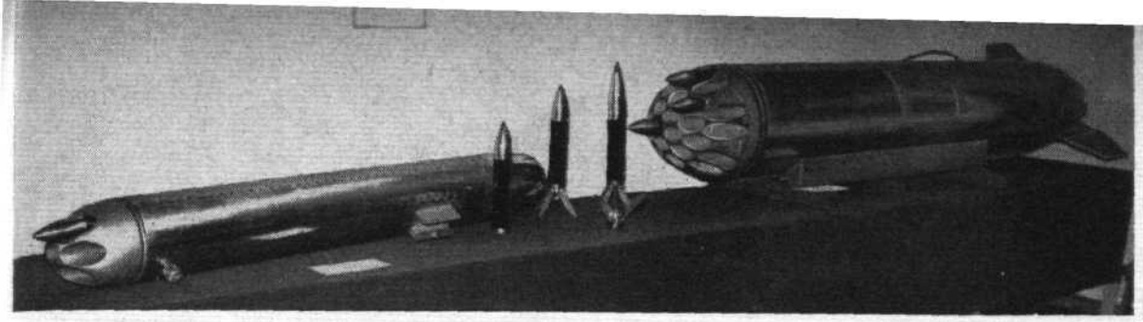
Despite the hundreds of hours flown, never has there been a complaint from the public. On the contrary, they are intrigued when they see these giant posters sailing through the skies.

Last January we commenced experiments with "sky talkies." The public reaction was fantastic! Police called at the aerodrome, complaints rolled in from all quarters. Local papers gave it space and it was generally considered an intolerable nuisance. One old gentleman thought it was judgment day and dropped his spade and ran into his house. He was very upset indeed. We discontinued this form of aerial publicity in February. In our humble opinion it should be confined to the Mau Mau.

London, S.W.1. S. PEARCE-SMITH,
Aviation Manager, Aero Publicity.

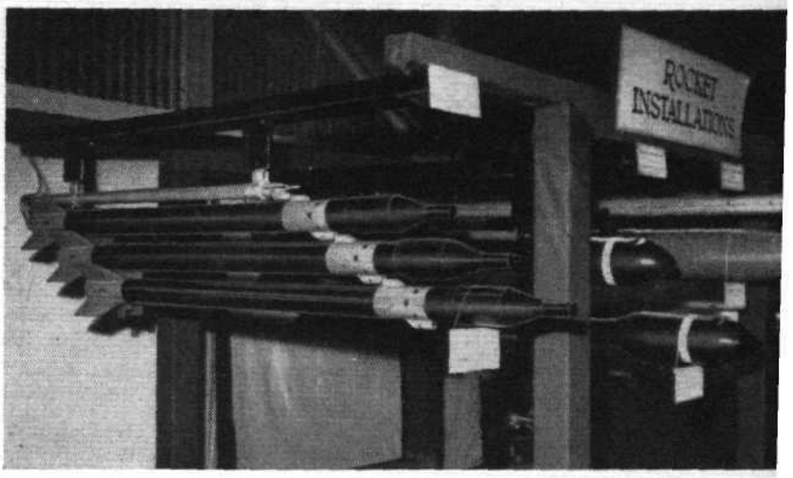
FORTHCOMING EVENTS

July 20-24. Venice: Fifth International Aeronautical Exhibition.
July 23. R.N.A.S. Brawdy, Pembrokeshire: Air Day.
July 23. R.N.A.S. Ford, Sussex: Air Day.
July 23-24. Alessandria Aero Club: Air Rally.
July 23-Aug 1. National Gliding Championships, Lasham, Hants.
July 24. Vintage Aeroplane Club: Garden Party.
Aug. 6-7. Dieppe Air Rally.
Aug. 13-18. Fourth Air Tour of Switzerland.
Aug. 15-26. Commonwealth Survey Officers' Conference, Cambridge.
Aug. 19-20. R.Ae.C.: Fourth National Air Races Meeting and Lockheed Aerobatic Trophy Competition, Coventry.
Aug. 21. Northamptonshire Aero Club: At Home.
Aug. 27. R.N.A.S. Anthorn, Cumberland: Air Day.
Sept. 3. Leicestershire Aero Club: Air Display.
Sept. 3-5. U.S. National Aircraft Show, Philadelphia.
Sept. 5-11. S.B.A.C. Show, Farnborough (Public Days, 9th, 10th and 11th).
Sept. 12-18. Battle of Britain Week.
Dec. 16. London Airport inauguration by H.M. the Queen.



(Above) The 60 mm rockets, fin-stabilized and with offset thrust nozzles, and the finned 31 tube and plain seven-tube pods from which they have been fired experimentally. "Flight" photographs

(Below) The nearest launcher in this group is the new Mk 12 rail with a tier of three 12 lb air-to-ground rockets.



MORE ABOUT THE R.A.E. JUBILEE EXHIBITION

AS described and illustrated in *Flight* last week, a great part of the work of the Royal Aircraft Establishment was shown to those invited to the celebration of the Establishment's golden jubilee. The following notes continue our brief review of equipment and processes exhibited in the large number of displays laid out in "A" Shed and in the many laboratories and workshops.

Among the Armament Department exhibits seen by visitors were a number of 30 mm Aden guns not enclosed in gun packs, together with the new Mk 12 rocket-launching rail carrying a tier of three 12 lb air-to-ground rockets. These are released from the rail by a newly developed blast-operated trip catch.

Particularly noteworthy was a series of rocket pods for launching groups of short 60 mm rockets. These have been tested under a Meteor wing. The rockets themselves are stabilized by folding fins, but one of those shown was spin-stabilized by four offset propulsion jets. This is a German system which has since been abandoned by R.A.E. A long tube was required to establish the spin before the rocket left the launcher, and this therefore had to be about four times as long as the rocket itself. A 31-tube finned pod, with glass plastic perforated nose, and a 7-tube plain pod, were also shown.

A further venture in spin-stabilized air-to-ground rocket launching was a large pod for seven 25 lb rockets, which were held in the tubes on spiral rails that gave the effect of a rifled barrel. All the rocket pods shown, however, were apparently experimental and none was in such a state that it might represent any new form of air armament. Further developments would prove a most potent addition to the present British fighter and ground-attack armoury.

A complete line-up of bombs was to be seen in "A" Shed, dating from the earliest air-dropped examples to the latest folding-fin type. Here the object has been to save space in the bomb bay by keeping the fins down to the diameter of the bomb itself. For stability during high altitude bombing, a time delay mechanism extends four surfaces which double the stowed fin-area of the bomb. All sizes of bomb up to 10,000 lb were shown with these extending fins, as well as a target marker canister so fitted. Many bombs were shown in "clutches," or holders, ready for loading.

Amongst gun-sighting exhibits was a series of gyro gunsights set up for visitors to try, using a model electric train as a moving target. But for the more knowledgeable a camera-gun film in "glorious technicolor" taken by a R.A.E. pilot from a Hunter, with a Canberra as target, was of a quality, both photographically and in marksmanship, which would be the joy and envy of most fighter pilots. It seems a pity that so few of those who saw it can have appreciated quite how much skill went to the making of it.

Farnborough has always been closely concerned with the various aspects of Naval flying, particularly in the development of new landing, take-off and handling equipment. The Naval Air Department display in "A" Shed included a wide variety of items, particularly a large scale model of an angled deck (H.M.S. *Triumph*) complete with working replica of mirror-landing aid. Next to it was a rig for catapulting models of Naval aircraft on to a "deck" equipped with one arrester wire and a crash net. Sea Hawk, Sea Venom, D.H. 110 and Gannet models were used in this rig for demonstrations of arresting and crash barrier trials, the Gannet being thrown into the net with the airscrews rotating. Partly from these tests had emerged the new type of nylon-strop arrester net and a series of photographs showed tests carried out with it at Farnborough, using an unpiloted Eagle-engined Wyvern prototype. It is important, of course, that the blades of the airscrew should not damage the net sufficiently to make it ineffective.

The Mechanical Engineering Department is responsible for a great variety of equipment, from loading pallets for airborne stores to various types of pressure suits for aircrew. These latter were displayed by live models, who were put to considerable discomfort while their suits were tightened and inflated to show the method of operation. The partial pressure-suit is a tailored garment which, by the inflation of a series of tubes, is tightened about the subject's body to provide the mechanical equivalent of pressurization in case of pressure-cabin failure. The constriction is considerable and the demonstrator understandably gave no uncertain signs of strain. To go with the partial pressure suit was a variety of helmets (so far the most difficult item to produce for this equipment) with various types of face protection.

Close by, strapped into a Martin-Baker Mk 2 ejector seat, was another member of the department, enclosed in an experimental full pressure-suit. This is in effect a personal, air-inflated pressure-cabin, but must be so designed that in operation it allows the wearer a sufficient freedom of movement. By a series of rotary glands and linked hinge-joints it has been achieved in this garment. The model could comfortably reach a relief valve on the chest of the suit to adjust the pressure when required. A lightweight flying helmet and oxygen mask are worn inside and, since the suit is effectively soundproof, an intercom. system was in use at the time for communication with those outside. To keep the suit habitable on the ground, even when the visor of the domed head-piece is raised, a continuous supply of cooling air is fed into it at all times, and this, together with the general geometry, made it rather difficult for the model to leave the seat. This trial garment does, however, represent a considerable advance over previous equipment of this type.

CRANFIELD AWARDS

AS reported last week, the eighth annual presentation of diplomas took place at the College of Aeronautics, Cranfield, on July 1st. It is now possible to give the names of students who received diplomas and prizes; the titles of their respective theses are included:—

Aerodynamics. — A. Akers, B.Sc., Temperature distributions in bodies at very high Mach numbers; L. D. Allen B.Sc., Possibilities of the high-speed tail-first aircraft; G. E. D. Bonham-Carter, B.Sc., Review of range-flying techniques; T. H. P. Brazier, B.Sc., Lateral dynamic stability of an aircraft with tail and arrowhead wings at supersonic speeds; K. Burgin, B.Sc., Effect of wing position on the characteristics of a slender wing/body combination; F. M. Burrows, An analysis of the oscillatory spin; D. C. Butler, An analysis of the possibilities of a supersonic commercial aircraft; J. Caldwell, M.A., Flutter derivatives of swept-back wings of finite aspect ratio at supersonic speeds; F/L. E. W. Carr, Some problems of long-range rocket trajectories; A. Clementson, Effects of dissociation and other phenomena on the boundary layer at high speeds; F/L. A. H. Craven, M.Sc., Ph.D., Some aspects of jet flow; T. J. Cummings, B.Sc., A review of novel methods of take-off and landing of high-speed aircraft; I. Davidson, B.Sc., The infinite unstaggered cascade in steady two-dimensional supersonic flow; D. L. Martin, B.Sc., The effect of non-uniform induced velocity on rotor derivatives; E. C. Martin, Wing divergence at supersonic speeds; W. D. Monteith, Application of dynamical response techniques to determination of aerodynamic derivatives in flight; T. Robertson, B.Sc., Life of slender wing/body combinations; P. A. Smith, Methods of estimating the drag and performance of jet-propelled aircraft; J. B. Sutcliffe, The possibilities of unconventional forms of control for transonic and supersonic aircraft; A. J. Walton, Take-off and landing of a modern small-aspect-ratio aircraft, including response calculations allowing for ground effects.

Design.—Lt. F. A. H. Ashmead, R.N., Heat conduction in structures; Lt. J. A. Bastick, R.N., Failure of struts at high temperatures due to creep; S/L. P. D. Chopra, B.Eng., I.A.F., Stress distribution in a multi-spar swept box; P. N. Cornall, Foam-filled structures; A. Coull, B.Sc.,

CRANFIELD AWARDS . . .

Theoretical analysis of cantilever plates in bending and torsion; C. Ellam, Strain measurements on a multi-spar wing and analysis of results; M. Gurudutt, B.E., Tests on a multi-spar box: influence of the flexibility of the tip rib; D. P. Hart, B.Sc., Theoretical analysis of multi-spar boxes with intermediate elastic ribs; L. Q. Hawe, Measurement of the properties of Dural at high temperature; Lt. G. E. Jervis, R.A.N., Continuation of experimental work on bearings: intermittent and oscillatory movements; F/O. H. M. Kent, Power controls; C. G. J. Larroucau, Vibrations of delta tailplane; comparison of theory and experiment; D. M. Mayne, Stress distribution and deflections of cantilever plates: comparison with theory; R. Nichols, Stability of sandwich plates in shear; F. J. Potts, Experimental investigation into stress distribution around a large circular reinforced cut-out in a spar web; T. J. Reid, B.Sc., Preliminary investigation of a blade tip damping flap on a rotary wing aircraft; E. H. Smith, Helicopter problems; H. Watson, B.Sc., Theoretical analysis of the buckling of circular cylindrical tubes in bending.

Aircraft Economics and Production.—R. J. Bond, Vibration of castings during solidification; R. H. Day, Investigation into some aspects of predetermined elemental times; J. Goddard, Basic theory and experimental techniques in machining and the application of metal-cutting fluids; D. M. Hunter, Spark erosion; C. R. Richardson, Organization of control for airframe production; M. A. Willis, B.Sc., Economics of mechanized accounting in industry.

Aircraft Electrical Engineering.—F/L. D. Abraham, B.Sc., Synthesis of electric networks for specified response in the time domain; K. M. Adams, M.Sc., Synthesis of the three-terminal resistor-capacitor networks; D. E. Beeswing, A twin-engined aircraft simulator: formulation of equations to be solved; W. A. Davie, B.Sc., Development of a high-speed isograph; J. Kurdelski, An aerial radiation pattern recorder; S/L. D. Mercer, Methods of binary/decimal data conversion, using saturable reactors; H. V. Miller, B.A., Behaviour of servo-mechanisms in terms of behaviour of the transfer function in the complex plane; H. D. Mitchell, B.Sc., Development of a digital product-integrator for the evaluation of convolution integrals; F/L. Tapamat, R.Thai.A.F., Development and testing of brushwear plant.

Aircraft Propulsion.—R. L. Brown, B.Sc., A gas-turbine simulator; H. F. Cantwell, Energy of ignition sparks: preliminary investigation into methods of energy measurement; T. Coldwell, Development of process for manufacture of inexpensive compressor blades and discs for axial-flow compressor research; Lt. J. H. Dunphy, Effects of mixture distribution and water injection on piston-engine performance; I. A. Hall, Combustion studies with a homogeneous mist; R. A. Harvey, B.Sc., Scaling of combustion-chamber test results; J. K. Hughes, Visual studies of primary combustion in gas turbines; W/C. M. J. Kirpalani, M.B.E., B.Sc., I.A.F., Pre-ignition in piston engines; Lt. B. A. Miller, R.N., Investigations into operation of pulse jet; J. H. Pollard, Design and performance of centrifugal pumps; T. H. Powell, Unstable combustion with particular reference to screech; F/O. J. Rex, Effect of blast tubes on rocket-motor thrust; A. Rottem, B.Sc., Performance characteristics of a Mamba turboprop: power boosting of a turboprop engine; F/O. C. Sutcliffe, Fire and explosive risks with modern fuels; E. D. Wall, Operating characteristics of a long-range ramjet.

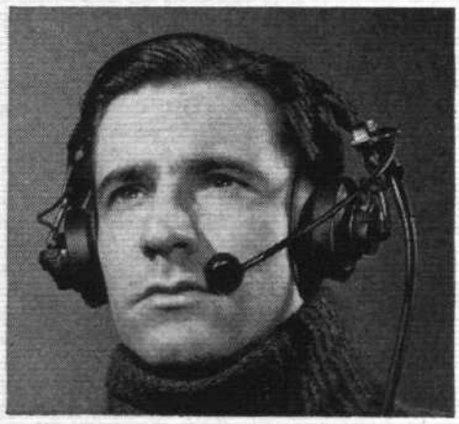
One-year Course Certificate (Advanced).—R. J. Parkhouse.

One-year Course Certificate.—F/O. S. K. Haider, B.Sc., R.P.A.F.; F/O. M. Latif, B.A., M.Sc., R.P.A.F.; F/O. A. H. Moghal, B. A., M.Sc., R.P.A.F.; F/O. M. A. Raqib, M.Sc., R.P.A.F.

Prizewinners.—Governors' Prize, and Woods of Colchester Prize in Aerodynamics, F/L. A. H. Craven; Woods of Colchester Prize in Aircraft Electrical Engineering, K. M. Adams; S.B.A.C. Prize in Aircraft Design, H. Watson; S.B.A.C. Prize in Aircraft Economics and Production, M. A. Willis.

R/T. IN COMFORT

AIRCREW headsets are a speciality of Amplivox, Ltd. (Industrial Products Division), 2 Bentinck Street, London, W.1. Equipment they are now supplying to B.E.A., the M.T.C.A., and other users employs lightweight headphones of the same general arrangement as the American HS 33 type, together with a boom-mounted microphone developed by Amplivox to the requirements of B.E.A. (Though it is the usual description, the word "boom" is perhaps uncomplimentary to the neat curved rod which, from a point above one phone, positions the microphone near the mouth; the microphone diameter is $\frac{7}{8}$in, depth $\frac{3}{8}$in and the weight $\frac{1}{2}$ oz; total weight of the attachment is $3\frac{1}{2}$ oz.)



The Amplivox headset, A.R.B.-approved.

The headphones employ a pair of fully tropicalized magnetic diaphragm inserts of light weight and original design. Standard impedance of each unit is 300 Ohms, giving 600 Ohms total when series-connected or 150 Ohms in parallel. Alternative low-impedance windings are available to special order. All the usual provisions for headband adjustment and comfort are made.

The microphone and boom can, if desired, be supplied for fitting to such existing headsets as the American HS 33 or Marconi-Brown No. 1573.

MINIATURE-VISCOUNT PRODUCTION

THIS highly finished 1/72nd-scale display model of a Viscount is one of a quantity-produced series for B.E.A., moulded in polystyrene by Insulators, Ltd., of Tottenham. A remarkable fact is that the complete aircraft—which is hollow—is, with the exception of the four engine nacelles, moulded in a single tool. In this one mould are four cavities, for front and rear fuselage halves and for the two wings.

The Insulators, Ltd., Viscount.

D.H. PROPELLERS APPOINTMENT

CHIEF aerodynamicist of de Havilland Propellers, Ltd., since 1951, Mr. P. Brett, B.Sc., (Hons.) A.F.R.Ae.S., D.L.C., has been appointed chief project engineer of the Company. He has been responsible, it is stated, for the aerodynamic design of de Havilland airscrews for all the new British engines now building, and his experience will now be extended to wider fields of design and engineering, and to the surveying of industry's and operators' requirements. Mr. Brett first joined the aerodynamics department of de Havilland Propellers in 1944. After a period at London University he went to B.O.A.C., returning to D.H. Propellers in 1950. He was appointed chief aerodynamicist in January 1951.

Mr. P. Brett.

INDUSTRY NEWS IN BRIEF

Mr. M. N. Golovine, M.B.E., A.C.G.I., A.F.R.Ae.S., formerly aero sales director of Armstrong Siddeley Motors, has been appointed Director of A.T.S. Co., Ltd., a company of the Hawker Siddeley Group specializing in consultant and market survey work.

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Mr. Michael Clark, director of the Electronics and Equipment Group of the Plessey Co., Ltd., is visiting the United States to study new developments there in the field of electronics and telecommunications.

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Air Trainers, Ltd., announce the appointment of Mr. L. Malec, M.B.E., A.F.R.Ae.S., to their Board of directors. Mr. Malec joined the company from B.E.A. in 1948 as technical adviser and in 1952 became joint general manager. Since then he has been responsible for commercial activities as well as for production.

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For many years past, the firms of Smith-Clayton Forge, Ltd., of Lincoln, and William Jessop and Sons, Ltd., of Sheffield, have maintained friendly relations, and during that time Smith-Clayton have been forging turbine and compressor discs from Jessops' temperature-resisting materials. Last week it was announced that the two companies had "entered into a long-term agreement to ensure the continuance of this trading relationship."

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Primarily in order to give employees in Dunlop factories, both in Great Britain and abroad, an understanding of the origin of the material which they fabricate, a film has been made under the title *Dunlop in Malaya*. Depicting the work of the company's 13 estates centred on Malacca, it shows in detail how the rubber is processed for shipment from the time when the latex is first tapped from the trees. Copies of the film are available on loan to engineering societies, etc., from Fort Dunlop, Birmingham.