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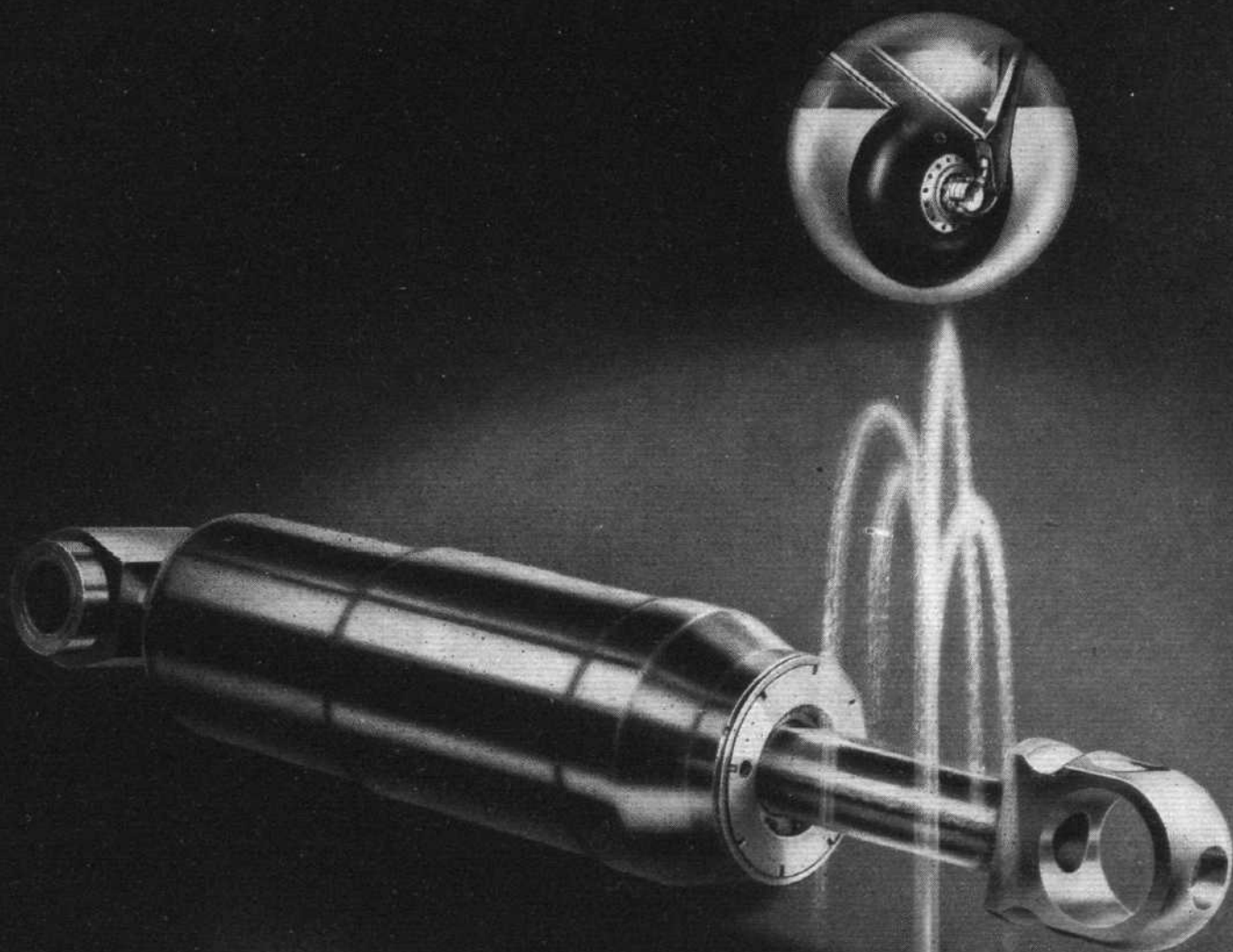


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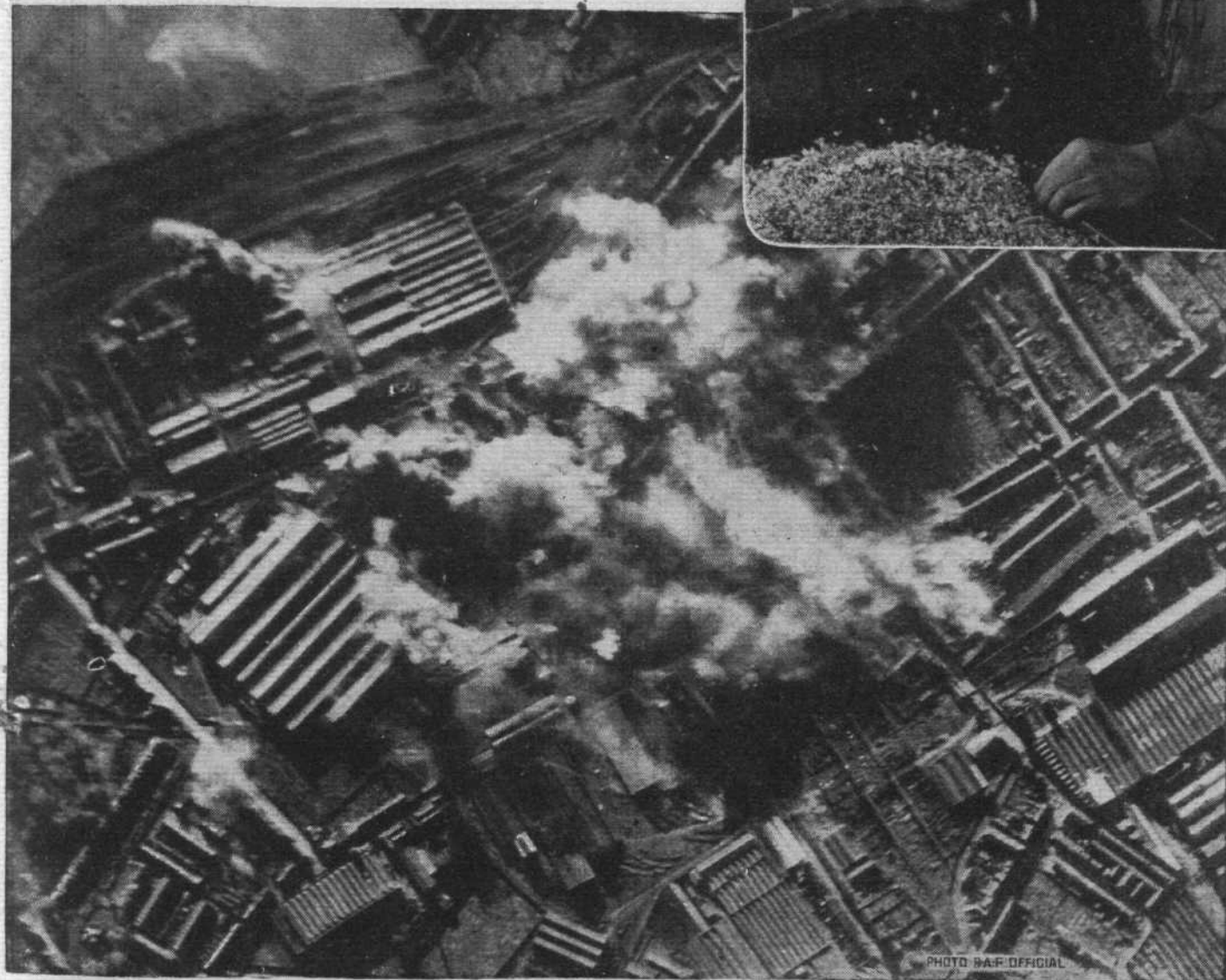
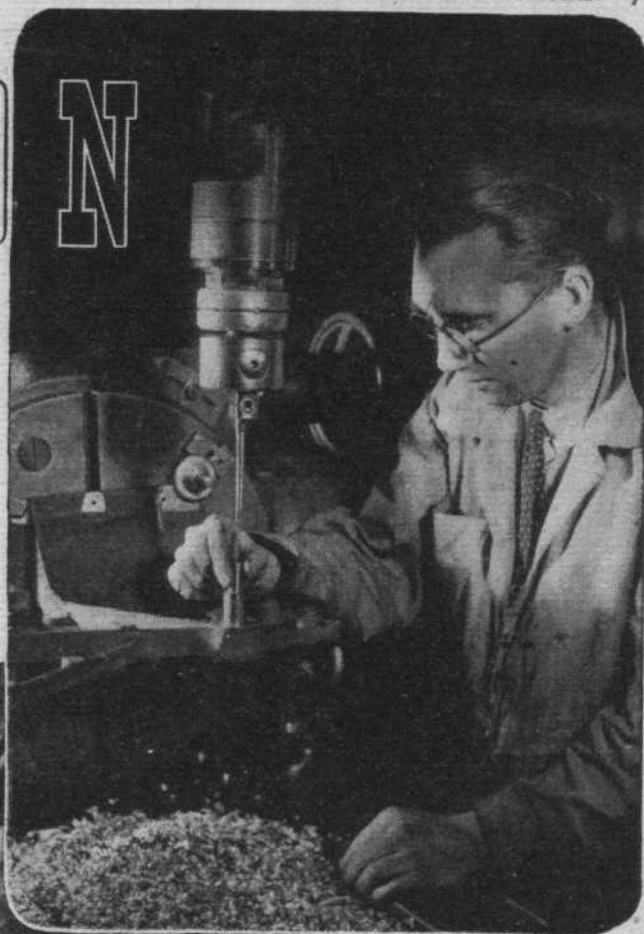
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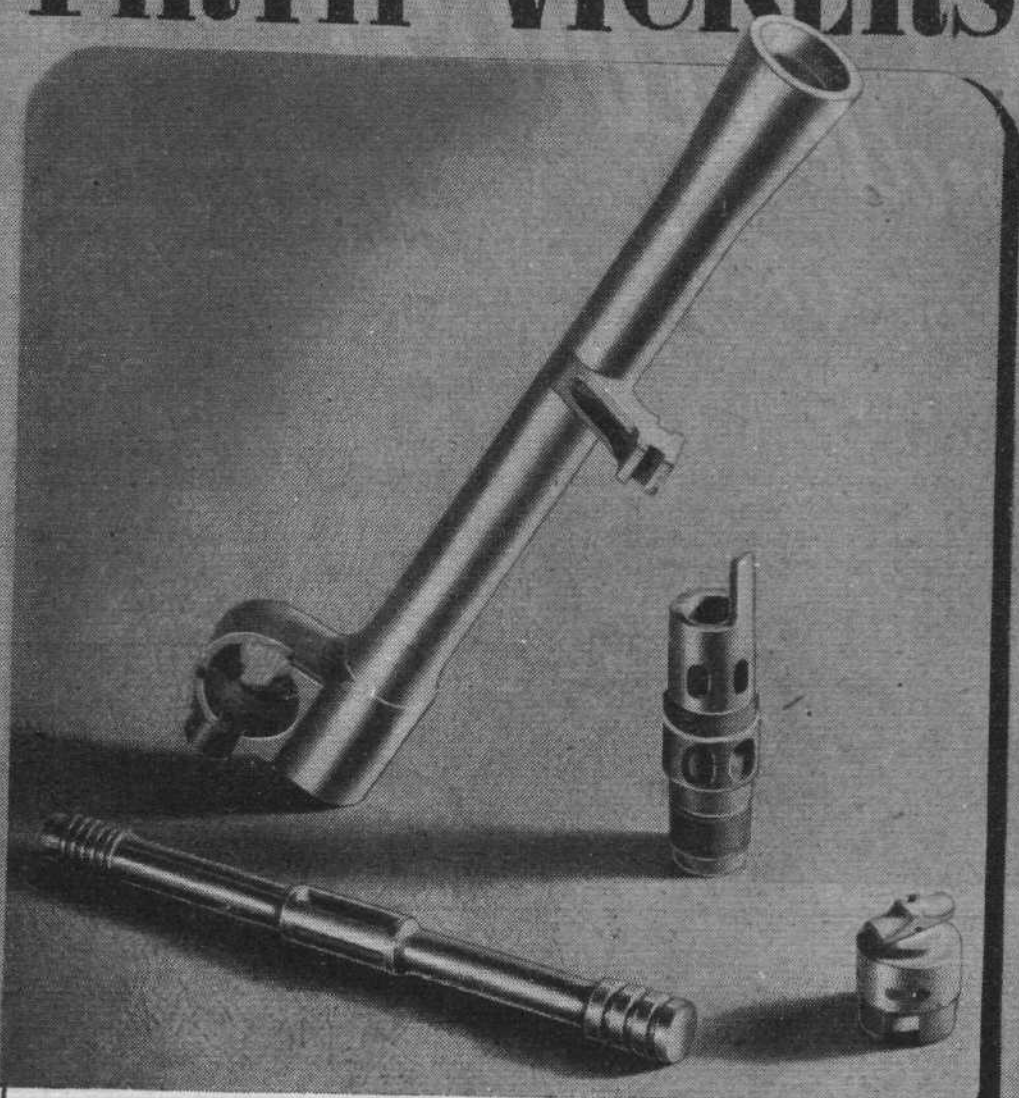
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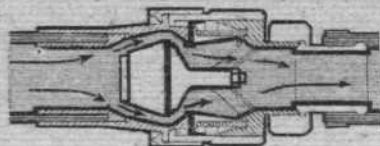
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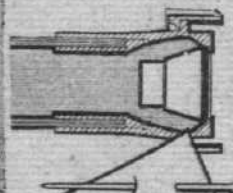
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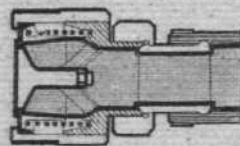
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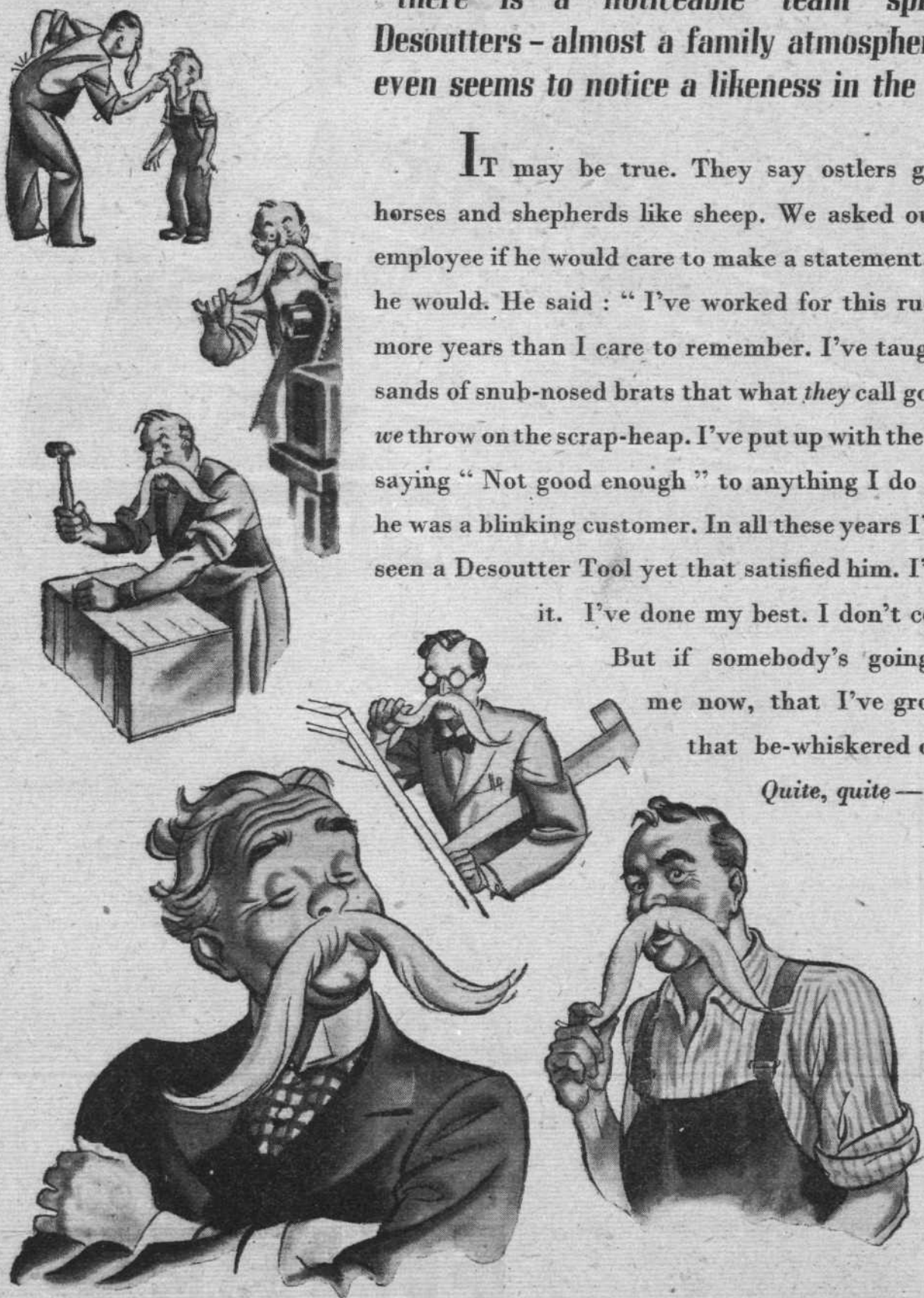
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IT may be true. They say ostlers grow like horses and shepherds like sheep. We asked our oldest employee if he would care to make a statement. He said he would. He said: "I've worked for this ruddy firm more years than I care to remember. I've taught thousands of snub-nosed brats that what *they* call good work we throw on the scrap-heap. I've put up with the Guv'nor saying "Not good enough" to anything I do just as if he was a blinking customer. In all these years I've never seen a Desoutter Tool yet that satisfied him. I've stuck it. I've done my best. I don't complain.

But if somebody's going to tell me now, that I've grown like that be-whiskered old . . ."

Quite, quite — we said.



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'FIREFLY' (BELGIAN)

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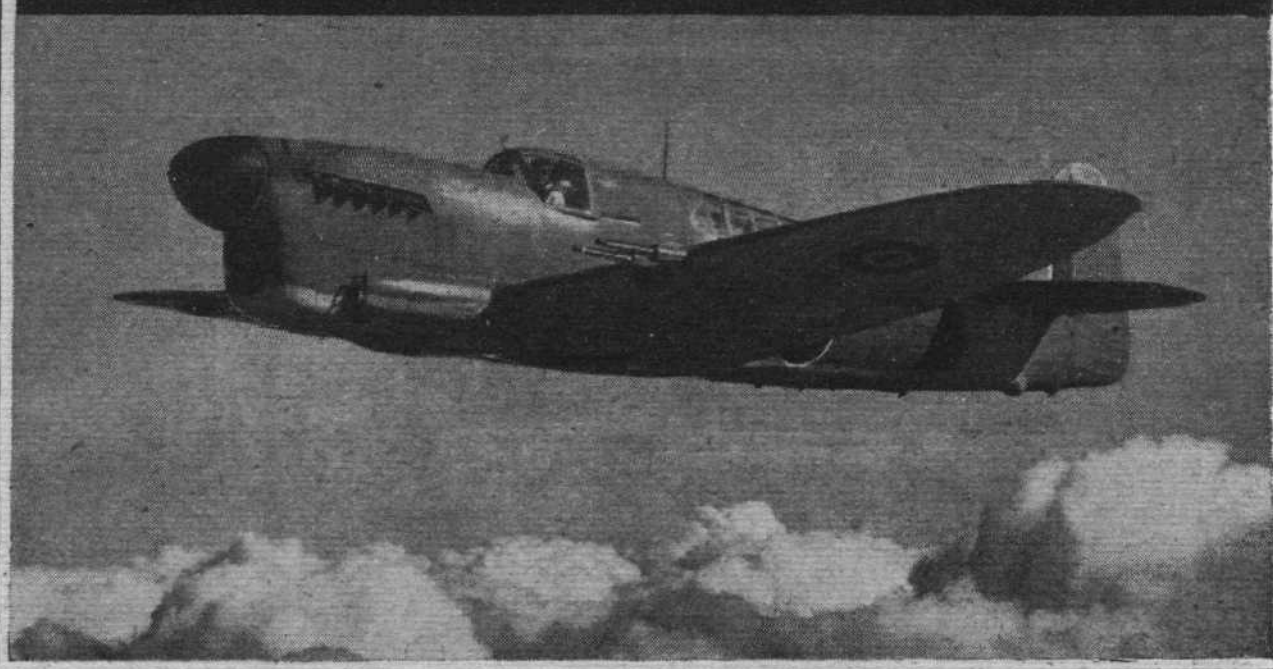
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FLIGHT

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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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Thursdays, One Shilling.

The Outlook

The Wilbur Wright Lecture

THERE is no American more esteemed in British aviation than "Ted" Wright; as his many friends in both countries affectionately call him. He speaks our language (aeronautically if not strictly linguistically); he looks upon aviation in much the same way as do 99 per cent. of British aviation folk; he displays that sense of fairness and sweet reasonableness which we found so admirable in, and which was so frequently expressed by, the late President Roosevelt; and he has that solid historical background which comes from a life usefully and prominently spent in aviation.

Starting as an officer in naval aviation in World War I, he transferred to designing and engineering, ultimately becoming chief director of engineering of the famous Curtiss-Wright firm. In that position he often had occasion to visit this country, with the result that he came to know the people in British aviation almost as well as he knew those in his own country. In 1936 he visited Germany, and in 1938, just after Munich, he lectured to the Royal Aeronautical Society on American methods of aircraft production. On that same occasion, at an informal dinner at which *Flight* was privileged to be present, Mr. Wright gave a warning ("off the record," and therefore not reported) about Germany's preparations and strength. Since the outbreak of war, while playing a leading part in guiding America's aircraft production, he has visited England on several occasions, and on his return to America he has each time earned the gratitude of Great Britain by giving his compatriots a true picture of what this country suffered and of her achievements in spite of dangers, difficulties and handicaps.

It would, indeed, have been difficult to think of a man whom British aviation would rather have had to deliver the 33rd Wilbur Wright Memorial Lecture. The 31st

was given by Mr. Wright's compatriot, Mr. Edward P. Warner, in whom Great Britain has another very good friend. Dr. Warner's lecture on post-war transport aircraft has become a classic in that he laid out certain parameters that had hitherto been missing or, at any rate, were not readily available. Mr. Wright covers a wider field this year; and, in spite of the handicap imposed by the fact that he is dealing with many things, some of which are much less tangible and therefore vastly more difficult to assess than technical problems, he succeeds in conveying a clear outline picture of what we must do if we want to make flying serve the ends of civilisation instead of being a perpetual threat of its destruction.

Encouraging for the future is the fact that Mr. Wright reaches conclusions of optimism. He says: "I believe the Neanderthal man is growing up; that the spiral of progress will, by virtue of the airplane, be benevolent; that air transportation and air power will be largely beneficial to the human family. This need not necessarily be so, nor will it come automatically; but that it will occur, because of the work and efforts of men of good will now predominating in the world, I have no doubt."

U.S. Air Forces Leave Burma

NOTHING could have emphasised more markedly the practical ending of the Burma campaign than the withdrawal of the U.S. Army Air Forces from Eastern Air Command, undoubtedly for operations in the Pacific. The R.A.F. and other British forces now have only mopping-up operations to complete, and then, we may be sure, they, too (or at least most of them) will also move eastward to help in striking the final blow at the aggressor in the Pacific.

The Japanese war is the concern equally of the British

and the Americans. Burma, of course, was not a primary interest of the United States; but that did not prevent our Ally from giving us yeoman aid in its reconquest. That aid took the form purely of reinforcement in the air, and nothing else could have been more helpful and more welcome. We should have found it hard to liberate the country so quickly without the great help given in many forms by the U.S. Army Air Forces. Malaya will probably be the next objective of British arms; and then we hope that our forces will join up once more with the Americans in striking the final blows.

Fido Figures

IN our issue of February 8th we made a plea for all-weather air war. Knowing, as we do, that now air power is the dominant factor of the battlefield, it is essential that it must be available under all weather conditions. It is virtually impossible for any commander to plan a big modern war operation if he is not assured of air effort without hindrance.

The fog dispersal apparatus, which delights in the name of "Fido," is a big step in the right direction. On the face of it the cost appears prohibitive but consideration in detail shows that on all counts it has given a good dividend.

For operational work there is, of course, no means of assessing values, and a great nation involved in total war does not count the cost. In this respect it seems definite that had Fido not been in operation at the time of the Ardennes push it is possible, if not probable, that Rundstedt might have got across to Antwerp and cut off the whole of Field Marshal Montgomery's forces. As it was, although the aircraft of 2nd T.A.F. were grounded on 50 per cent. of the days at that time, Bomber Command was enabled by Fido and instrument bombing to keep up the air attacks on the enemy's rear. For operational use it is essential to consider instrument bombing and fog dispersal as complementary one to the other. Both have uses of their own, but it is only when they work together that their full value is shown.

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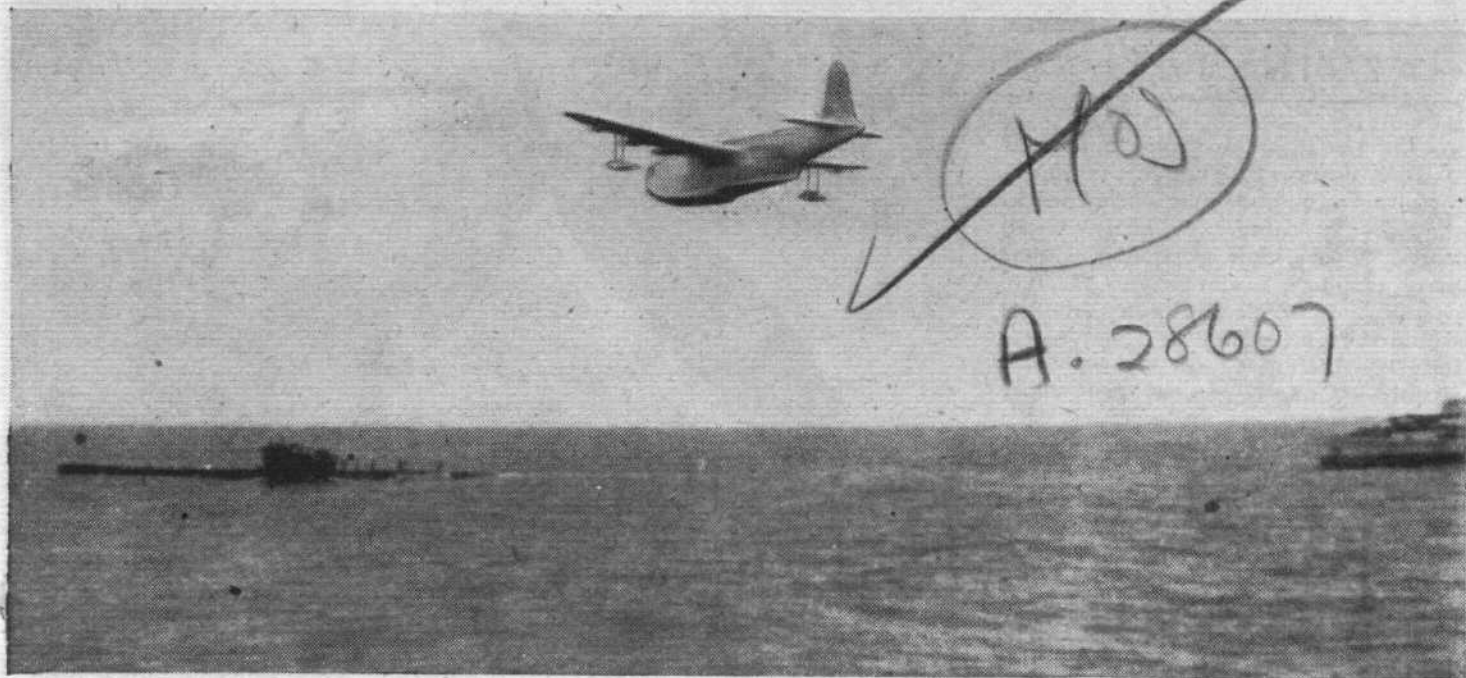
Next let us consider it from the sordid money-for-value angle, forgetting for the while that air crews' lives cannot be assessed in pounds sterling. The figures that matter are 2,500 aircraft saved and 10,000 airmen safe for the expenditure of 100,000 tons (roughly 30,000,000 gallons) of petrol.

Taking petrol at about 1s. per gallon delivered to the airfield, the total fuel cost of running "Fido" amounts to £1,500,000. Simple arithmetic shows that 2,500 aircraft, each with its average of four air crew, have been saved at a cost of only £600 per machine. Disregarding the aircraft and all sentiment in the matter, it is good business to save 10,000 air crew lives at £150 each when probably £3,000 has been spent on training each one.

It will be interesting to see if some similar device is made to clear the air over the decks of aircraft carriers. Presumably the heat-producing unit in this instance would have to be steaming in line ahead relative to the carrier, in order that the area of clear air should be over the flight deck and not astern of the ship.



The Miles Aerovan, which is described in this issue, is an unorthodox freighter-passenger-ambulance aircraft of wooden construction. Miles aerofoil flaps give excellent low-speed handling and the low tricycle undercarriage permits manoeuvring on unprepared ground.



ESCORT AND PRISONER: The scene from the British sloop *Magpie* as she and H.M.S. *Amethyst* (right) escort U-boat 249 through the south-western approaches to surrender. A Short Sunderland watches overhead.

WAR in the AIR

After Tokyo then Yokohama : British Carrier Strength :
U.S. Air Forces Leave Burma

IT is not very far from Tokyo to Yokohama, the latter being a great naval port, and an industrial centre as well. So it was not unexpected that the American Superfortresses should turn there next after devastating the Capital with fire-bombs. Last week more than 450 of the bombers kept up an attack on Yokohama for half an hour, and did widespread damage. Only two of the bombers were lost.

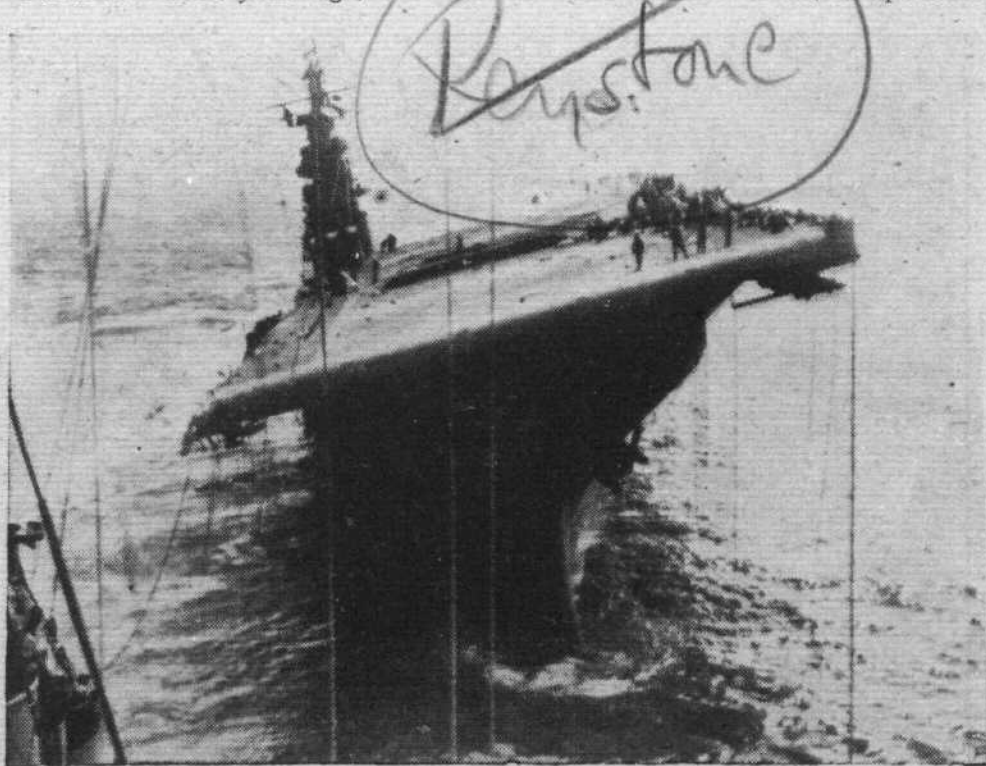
The Japanese broadcasts have said that Viscount Ishii must be presumed to have lost his life in one of the recent raids on Tokyo. He had been twice Ambassador to Paris and had held other important posts. Aged 78, he was rather more than an "Elder Statesman."

Another piece of bad news for the Japanese was the recent launch of a new British carrier, H.M.S. *Powerful*. Details have naturally not been published, but she was described as a light carrier, and she is to be fitted out for service in the East. Proper provision of that sort adds greatly to the comfort and health of a ship's company, and must therefore add to the efficiency of their work. The launch followed quickly after the announcement that H.M.S. *Furious* was to be withdrawn from active operations with

the fleet. Originally she was a sister ship of the *Courageous* and *Glorious*; but when converted for carrier work she was given a flush flight deck, and the smoke was ejected from her stern, from stacks which lay horizontally under the flight deck. She was fast, but only accommodated 30-odd aircraft. The present writer remembers flying over her during exercises in the North Sea some years ago, and her

appearance from up above was distinctive and quite curious. The Royal Navy has now enough modern carriers to be able to dispense with craft of out-of-date design.

No hint has yet been given of what proportion of the R.A.F. bomber force will move out to the East now that the German war is over. The machines that go will first have to be modified for service in the Pacific, an operation



A STAUNCH SHIP: The U.S.S. aircraft carrier *Franklin* after she had been hit by two 500-lb. bombs from a Japanese dive bomber. Over 1,000 casualties were sustained.

WAR IN THE AIR

known by the ugly sounding word "tropicalisation." Though the Superfortresses have done magnificent work, they do not carry very heavy bomb loads. A very high proportion of their carrying power is devoted to the fuel necessary to cover the long distances which they have to fly. Japan's war industry has not nearly been hamstrung yet, and a great deal more bombing will have to be done. One doubts whether the Japanese fleet is now in a condition to offer much resistance to the combined forces of America and Britain; but landings will be necessary, and they cannot be undertaken with a feeling of comfortable assurance until the enemy's air power is thoroughly broken. The Japanese have lost many aircraft lately, and the quality of those pilots left is said to be much inferior to that of their predecessors; but still more bombing of factories and training schools is desirable before the home islands of Japan are invaded.

Reorganisation

A RECENT move in this direction is the withdrawal of all U.S.A.A.F. units from Seac with the exception of Transport Command units maintaining supplies to China. This is a major



"HELLZAPOPPIN": Bombing-up a Hurricane bomber on a forward airstrip in Central Burma.

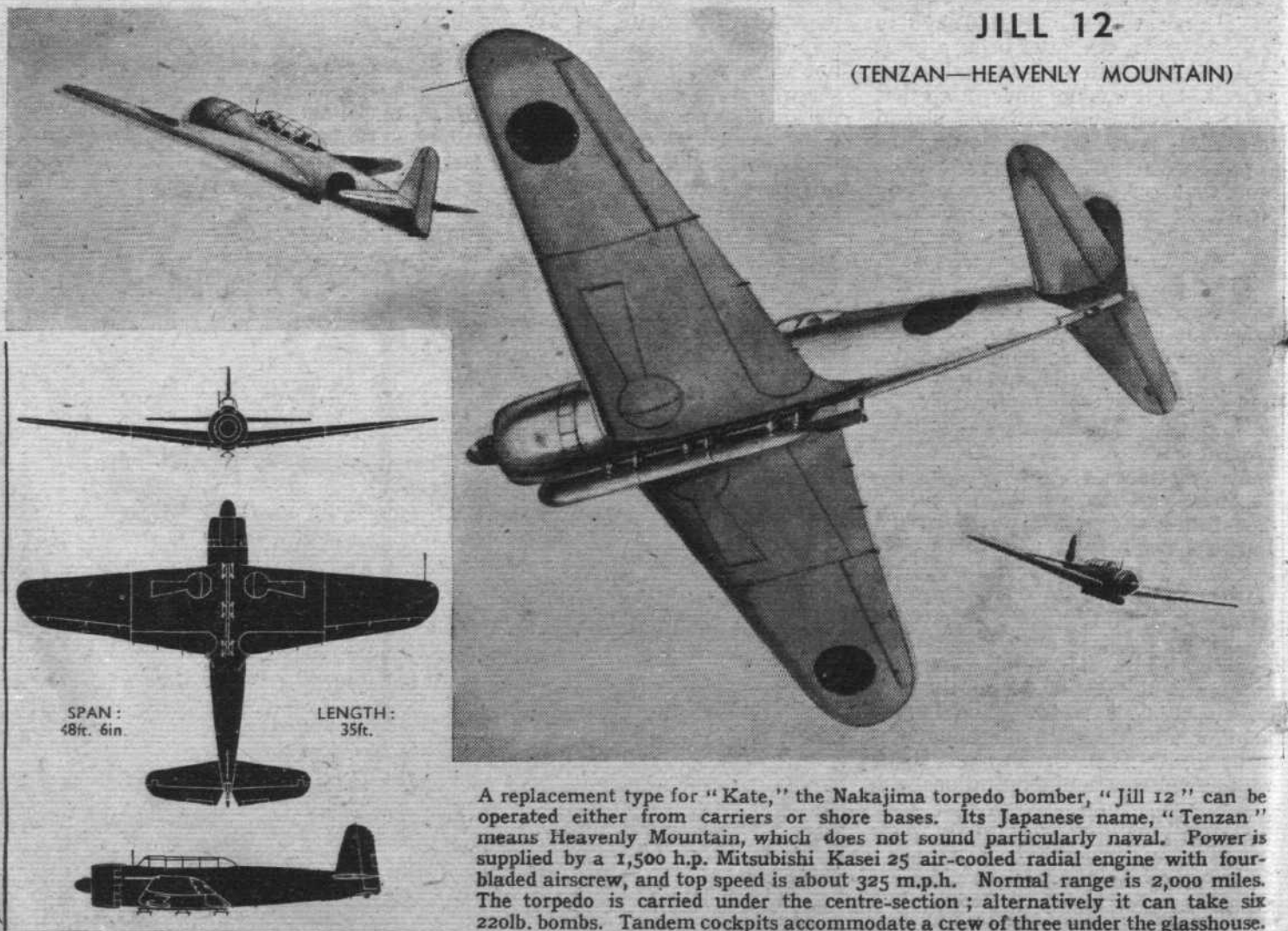
step in the reorganisation of Allied forces in this area of the Pacific for the coming all-out offensive against Japan. The withdrawal involves the handing over of Eastern Air Command by Maj. Gen. Stratemyer to Air Marshal W. A. Coryton. Another recent development is the addition of B-29 Superfortresses to the striking

power of the U.S. Eighth Air Force, which will now add its weight to that of the 20th and 21st U.S. Bomber Commands.

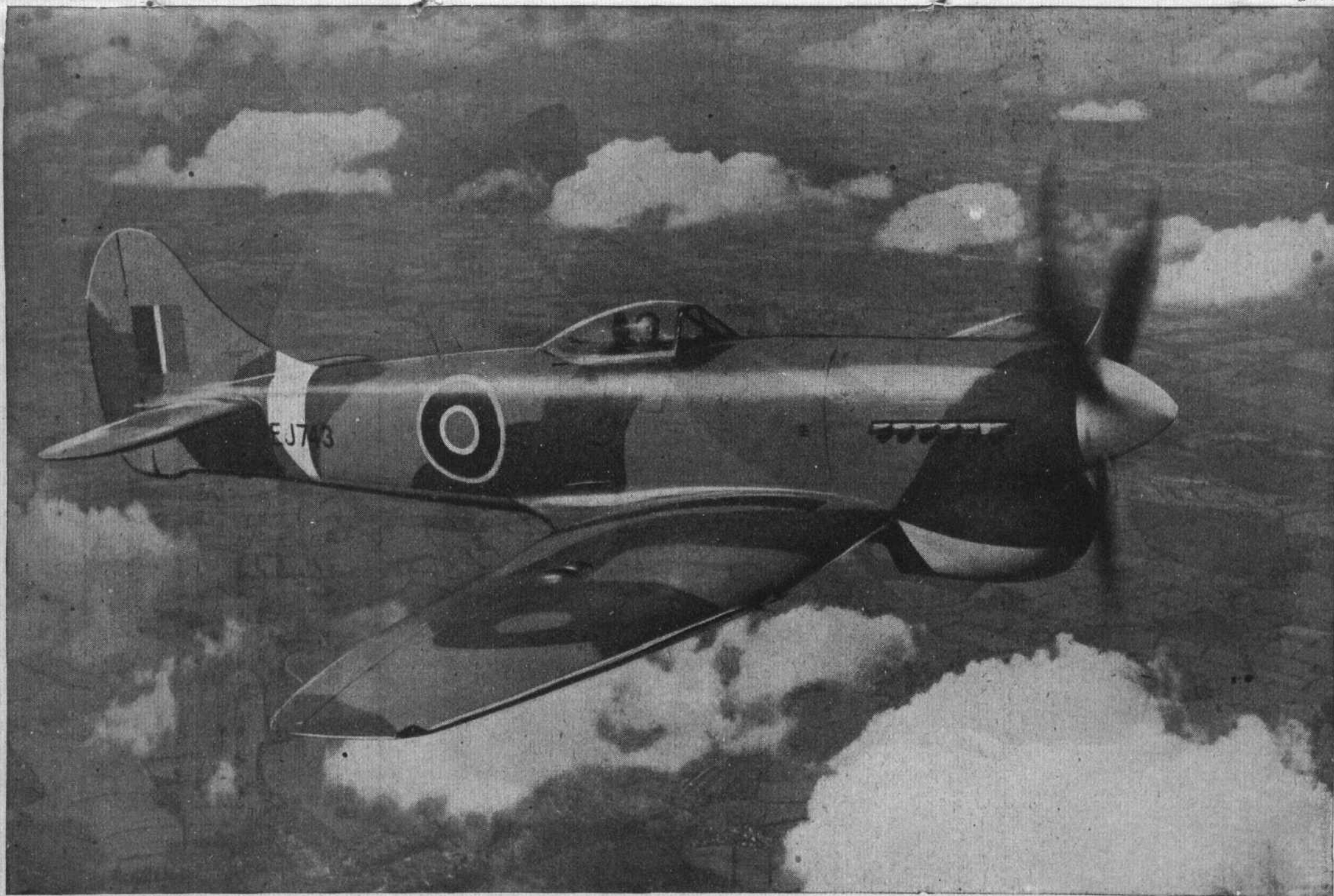
In the meantime, Eastern Air Command's Strategic Air Force, now an all-British concern, is reaching south from Burma, where its task is complete, to Malayan targets.

JILL 12

(TENZAN—HEAVENLY MOUNTAIN)



A replacement type for "Kate," the Nakajima torpedo bomber, "Jill 12" can be operated either from carriers or shore bases. Its Japanese name, "Tenzan" means Heavenly Mountain, which does not sound particularly naval. Power is supplied by a 1,500 h.p. Mitsubishi Kasei 25 air-cooled radial engine with four-bladed airscrew, and top speed is about 325 m.p.h. Normal range is 2,000 miles. The torpedo is carried under the centre-section; alternatively it can take six 220lb. bombs. Tandem cockpits accommodate a crew of three under the glasshouse.



THE TEMPEST (Napier Sabre Engine).—The latest and fastest of the line of famous Hawker fighters was used with distinguished success in beating the flying bomb.

[Adv.



GIT' UP DEM STAIRS...

When a pilot opens the throttle and eases the stick well back this Spitfire gives out and really 'gits up dem stairs.' There are many factors which contribute to this superb performance . . . fine design and craftsmanship . . . breathtaking engine power . . . a youthful pilot with a nice pair of hands . . . reliable maintenance work on the ground including the rather amazing protection from dirty weather given by Healthguard Aeroequipment.

HEALTHGUARD



HERE AND THERE

Reduced R.C.A.F.

COL. COLIN GIBSON, the Canadian Air Minister, has announced that the re-allocation and demobilisation plan for the R.C.A.F. will reduce its strength from 165,000 to 100,000. Volunteers for the Pacific will first have thirty days' home leave.

Polar Puzzle

CANADIAN polar scientists of the Mines and Resources Dept. are disputing the report of the *Aries* expedition that the Magnetic North Pole is among the Sverdrup Islands, 1,500 miles from the Geographical North Pole, and within 75 miles of the Astronomer Royal's estimate. The Canadians claim their location on the Boothia Peninsula, Northern Canada, is "undoubtedly correct" as it is based on "numerous investigations."

However, as McKinley and his merry men have been to their location, we back the crew of the *Aries* every time!

More U.S. Carriers Wanted

THE U.S. Navy Dept. has called upon American shipbuilders to redouble their efforts in constructing aircraft carriers, some of which are said to be behind schedule owing to manpower shortage.

Although the U.S. boasts the largest aircraft carrier fleet in the world, the Navy will need many more as it carries the offensive to the principal Japanese islands with their land-based aircraft.

At present the U.S. Navy has 26 carriers and 65 escort carriers, and these



HIS BABY: Nobody was more interested to hear from Wing Cdr. D. C. McKinley (left) how well the Lancaster, *Aries*, had behaved on the Polar flights than its creator, Mr. Roy Chadwick (centre), who was among those to welcome the expedition home at its base at Shawbury, Shropshire.

have maintained an advantage of more than five to one in air combat in the Pacific where, in the past three years, more than 10,000 Jap aircraft have been shot down in addition to hundreds of enemy ships sunk or damaged and numerous shore installations wrecked.

Long Range P-47

DESCRIBED by Lt. Gen. Barney M. Giles, Commander of U.S. Air Forces in the Pacific, as "the longest range fighter yet put into operation on any front," the latest type P-47 Thunderbolt, flying from newly built bases on Okinawa, is said to be easily capable of making the non-stop trip to Tokyo and back, a distance of 1,800 miles.

Fine Safety Record

THE accident-free record of an R.A.F. squadron of Transport Command operating on the "hump" route to China as well as to most parts of South-East Asia Command was praised by Air Vice-Marshal C. E. N. Guest when, at a Calcutta airfield, he presented the commanding officer with the Airmanship Cup for squadron efficiency.

From May, 1944, until March, 1945, aircrews of this squadron flew 19,000 hours without a single accident.

Air Vice-Marshal Guest said that over the most difficult route in the world the squadron had an average accident rate of only 0.7 per 10,000 hr. and there had been no mechanical failure for a year.

R.A.F. Cricketer Candidate

GROUP CAPT. R. FULLJAMES, M.C., B.A., A.F.R.Ae.S., who retired in April, is contesting Southampton as Liberal candidate. He has also found time in Southampton, where he has retired, to help Mr. H. P. Folland to start successfully a branch of the Air League of the British Empire. The recent formation of a Southampton branch of the R.A.F. Association is also due to his effort.

Group Capt. Fulljames has been a regular pilot since 1916 and an engineer

specialist in the R.A.F. He is still remembered in Service cricketing circles as a successful slow left-hand bowler who, in 1928, finished second in the all-England bowling averages. During that season he bowled 52 consecutive overs at the Oval against the Army XI, and performed the "bat trick" against the Navy.

Aluminium Industries Exhibition

AN exhibition of the potentialities of aluminium and its alloys was opened by Mr. Ernest Brown, the new Minister of Aircraft Production, on May 30th at Selfridges, Oxford Street, London. The exhibition—which is excellently staged—will be open throughout the month of June, and although of a very general flavour does devote a good deal of space to the part played by aluminium alloys in the aircraft and engine industries.

Mr. Ernest Brown, in his laudatory opening speech, mentioned that he anticipated having to enlist the services of numerous small boys in order to learn the facts about aircraft. This, as was to be expected, drew the laughter of his audience, but nevertheless is, we feel, a singularly illuminating revelation.

One for Ripley

THIS is not our story; let that be clearly understood. The Press Association credit it to Grp. Capt. Larry Wray, A.F.C., of Ottawa, who has recently reached England from a German P.O.W. camp.

An R.A.F. flier, falling from an aircraft which sustained a direct hit, had had no chance to get his parachute and was plummeting to earth. As he was falling he saw a parachute pack falling near him and, stretching out his arms, managed to grab it, snap it into position on his harness, and pull the ripcord. The chute opened and he landed safely and was taken prisoner.

This reminds us of the last-war story (subsequently included by Ripley in his well-known "Believe It or Not" series) of the R.F.C. observer who was catapulted from his cockpit when his



Mr. Harold Macmillan, the new Air Minister in the "Caretaker" Government, on his way to the House.

HERE AND THERE

pilot suddenly dived, but landed astride the fuselage unhurt when the aircraft began to level off again, and was able to scramble back into his seat.

Well, such things *could* happen!

Honoured in His Absence

EX-AIRCRAFT apprentices of Halton recently gave a dinner at the Savoy, London, in honour of Marshal of the R.A.F. Lord Trenchard who was, unfortunately, unable to be present. Guests included Air Vice-Marshal Sir Norman MacEwen, Air Marshals Sir Bertine Sutton and Sir John C. Slessor, and Wing Cdrs. A. C. Kermodie and Whittaker. In addition to Group Capt. T. G. Mahaddie, who presided, there were also present 23 other "Old Haltonians"—two group captains, eight wing commanders, ten squadron leaders and three humble flight lieutenants.

R.A.F. Heavies to Bomb Japan—

HEAVY R.A.F. Lancaster and Halifax raids on Japan were forecast in a statement made by the British Information Service in New York.

"There is no harm in telling the Japanese right away that they are going to be bombed by R.A.F. heavies," it said.

Referring to the co-operation of Bomber Command in the past with the Eighth U.S.A.A.F., it added, "Allied strategists have no intention of breaking the winning team."

—With 6-tonners

ON the question of bases, the statement said the fall of Rangoon had brought into Allied hands terrain suitable for building a string of heavy bomber bases. "Operating from this area, heavies could carry 6-ton bombs to Bangkok, Singapore, Penang, Sumatra and targets in the China Sea." It suggested that the Eighth U.S.A.A.F. and R.A.F. should resume joint operations from bases in the Marianas and Okinawa.

"In the Marianas the Americans are now building airstrips at a prodigious rate. By the time the R.A.F. is able to transfer a large formation from the West, there may be bases for them within range of Japan."



MILES AHEAD. A model of the very unconventional twin-engined, tail-first Libellula at the Miles exhibition in Brook Street, London. In his opening remarks Mr. F. G. Miles stressed the urgency of research work.

News in Brief

ACCORDING to Paris Radio, quoted by Reuter, France is to send 180 pilots a month to the U.S. for a year's training.

Sir Frederick Handley Page has been elected president of the Royal Aeronautical Society for 1945-46, and Dr. H. Roxbee-Cox and Sir Oliver Simmonds, M.P., have been elected vice-presidents. All take office on October 1st.

Statistics issued by the U.S. Navy claim a total of 11,601 Japanese aircraft destroyed for the loss of 2,070 of its own aircraft from the start of the Pacific war to April 1st, 1945. This represents a winning ratio of 5.6 to 1.

Four senior R.A.F. officers last week received the U.S. Legion of Merit at a ceremony at the M.A.A.F. headquarters in Rome. They were Air Vice-Marshal R. M. Foster, A.O.C. Desert Air Force; Air Comdre. Whitney Straight, commander of an R.A.F. transport group; Air Comdre. R. B. Lees, Senior Air Staff

Officer, M.A.T.A.F.; and Air Comdre. T. G. Pike, Senior Air Staff Officer, Advanced Desert Air Force.

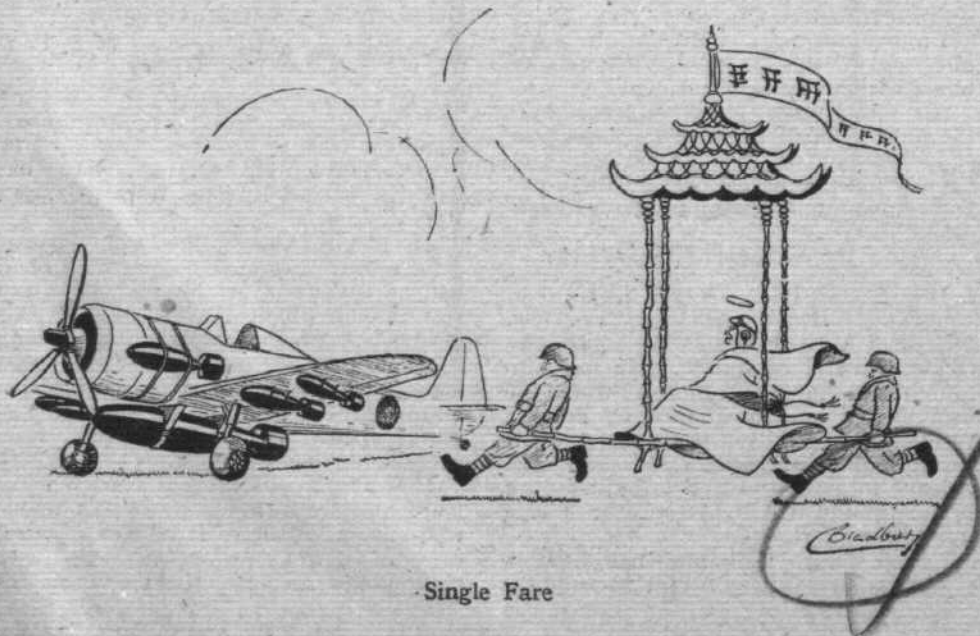
The problem of ensuring perfect joints in the 21 miles flexible under-water section of "Pluto" (pipe-line under the ocean) was solved by George Angus and Co., Ltd., of Newcastle-on-Tyne, who used coupling seals and glands made from their "Gaco" synthetic rubber.

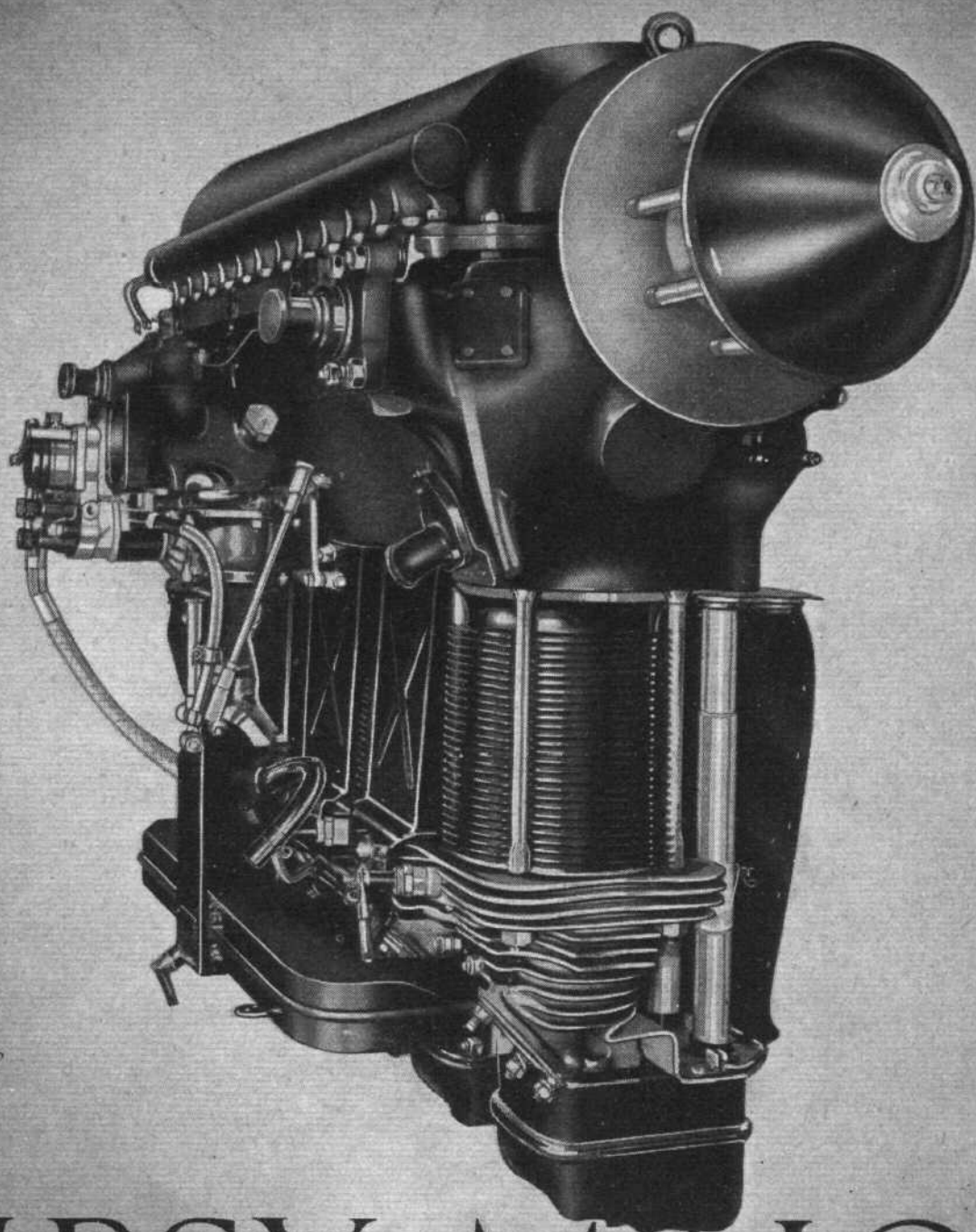
It is unlikely that the Consolidated B-32 (Superliberator) will see combat in any great numbers, according to a recent message from Washington. Of the two factories building this aircraft, one is said to be ceasing production almost immediately and the other will do so at the end of the year.

Jubilee celebration of the R.A.F. Cadet College, Cranwell, is to take place at Cranwell on Wednesday next, June 13th. All ex-Cranwell cadets, officers (serving and retired) and civilians of officer status who served at the college before the war are invited to attend. Those desiring to do so should write at once to the Mess Secretary, R.A.F. College, Cranwell, Sleaford, Lincs.

Mr. H. N. Sporborg, chairman of B.T.H., is to retire at the end of this month after 43 years' service with the company. He also retires from the positions of vice-chairman of Associated Electrical Industries, Ltd., director of Metropolitan-Vickers Electrical Co., Ltd., and chairman of the Cosmos Mfg. Co., Ltd., and Lamp Caps, Ltd.

A chain of sales and enquiry offices are to be opened throughout the country by Northern Aluminium, Ltd., for the benefit of manufacturers. The first of these was opened last week at 4, Chapel Walks, Manchester, 2, and others will follow in London, South Wales, the north-eastern area, and Scotland. Midland enquiries can now be handled at the company's Birmingham works.



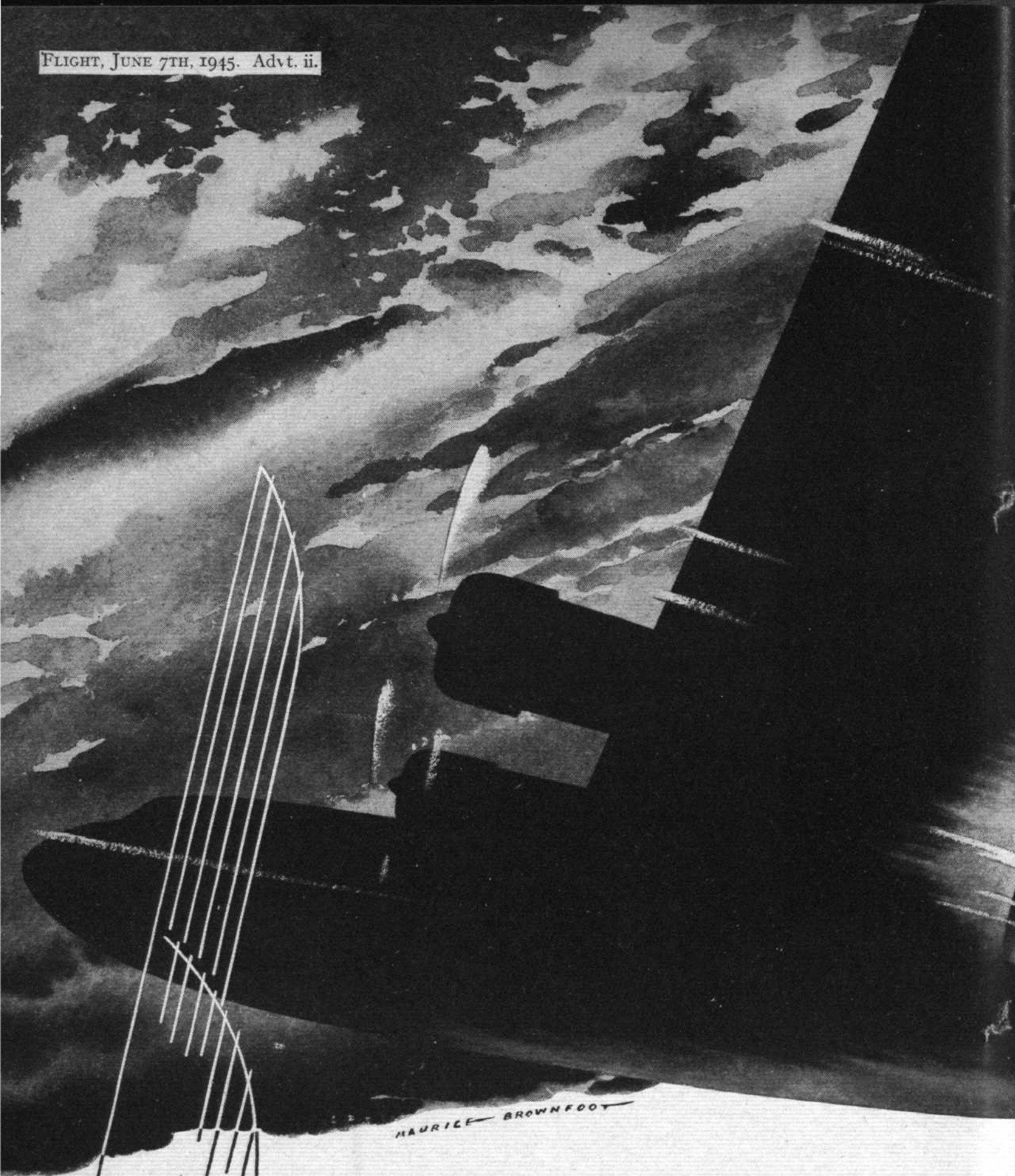


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*now approved to run 1500 hours
between overhauls—
— no intermediate dismantling*

In a modern touring or training aeroplane this may represent anything from 150 to 250 thousand miles of travel without even removing the cylinder heads.

FLIGHT, JUNE 7TH, 1945. Advt. ii.



MAURICE BROWNFOOT



CORRISONS

CROYDON

CONSTRUCTION, MAINTENANCE AND REPAIRS

Britain's Aircraft

Exhibition in the Heart of London, Opening June 21st

AN announcement that an exhibition of Britain's aircraft is being organised in London was made in *Flight* of May 3rd. From a list of the exhibits it is clear that the display will prove particularly attractive to all interested in the progress of aviation and the multitudinous technical achievements of British aircraft engineers.

A central site in Oxford Street has been chosen, which some may not consider ideal from the point of view of accommodating a large section of the public, since the exhibition, being free, huge crowds may be confidently expected. It is intended that the exhibition, which opens on June 21st, will continue for two or three months. The site chosen is the bombed-out premises of John Lewis & Co., Ltd., Oxford Street, and extends to some 72,000 sq. ft. floor space.

Among the aircraft which will be displayed are examples of famous fighters of the R.A.F. and Fleet Air Arm, as well as medium bombers and heavy bombers. Lancaster, Halifax, Beaufighter, Firefly, Tempest, Auster, Spitfire, Mosquito, Walrus and part of a Wellington will constitute the main types on show. The original Gloster E 28/39 jet-propelled aircraft will also be included and should prove a most attractive exhibit.

Quite apart from actual examples of aircraft there will be a variety of engines in the power section, a display of bombs, instruments and many working models as well as sectioned components. Thus the exhibition will be educational as well as interesting.

To assist the public in understanding the intricacies of modern aircraft equipment there will be lectures and films and explanatory material dealing with such components as

gun turrets, armament, airscrews, radio equipment, plastics, use of wood, and such-like. Maintenance services will not be overlooked.

The central feature of the exhibition will be an example of the famous Avro Lancaster bomber with the upper portion of the fuselage covered in Perspex to reveal the internal equipment. The interior will be linked by radio with the radio section in another corner of the hall.

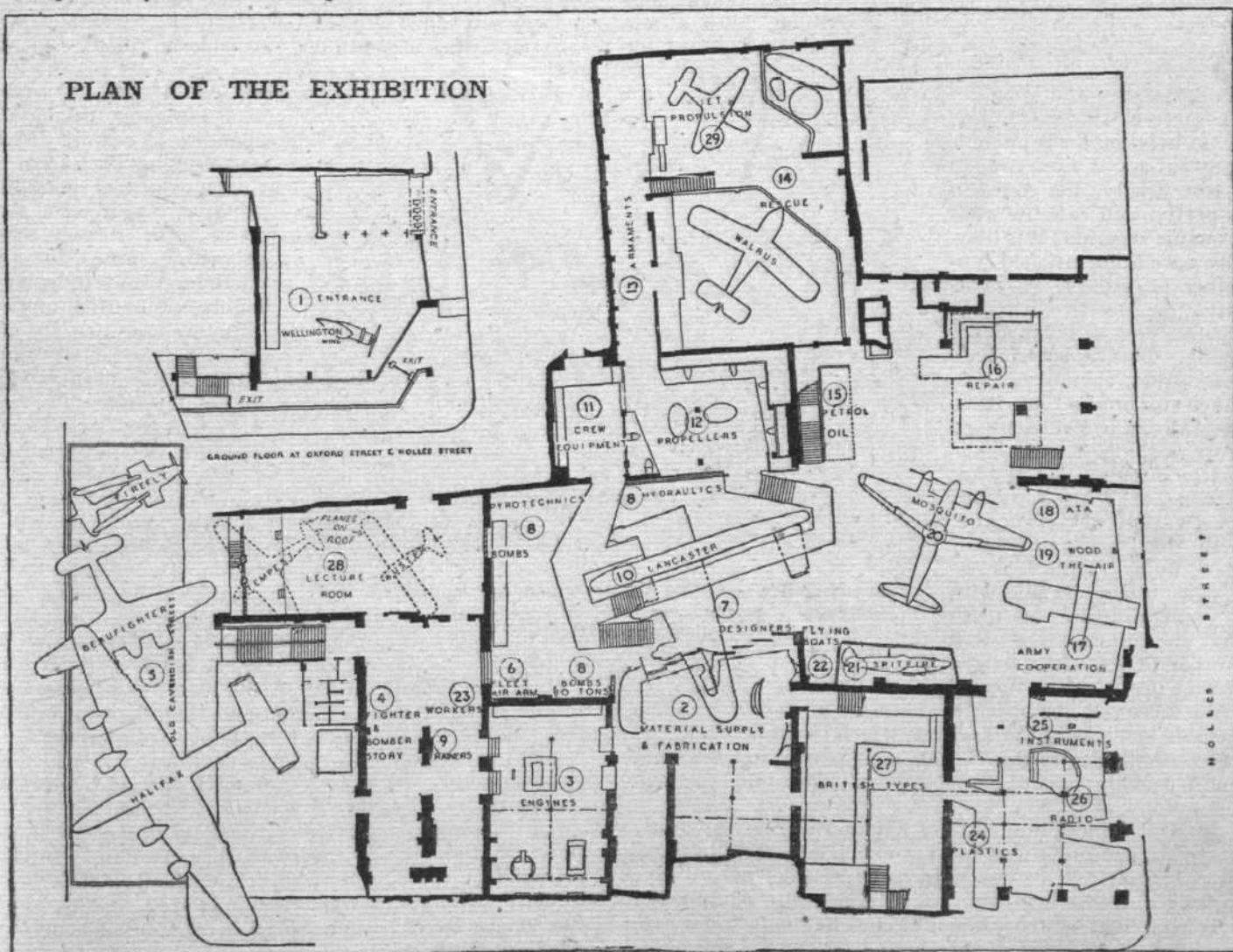
Flying boats will have a place; indeed, the Walrus will be afloat in a suitable pond, and the Air-Sea rescue service section, including lifeboats and specimens of fighter and bomber dinghies, will be adjacent. Gliders will be represented by the Horsa.

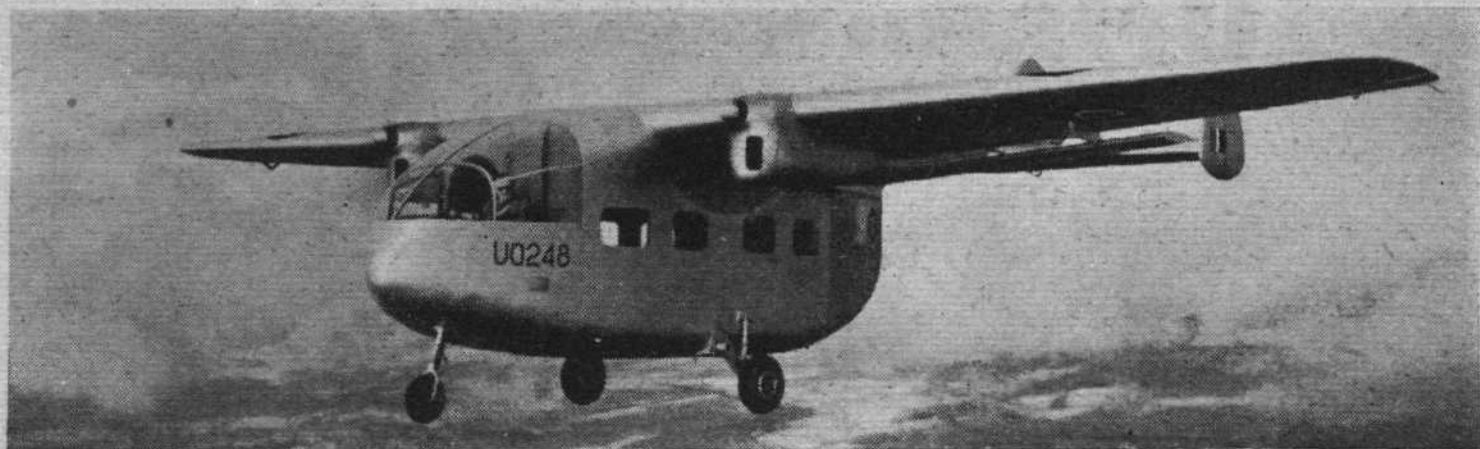
On the opening day, June 21st, the R.A.F. Band will approach the exhibition from the east about 11.35 a.m., whilst the Fleet Air Arm and airborne troops will converge on the exhibition from north, south and west, the fourth leg being the important workers' section, headed by a workman's band. The official opening will be at 12 noon and an official luncheon will follow at which Ambassadors, Air Attachés and members of the industry will be present. It is hoped that the King and Queen will pay a visit to the exhibition.

The Ministry of Aircraft Production is responsible for the display, in conjunction with the Ministry of Information, Campaign and Exhibits Division.

The exhibition has been designed to show the part that the British aircraft industry has played in giving supremacy in the air to the Air Forces, and to pay tribute to the many grades of technicians who have contributed to the strength and outstanding deeds of the Royal Air Force and Fleet Air Arm.

PLAN OF THE EXHIBITION





Miles Aerovan (M57)

Functionally Designed General-purpose Aircraft with Particular Appeal for Operators of New Ventures

WHENEVER Miles Aircraft Limited announce a new machine, one may be sure that they are heralding something out of the common. Latest of the Miles creations is the M57 Aerovan, and a very interesting aircraft it is. The illustrations will make clear the general layout and style of the machine which, with the exception of the metal tail boom, is of all-wood construction.

Miles aerofoil flaps and the slotted ailerons make for positive handling characteristics at very low speeds. This, in turn, has necessitated the employment of three fins and rudders. The aircraft should, in addition, have a fair degree of "pendulous" stability. Although designed for Gipsy Major or Cirrus Major engines, any other make of similar power and weight can be fitted if required. An alternative choice is also given between fixed-pitch or constant-speed airscrews.

Put briefly, the Aerovan is pretty well exactly what its name suggests; it is literally a well-dimensioned container of 530 cu. ft. capacity equipped with the necessary appurtenances for flying. This somewhat bald description should not be taken to imply that it is, therefore, a less efficient aircraft. It is essentially a neatly designed aerial van, capable of being furnished for a variety of duties, and, with this, has remarkably good flying characteristics. It can, in fact, be said with a great measure of truth that the aircraft is a small brother of the M.61 freight project described in the April 12th issue of *Flight*.

We have not the space to dilate upon the almost innumerable versions of the Aerovan which could be made; but an excellent idea of the various uses to which the machine could usefully be put can be gained from the following suggestions:—

(1) A light freighter with a payload of one ton, range 450 miles, cruising speed 110-115 m.p.h. at nearly 10 m.p.g. for a fuel-oil cost of less than 30s. per 100 miles. (2) A passenger feeder-line aircraft alternatively equipped to carry six, eight or ten passengers and having a toilet compartment at the rear of the cabin. (3) An air ambulance

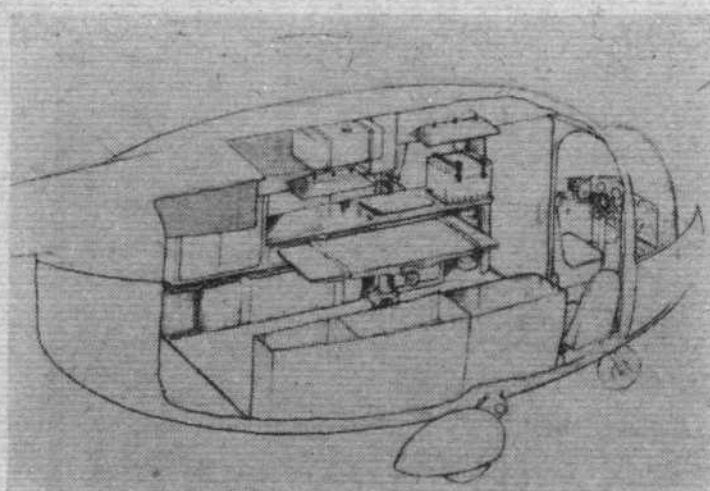
with a maximum capacity for eight stretchers and provision for an attendant nurse—the hinged rear door section of the cabin and the low-level floor make this application particularly effective. (4) An aerial emergency operating theatre fully equipped with all the essentials for emergency surgical operations and with accommodation for doctor and nurse. (5) A flying caravan which would permit the private owner to live—or camp—aboard and fly where he desired. In this version provision is made for settee-bunks for two people together with a pressure cooker, sink and six-gallon water tank, toilet and wardrobe facilities, in addition to crockery, plate and glass stowage.

This remarkable little aircraft could also be used as a flying shop, taking merchandise to remote districts and bringing back local products. Further, it could be equipped as an aerial showroom with display cases, literature, etc., to assist commerce and industry in highly competitive markets.

In the Aerovan the pilot is well positioned, and is given a wonderfully good range of view. The front screen is a large piece of moulded Perspex; panels of similar material form the top half of each side, and another large panel is carried over the pilot's head. The field of view is illustrated by the fact that, when taxiing, the pilot can see through about 200 deg. in azimuth and to within

10ft. of the aircraft's nose. A full-length door gives access to the cockpit, and a communicating door is provided between the main cabin and the pilot's compartment. On the starboard side of the pilot is arranged a seat for either an observer or, in the case of the "private" versions, a passenger.

The landing gear of the Aerovan is distinctly in keeping with the general tenor of the machine. It is not retractable, yet is a tricycle arrangement with a levered form of main-wheel suspension mounted directly on the fuselage, a steerable nose wheel being located beneath the pilot's compartment. This layout permits the fuselage



An emergency operating theatre which can be flown to the inaccessible patient, is one of the most interesting applications of this aircraft.

floor to be kept very low—about 24in.—relative to the ground, and also permits of the floor being level, both these qualities being of great value for loading and unloading the machine, more particularly in its freighter and medical versions. One of the accompanying illustrations showing a car being loaded is amply illustrative of this. Additionally, to facilitate access to the fuselage interior the hinged tail fairing when opened discloses an aperture about 5ft. square, and as there is an unobstructed height of 8ft. 4in. between the tail boom and the ground a delivery van, for example, can back up squarely against the loading platform of the fuselage and take on or discharge cargo directly. Headroom in the fuselage varies between a minimum of 5ft. 3in. and a maximum of 6ft. 8in.

A point which is of singular importance in the new aircraft is that the fuel tanks specified are of the Henderson flexible crash-proof type. For some time now there has been a great deal of research into the phenomena of fuel tank behaviour in aircraft crashes, and some very interesting facts have come to light. We are very pleased indeed to see that Miles Aircraft, Ltd., are losing no time in safeguarding their clients from the hazard of fire consequent upon a crash.

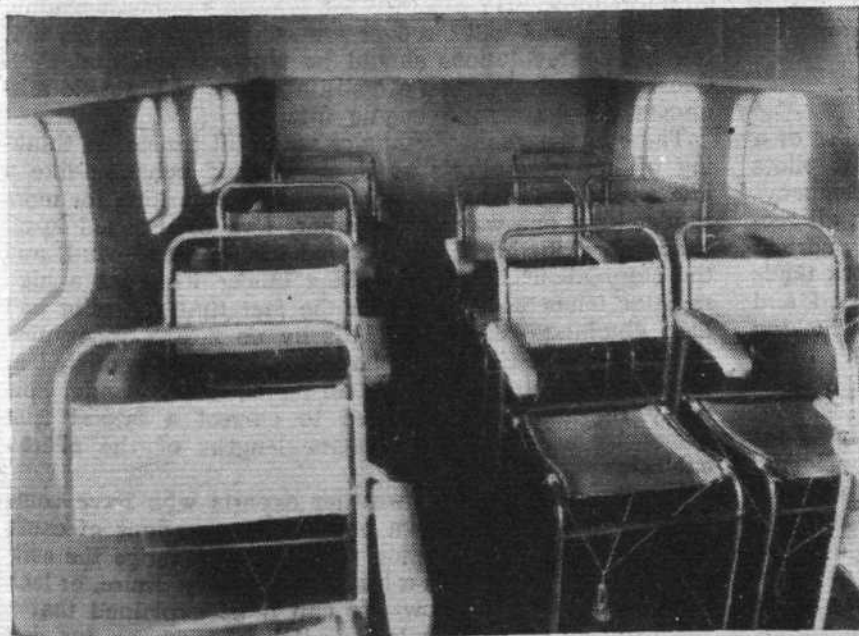
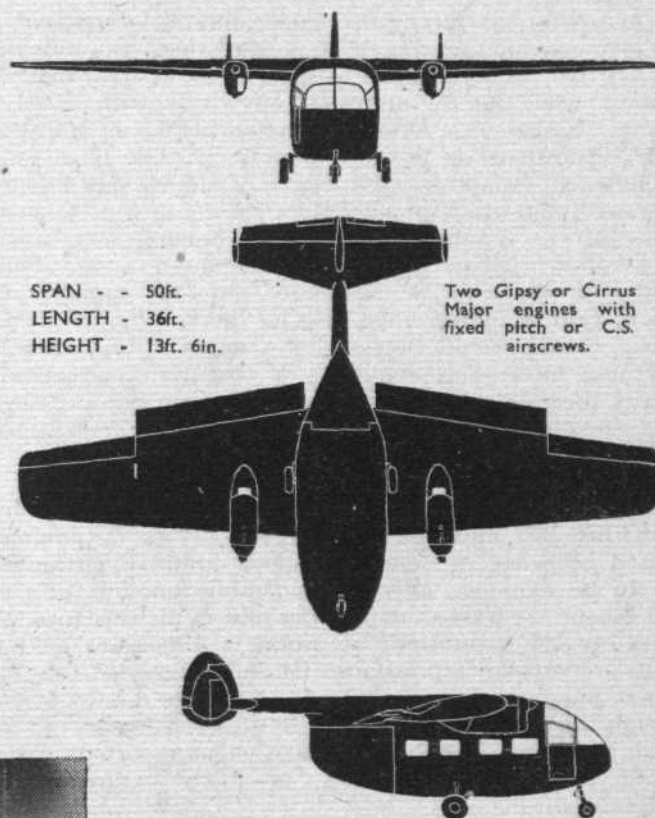
Performance is good, in view of the limitations and capabilities of the aircraft. Empty weight is 3,000 lb. and the maximum payload one ton—maximum speed is 130 m.p.h. and cruising speed 110-115 m.p.h. It is further claimed that the machine takes off and lands in a distance of between 100 and 260 yards according to load; a remarkably small figure.

The manufacturers suggest that in view of its take-off and landing characteristics the Aerovan is independent of extensive airfields, and passengers can be taken up and put down at any reasonable point, making it possible for entirely new air routes to be inaugurated. To this we would add that with so versatile a machine capable of fulfilling so many rôles, not only new air routes but new aerial fields of commerce could conceivably be inaugurated.

There is, however, the rather questionable ease of movement on unprepared fields in view of the relatively narrow track of the undercarriage main wheels. Certainly the vertical distance from the median wheel axle position to the centre of gravity is not great, and this should compensate in some degree the penalty of the narrow track; nevertheless, without proof to the contrary, one would imagine



Medium-sized cars can be transported efficiently and quickly. Loading is no problem owing to the hinged tail fairing of the cabin and the low level floor.



Ten passengers can be carried in the Aerovan. Note the seat anchorage. In the six-passenger version comparably more luxurious chairs are provided as there is greater unit space.

that handling the aircraft on an unprepared surface, particularly in anything of a wind, might be somewhat of a tricky business calling for a good deal of care on the part of the pilot.

Despite this small point of criticism which, after all is not concerned with the normal or general use of the machine, we must agree that the Miles M57 Aerovan is a refreshing venture which would appear to deserve a full and very useful future.

A.T.C. GLIDING PROGRESS

OVER 14,000 glider launches were successfully made by A.T.C. cadets at eighty-four A.T.C. gliding schools during March. These included 6,726 ground glides for beginners, 4,376 low hops up to about 100ft., and 2,920 high hops up to 100ft. Cadets under training for gliding numbered 1,546, of whom 243 were passed as proficient up to A.T.C. gliding standards. About six weeks training is required to reach proficiency.

These figures reveal the rapid strides being made by gliding in the Corps.

"Indicator" Discusses Topics of the Day

A Pilot's Job is No Sinecure

Teaching a Better Understanding Between Ground and Flying
Staffs : The Need for Patience and Confidence on Both
Sides : Some Earthbound Misconceptions

PEOPLE in their judgments and ideals have always tended to jump from one extreme to another. In our particular world of flying people the haloed, be-goggled, moustachioed, heroic and all-knowing aeronaut, who at one time could do no wrong, is tending to slip down into the category of a mere Airframe Driver Mark One. Because it has been found that Smith, Jones, and Robinson can all be taught to fly in much the same way as they can be taught to drive cars, there is a distinct tendency amongst laymen to think that there is nothing in this flying business.

There isn't, as far as the mere conditioned reflexes of aircraft control are concerned. But there is, and will always be, something very special about the man or woman who can fly anything anywhere with absolute safety. Flying of a serious nature—whether on transport runs, operations or testing—involves a pilot in a series of judgment balances and a degree of almost subconscious concentration which are needed in few other professions. Some of the "automatic" skill in judging such things as weather, approach conditions and innate serviceability is the direct result of experience, but the capacity for quick, calm thinking must also be there.

Not that I would suggest for a moment that there is anything miraculous about it, or that the good pilot is in any possible way a superman. Far from it. But there is a speechless gap between the pilot who knows most of the answers and the however-clever technician or organiser to whom flying seems to be merely a matter of the reflex control of a mechanical contrivance. I feel that this gap must be filled if the delays in progress, caused by what can only be called dumb disagreement, are to be avoided. Very considerable amounts of time and labour are wasted at factories and in maintenance sections because insufficient attention is sometimes paid to pilots' reports or impressions. It isn't suggested that the expert judgments of professional test pilots are doubted—though flight shed foremen will occasionally try to re-think for them—but that the often vague reports of casual pilots tend to be treated as mere temperamental imaginings.

Ground Crew's Opinions

It seems to be impossible for the average member of a ground staff to get the idea out of his head that pilots are, by their very nature, addle-brained and temperamental. Why, since they have been drawn from all sections of the community and were once, presumably, normal citizens, should they be? The nature of their work tends to make them, at times, somewhat short-tempered and impatient with people who seem, at the time, to be lacking in understanding. The flying of an aircraft doesn't begin with the take-off and end with the landing. While walking towards his aircraft and organising himself therein, a pilot is already mentally involved in the flight, and for some time afterwards he is re-living the various incidents during the trip so that he can add to the sum-total of his useful experience. With large and complicated aircraft, especially, the captain has a very great deal on his mind while preparing for the take-off, and the entire safety of the crew and/or passengers depends on the accuracy of his judgment and the reliability of his memory.

A simple, safe rule for ground staff could be: Never talk to the driver except on matters of urgency while he is preparing for a flight, during the flight, or for a period

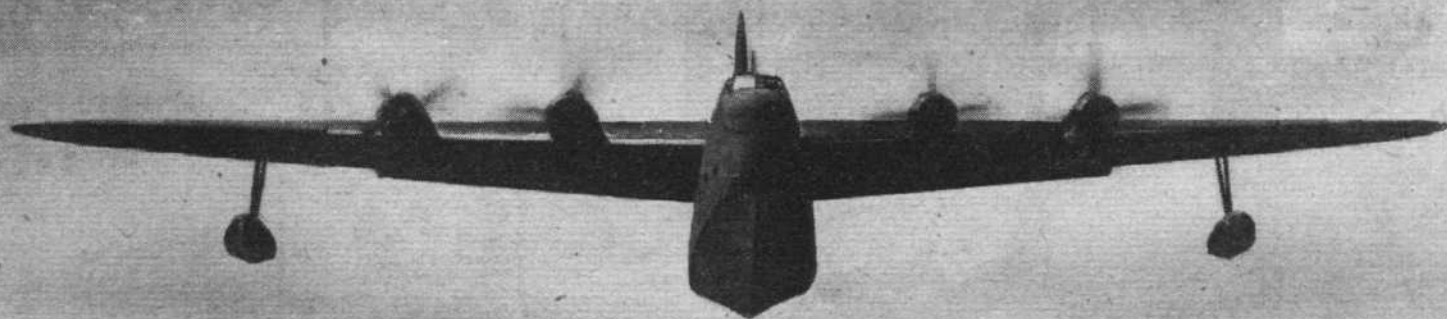
of ten minutes or so afterwards. The expert amateur psychologist will see quite easily when that "inner-life" look has left the pilot, and he is prepared to discuss the aircraft or the weather, or even to explain patiently some point which cannot be easily grasped by those who do not spend most of their working time in the air. In his turn the pilot should know when not to discuss his particular problems with technicians and others who have their own difficulties. One doesn't barge into a drawing office to buttonhole the chief designer while he is in the middle of some abstruse calculations in order to tell him that there is a bad oil-leak from Number Three motor; or into the managing director's office to say that a passenger has been sick. Why, then, be surprised when a pilot is a little short-tempered if silly theories are expounded to him just as he climbs out of an unserviceable aircraft?

Tolerating Tolerances

And some very silly theories are expounded at just such unfortunate moments. Let me give some examples from my own limited store of experience. Once, after struggling back home on one engine of a twin, an otherwise quite intelligent engineer seriously suggested that the trouble might merely have been a faulty boost gauge. I had to walk away and recover myself before speaking; ten minutes later he could have made that suggestion and received a polite and reasoned reply. Then there is the "tolerance" expert who has read all the gen. books. You bring back an aircraft to report a very low oil pressure and a very high oil temperature. When you have given him the figures his face lights up as he explains that, according to the book, each of these figures is within the permitted tolerances. Surely they are—for five minutes only, for one thing at a time, and for abnormal conditions. All you can say is that it is possible for a human being to have a temperature of 105 deg. and still live—but that he wouldn't be considered to be in the best of health. You may report the fact that the c.s. stop-controlled engine revolutions are a hundred low. He will then ask you for the boost reading at the time, and will discover somewhere in his books that the run-up revolutions should be between this and that. Constant-speed airscrews are still a source of fantastic misunderstandings among engine fitters.

There is the Senior Wrangler who still insists on thinking of the wind-effects as if an aircraft behaved like a kite on the end of a piece of string. When asking for more rudder bias, one way or the other, I've been asked in all seriousness whether I had allowed for the cross wind, and the story about the high-ranking officer who put a high radiator temperature down to the fact that the pilot had been climbing "down-wind" is by no means apocryphal in basis. Very similar explanations have been offered at one time or another to nearly all pilots, and I wonder how many riggers have attempted to correct a lateral trim defect by adjusting the relative lengths of the aileron cables?

Finally, there are the weather experts who have come quietly, through their own unaided observations of cause and effect, to the conviction that all pilots judge the suitability of the weather on a basis of their own desire, or lack of a desire, to fly. How else can it be explained that a pilot will go off happily to do a job of work on one day when it is pouring cats and dogs, yet will refuse adamantly to take the air on another day when the sun is brightly shining? To him, rain may be "bad" weather



The world's fastest flying ship

S H E T L A N D

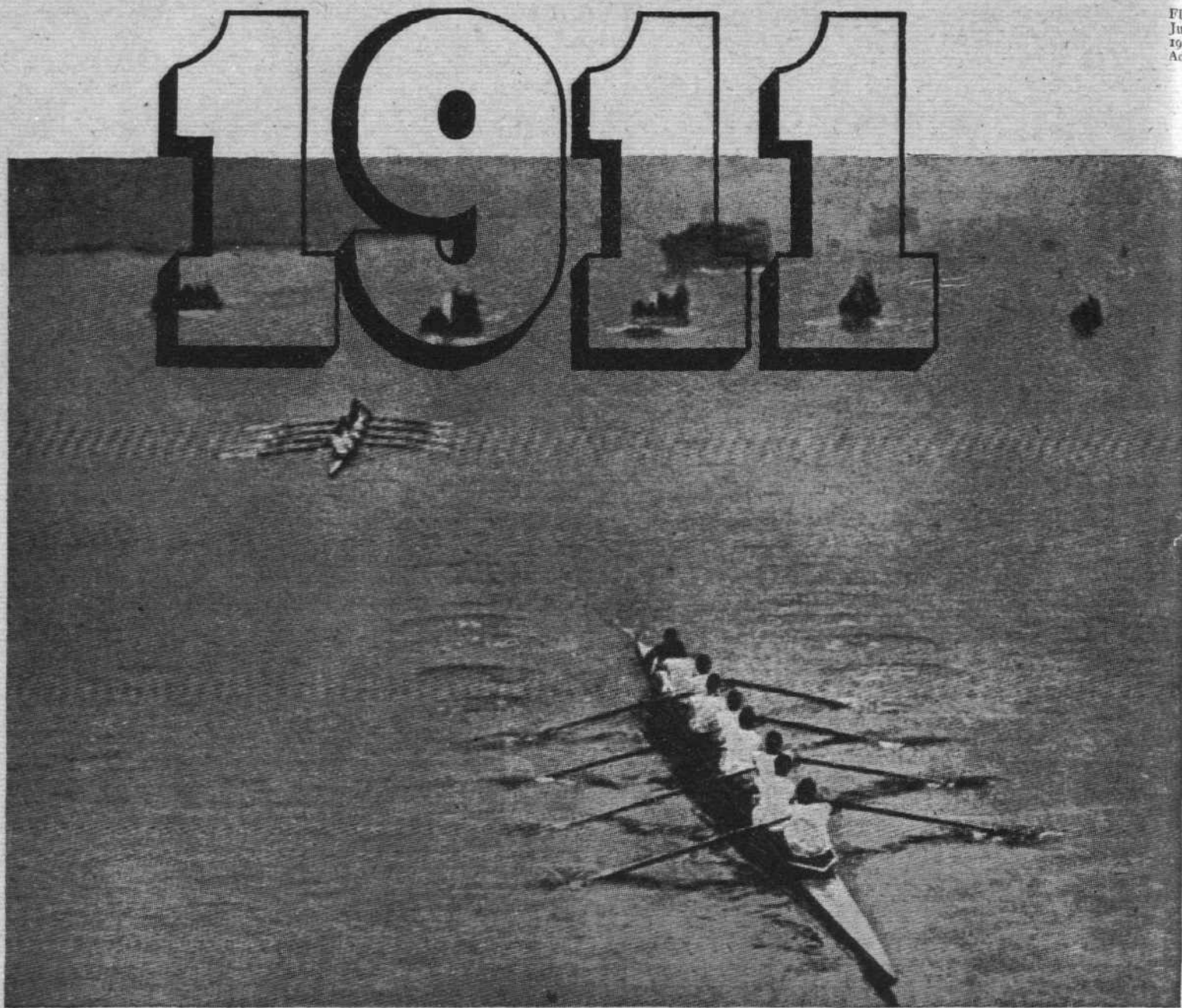
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SHORT BROTHERS and SAUNDERS-ROE

flies with

D E H A V I L L A N D
P R O P E L L E R S

The enormous power of the four Bristol Centaurus engines, each giving over 2,500 h.p., is efficiently converted into thrust by de Havilland propellers. Their metal blades of excellent power-weight ratio, resisting the effects of sea atmosphere, wash and spray, ensure long trouble-free service.





Oxford wins the University Boat Race by 2½ lengths in record time (to date) of 18 minutes, 29 seconds. April 18, 1911.

WHEN WE WERE YOUNG

Most photographs of the event show that the spectators were more interested in an aeroplane flying over the course for the first time, than in the race itself. No doubt there were many who deprecated the intrusion of the new-fangled contraption ('if it had been intended that we should fly, we would have wings'), and there could have been few who foresaw the mighty future

in the air, that is common understanding now. No public notice was focused on another event of 1911 — the foundation of the firm Cellon, but, amongst other matters, our eyes were fixed on the aeroplane with more than casual interest. The progress of Cellon has been parallel to the progress of aviation and we can look back on thirty odd years of effort with justifiable satisfaction.

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A PILOT'S JOB IS NO SINECURE

and sunshine may be "good" weather. The fact that on the rainy day the visibility may be quite good and the cloud-base well up in the thousands, or that on a sunny day one may not be able to see the chequered box from the control tower, has not occurred to him. When there is some four-engined device waiting to be flown on a test circuit, he will point to an airborne Tiger Moth and ask why we, too, have not taken the air. The fact that the Tiger can be flown round inside the perimeter track while the f.e.d. must make a five-mile circuit, during which flight engineers scurry about their complicated business, has not been vouchsafed to his understanding.

Yet he, and all the other occasionally troublesome

fellows, could understand quite well if they only cared to try, and were ready to start with as much confidence in a pilot's judgment as they have in their own. If, too, the now comparatively rare Philistine would try to temper his desire to treat all grounded technicians with scarcely veiled contempt. Understanding is necessary on both sides of the low fence which still tends to segregate pilots and non-pilots. There are things that the non-flyer will never understand, and there are moments when, to the earnest technician, the apparently scatter-brained flying chap can be most irritating.

When each of the experts in his particular line learns full respect for and confidence in the other's judgment and common sense, up to the limits set by varying experience, then everyone in the flying business will be better able to get on with the work in which we are all vitally interested.

"INDICATOR."

Sunderland's Fast Flight

Lord Wavell Benefits from Recent Development Work

LORD WAVELL'S recent flight from Karachi to the United Kingdom in a British Overseas Airways Corporation Sunderland aircraft was the fastest from India to the United Kingdom that has yet been made by a flying boat. The distance of 4,147 nautical miles, or 4,780 statute miles, was completed in 28 hours and 23 minutes, giving an average speed of 162 m.p.h., using approximately 50 per cent. of the take-off power of 1,030 horse-power per engine and carrying a normal service load.

The same aircraft, Sunderland D for Dog, on the special flight out from the United Kingdom, under similar operating conditions and carrying a normal service load, but assisted by a 20 m.p.h. tail wind, completed the same distance in 25 hours, an average speed of 191 m.p.h.

On the present regular schedule this operation takes four days to complete, as all flying is done during daylight hours. Night stops are made at Augusta, Cairo and Bahrein. Actual flying time, however, is scheduled as 34½ hours, but in practice it has been found that this time has, on average, been reduced by some 4½ hours.

The stages and times on Lord Wavell's return flight were:—

Karachi-Bahrein	6 hours 57 minutes
Bahrein-Cairo	7 " 22 "
Cairo-Augusta	6 " 37 "
Augusta-U.K. Marine Base	7 " 27 "

and on the special flight out to Karachi, the stages and times were:—

U.K. Marine Base-Augusta	7 hours 28 minutes
Augusta-Cairo	5 " 30 "
Cairo-Bahrein	6 " 41 "
Bahrein-Karachi	5 " 21 "

The aircraft was under the command of Capt. R. C. Parker and carried a crew of nine.

It can be seen from the foregoing that British Overseas Airways Corporation Sunderlands now normally cruise at about 165-170 m.p.h.

These improved speeds have been made possible as the result of development work recently undertaken by the Corporation, including test flights on which were carried two members each of the Bristol Aeroplane Company and the British Overseas Airways Corporation Technical Staff, and which were carried out under all applicable conditions of temperature and altitude.

Leaving the United Kingdom in an aircraft equipped with a torque-meter and other special instruments, in severe weather conditions, the sea even froze over at the point of departure, and flying through the centre of Africa, at Khartoum the temperature was 124 deg. in the shade, to the Cape where relative humidity on one occasion was 100 per cent., 150 hours of test flying was completed.

Modifications were made to the carburettor air pre-heating and the engine-cooling systems. Improvements in

aircraft attitude were also made by moving the C. of G. inch by inch, taking into consideration the alterations in the C. of G. as fuel is used from the various tanks, until a position was found giving an average best. It became immediately evident that the modifications carried out on the Pegasus XVIII engines has made possible the use of more power without greatly increasing fuel consumption. As a result "best" speed has been proved higher than was previously believed.

Very extensive calculations regarding engine performance had been made prior to the test flying, and it was gratifying to those concerned that results agreed within approximately 2 per cent. of calculated optimum, which, it may be pointed out, is less than the possible cumulative error in instrumentation.

Effect of Limpets

Take-off performance was carefully assessed, and take-off runs measured at altitudes varying from 1,700ft. to sea level. In this connection it can be mentioned that a few small crustacea on the planing bottom affected take-off performance very appreciably, and it was established that the popular notion that limpets fall off craft in fresh water is a complete fallacy.

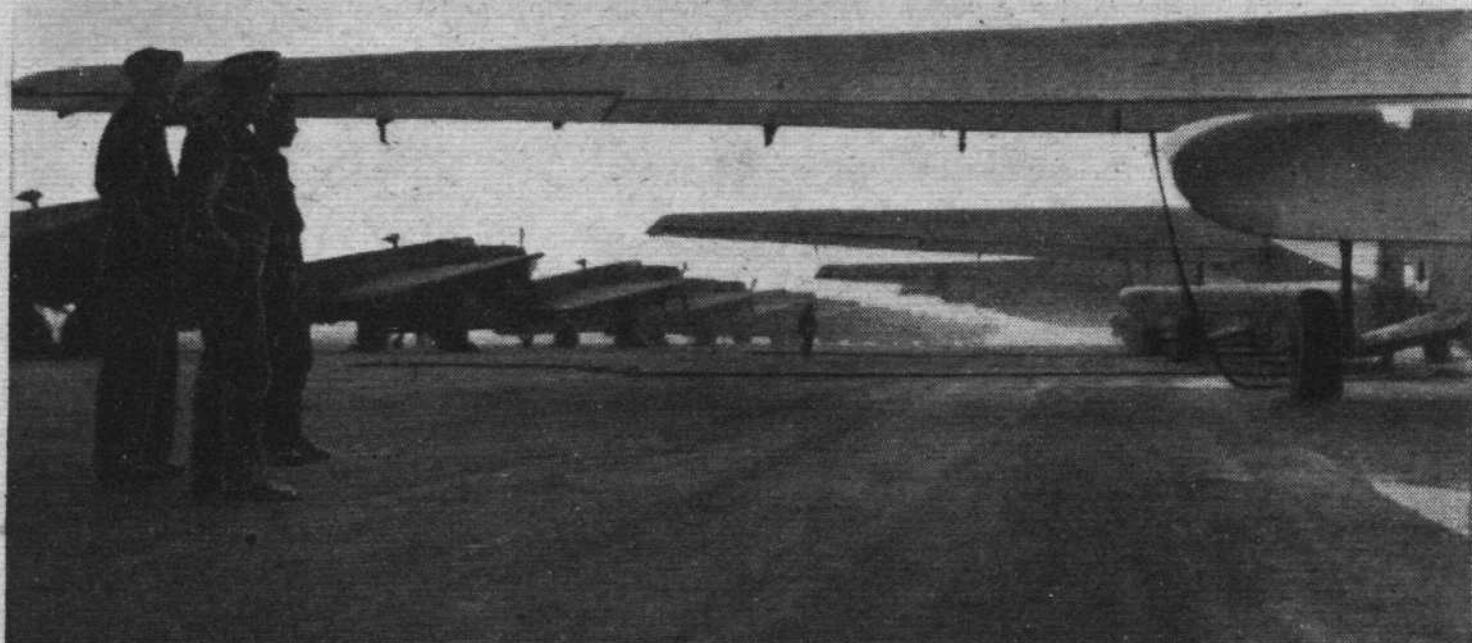
Take-off runs were measured by triangulation from data gathered by three observers using plane tables or theodolites.

At 4,680ft. pressure altitude in still air and on fresh water, and an average outside air temperature of 28 deg. C., the take-off run at a gross weight of 48,000 lb. was 1,250 yards; at a gross weight of 51,000 lb. 1,550 yards, and at a gross weight of 54,000 lb. 1,900 yards. These results were most satisfactory, and demonstrated that the Sunderland has an excellent take-off performance in the most adverse conditions under which it is ever likely to be called upon to operate.

While the test Sunderland was at Durban, the torque-meter and other special instruments were transferred to a "C" Class flying boat, and it was interesting to learn that the performance of this somewhat elderly aircraft was still most satisfactory after some eight years of very hard work.

Progressive modifications are now being carried out on the Sunderlands by the Corporation at their Marine Base, Hythe, which will allow sixteen passengers to be carried fully berthed, thus giving day and night accommodation. Alterations are also being made to the flight deck to enable two adjustable reclining chairs for the use of the crew "off watch" to be fitted between the First Officer's seat and the bulkhead, where a space of 9ft. 3in. long has been made available by the removal of the Navigator's table and equipment to a position between the back of the Captain's seat and the space used by the Radio Officer.

No 38 GROUP



FOR THE RHINE CROSSING : Halifaxes and Hamilcars of No. 38 Group lined up ready for the great airborne attack.

A Striking Force with No Equal : How the British Airborne Armies Came Into Being

THE part played in the winning of the war in Europe by airborne forces has been considerable. Hitherto it has not been possible to tell the full story of how they originated. It is here told in brief outline, from the early beginnings in 1940 to the present time. It is to be greatly regretted that the chief of 38 Group, Air Vice-Marshal Scarlett-Streatfeild, C.B.E., should have lost his life with many others in an air accident in Norway, after commanding with such distinction this new striking force, to which there is no counterpart elsewhere. It should be mentioned here that 38 Group is responsible for all Royal Air Force airborne operations.

While this country was reeling from the fall of France and preparing to meet the onslaught of German air power, one or two R.A.F. officers were already planning for the day of our return into Europe. It was in June, 1940, that the need for a British Airborne Force was foreseen. Two men were selected to organise it: Wing Commander Sir Nigel Norman and Major John Rock. Wing Commander Norman came from the Air Ministry and Major Rock from the 13th Infantry Brigade, where he was a Brigade Major.

June 25th saw the formation of the Central Landing Establishment. Two problems faced the two Services: (1) the aircraft to be used; (2) the system of obtaining airborne troops. The first problem was tackled by providing Bombays for door-jumping, and Whitleys for "pull-

off" from the rear of the fuselage. To tackle the second it was decided to drop a number of P.T. instructors, and, after a certain amount of experience, to evolve a system of training, and use the men as instructors.

These men included Lieutenant Elliott, of the R.A., and Sergeant Davis, of the R.E. They tried jumping from the bomb bay and then from the rear of a Whitley, the belly gun turret having been removed. Next they experimented with jumping through a hole in the floor. This opening was designed jointly by Flight Sergeant (now Wing Commander) Breverton, a veteran of parachuting at Hendon

Air Displays, and Mr. Leslie Irving, the parachute manufacturer. It was then decided that this was the best way. The method of dropping was the old static-line system designed for use by balloon crews in the 1914-18 war.

The task of forming a Parachute Training School fell to Squadron Leader Louis Strange, D.S.O., M.C.,

D.F.C. and bar, assisted by Squadron Leader Benham. Squadron Leader Strange added the bar to his last-war D.F.C. for flying Hurricanes out of France under the noses of the Germans.

Close liaison between the Army and the R.A.F. soon produced a nucleus of efficient pilots and a keen and fearless set of R.A.F. and Army tutors. Next, volunteers were called for. There was an immediate response. Fifty men were selected from all branches of the Army, and they formed a hardy, devil-may-care crowd, willing to go any-

A tragic note is lent to this article by the news that Air Vice-Marshal Scarlett-Streatfeild, C.B.E., A.O.C. 38 Group, was killed, with many others, when his Stirling crashed in Norway on May 10th. Four Stirlings were leading an airborne force which was to assume temporary control after the surrender. Unexpected bad weather set in, and the four machines crashed in the Norwegian mountains.

where and do anything. Lieutenant-Colonel Jackson, of the Royal Tank Regiment, was their first C.O. These men finished their course with only two fatal casualties. This decided the War Office to release more men. No. 2 Commando was formed, and soon most of them had done their jumps.

At this point it was decided to increase the establishment of the C.L.E., and Group Captain Harvey was appointed to command. This meant that the school consisted of a combined R.A.F. and Army Unit commanded by a R.A.F. officer. It was one of the happiest and most efficient units in the three Services.

The first exercise was done on Salisbury Plain in December, 1940. Five aircraft were used with great success. Meanwhile glider work, which, in the summer of 1940, the Prime Minister had ordered to be put in hand, went on. Flying Officer Kronfeld, Pilot Officer Fender, and several other old sailplane pilots, were called in; they started initial training in Tiger Moths towing sailplanes. Very soon the prototype of the troop-carrying glider was produced. However, troops were not yet called upon to volunteer for glider-borne units.

A year later the Hotspur was produced, and Army glider pilots began training on a large scale. By the winter, Group Captain Sir Nigel Norman, who was later killed in an air accident in April, 1943, produced plans with Lieutenant General F. N. Browning for the formation of 38 Wing and the First Airborne Division. Working closely with the Glider Pilot Regiment, a fifty-fifty combination of R.A.F. and Army, commanded by Colonel Geo. Chatterton, the tug pilots trained ceaselessly to take the gliders over the exact spot needed for release.

First Airborne Operation

Meanwhile, training of parachute troops went on apace. January, 1941, saw preparations for the first airborne operations the British Army had ever done. The object was an aqueduct in Southern Italy. Major T. A. G. Pritchard of the R.W.F. was to command six "sticks" of ten men. The objective was the wrecking of the aqueduct and eventual escape by submarine. Wing Commander Tait—of *Tirpitz* fame—was selected to command the squadron. In February they left for Malta and dropped in Italy a few days later. The air side of this operation was a complete success.

The success of this operation proved to the Army and R.A.F. the need for a large airborne force to assist in the invasion of Europe. Soon it was decided to form a Division at home, and a Force of mixed British and Indian Airborne troops in India.

Six months before the invasion of Normandy the then Air Officer Commanding, Air Vice-Marshal L. N. Hollinghurst, was given the task of preparing the airborne forces for the operation. Then, as in the Rhine operation, the crews trained right up to the eve of D-day.

For the Rhine operation, Air Vice-Marshal Scarlett-Streatfeild achieved his operational strength between Christmas, 1944, and March 24th, 1945. 38 Wing, as it was in the early days, carried the banner.

For the purposes of an airborne operation, 38 Group controls 46 Group and forms the R.A.F. component of the First Allied Airborne Army with their American counterpart, 9th Troop Carrier Command.

38 Group trains its own aircrews and glider pilots. It is responsible for its allotments and servicing of its own gliders, containers, and parachutes; is responsible for the initial training of paratroops, and, for that matter, in many respects, the airborne divisions and the landing troops. Perhaps even the Royal Air Force in general does not realise that all parachute training is carried out under the control of 38 Group.

Some of the original squadrons took part in the Rhine operation, but few of the original pilots are left. Wing Commander Musgrave, recently awarded the D.F.C., rightly



THE FIRST OVER THE RHINE: Ground crews, their job done, watching Stirlings and Horsa gliders taking-off for Arnhem last September.

calls himself "the oldest inhabitant" of his squadron, but out of these early efforts have grown a spirit and a tradition which makes 38 Group, now perhaps the largest in the whole of the Royal Air Force, unique.

The scene on March 24th, 1945, when the terrific concourse of tugs and gliders stretched throughout the skies between here and Germany, provided a violent contrast to those which the enthusiasts saw in the early days. 38 Group, to launch the greatest airborne force ever, put every man from every station, tutor, tour-expired pilots, or even the tyro straight from the completion of his initial training, into the air. The magnitude of that effort may be appreciated from the fact that Group aircraft "lifted" a quarter of a million pounds more than the American force.

The Air Officer Commanding gladly conceded the major credit to all the air and ground personnel for their unbounding enthusiasm and continued co-operation. As he described their morale—"they are like a pool of petrol, and when an operation comes along one touch of a light and up they go in a terrific blaze of enthusiasm and effort."

How true this is can be seen in the fact that in the invasions of Sicily, Normandy, Holland and Germany, tug pilots went round and round in circuit through flak to ensure an exact release for their gliders. Glider pilots have held on through opposition and crash landings to come out of their gliders fighting—as infantry commanders. There has never been a combination quite like them.

ROTOL TRAINS SCHOOLBOYS

A NOVEL scheme to provide boys who mean to take up engineering careers with practical factory experience whilst still at school has recently been initiated by Rotol, Ltd., in collaboration with the authorities of Cheltenham College.

A number of boys from the college are at present supplementing their engineering education with a practical course in machine shop practice in the workshops which Rotol, Ltd., have specially equipped for the training of their own apprentices. While on this course the boys are treated as ordinary apprentices and have to arrive "on time" each morning at the factory, "clock in" and take their meals with other employees at the works canteen.

The object of the scheme, claimed to be the first of its kind in this country, is to provide highly skilled technicians for the nation in the shortest time possible by giving boys practical factory experience as a normal part of their school curriculum. In addition, the scheme will provide special courses during the long vacation for those who are studying for an engineering degree at the university.

STOCKHOLM—OSLO

THE Swedish Airotransport Company resumed a regular air service between Stockholm and Oslo when the first aircraft left for Oslo since the liberation of Norway.

The company hopes shortly to reopen a regular direct service between Stockholm and New York.

Two Novel Types

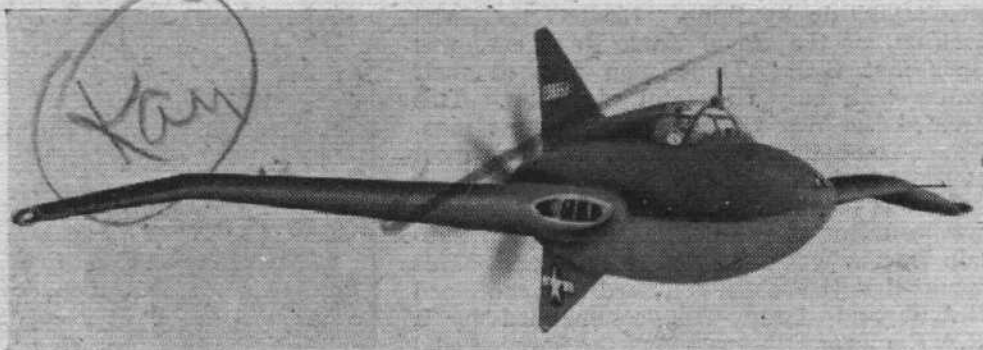
Pushers with Submerged Air-cooled Engines and All Flying Control Embodied in the Wings

PRELIMINARY announcements of two novel aircraft designs have recently reached us from America, and though they are in widely different categories, they have certain features in common which indicate some of the lines on which research and development are tending among experimental aircraft engineers in the U.S. The two aircraft are the Northrop XP-56 single-seater fighter and the Consolidated Spratt "controllable-wing" light aircraft; each is a pusher type employing an air-cooled engine buried in the fuselage behind the pilot, and with all the flying controls incorporated in the main supporting surface.

Except for the presence of fixed vertical stabilising fins above and below the rear extremity of the streamlined nacelle, the XP-56, designed by Jack Northrop, famous for his originality, may be said to fall into the "tailless" category, elevators and lateral controls being on the wing's trailing edge. The power unit, a Pratt and Whitney air-cooled radial engine, is mounted within the nacelle behind the pilot's cockpit and drives a six-bladed contra-rotating propeller. The engine is blower-cooled, air being admitted by ducts in the leading-edge roots of the wings. This aircraft is claimed to be the first pusher type to employ contra-props (giving high thrust with balanced torque reaction), and also the first with a completely submerged air-cooled engine. It is reported that successful flights have already been made and valuable data obtained.

This design, of course, has a number of immediately obvious advantages. Its all-up weight should be comparatively low, the submerged engine and nacelle offers the minimum parasitic drag, while the wing form suggests a high life/drag ratio. As a fighter, the absence of an airscrew in front benefits armament arrangements, but a pusher airscrew, unless it can be jettisoned, suggests the desirability of some means of ejecting the pilot clear of the blades when baling-out.

The second novel type is a small two-seater developed by William B. Stout, Consolidated Vultee's experimental engineer, which embodies a controllable wing evolved by George Spratt, the design specialist in the corporation's Stout Research Division at Dearborn, Michigan. This strikingly unusual little aircraft dispenses with normal elevators, ailerons and rudder, control being effected by movements of the parasol wing about two pivots, one giving a variable angle of attack and the other providing lateral and directional control. The



NORTHROP XP-56: This tailless pusher with submerged air-cooled engine and contra-prop is remarkably "clean." The apertures in the downswept wing-tips may have a control function.

tail is merely a stabilising unit, having fixed horizontal and vertical surfaces except for what appears from the photograph to be a trimming tab on the vertical fin.

So far no structural details or specification has been released for publication, but it would appear (again from the photograph) that a horizontally opposed engine is mounted inside the fuselage behind the cabin, air for both cooling and aspiration being taken in via louvres, one of which can be seen immediately behind the transparent, streamlined cabin top. In this case also, cooling is probably assisted by some form of blower. Below and slightly forward of the air-intake will be seen what is evidently the exhaust stub from the starboard cylinders, and immediately in front of this, a large inspection panel. Since the thrust-line of the propeller is obviously well above the level of the engine, the power unit is no doubt set at an angle in the fuselage and the drive carried aft via a shaft and one or more universal joints, or suitable gearing.

Another feature which will be noticed is the four-wheeled undercarriage, and bearing in mind "Bill" Stout's interest in the possibilities of the flying-flivver type of personal transport (this project has a foot throttle) it will be apparent that

if the controllable wing can be turned through 90 degrees to lie longitudinally above the fuselage, and the front pair of wheels are steerable, then this little aircraft could at least be driven between the local airstrip and the owner's garage—albeit at some breezy inconvenience to road-users immediately astern, unless one includes provision for declutching the airscrew and engaging an auxiliary drive to the rear wheels.

The idea of a tilting wing is, of course, almost as old as flying itself. One of the earliest machines to fly with a variable incidence wing was the



STOUT WORK I: Faintly reminiscent of the *Pou du Ciel*, this "Convair" experimental pusher with controllable wing and four-wheeled undercarriage hints at the flying flivver idea.

Paul Schmitt biplane exhibited at an early Paris Aero Show. The combination of lateral tilt with variable incidence was first used in the front plane of the Focke-Wulf "Ente" (tail-first) monoplane, with results fatal to Dr. Wulf who was piloting it. Just before this war an Italian inventor built a machine in which the main wing was controllable about both the transverse and longitudinal axes, but nothing more seems to have come of it. Mr. Stout, however, is quite enthusiastic about the results of the initial flight tests of his latest development. "Our little ship flew wonderfully," he reports in a letter to Mr. Geoffrey Smith, *Flight's* managing editor, who saw the machine in course of construction. "It is a single control job, more than fool-proof, and always flies horizontally." This last remark means, of course, that when the controllable wing is banked for a turn, or its incidence changed for climbing or descending, the fuselage maintains the normal level attitude in the rolling and pitching planes.

No big claims are made for the Spratt system by Consolidated; indeed they state that much further development will be necessary before it can replace the conventional method. But they envisage its eventual adoption for light aircraft.



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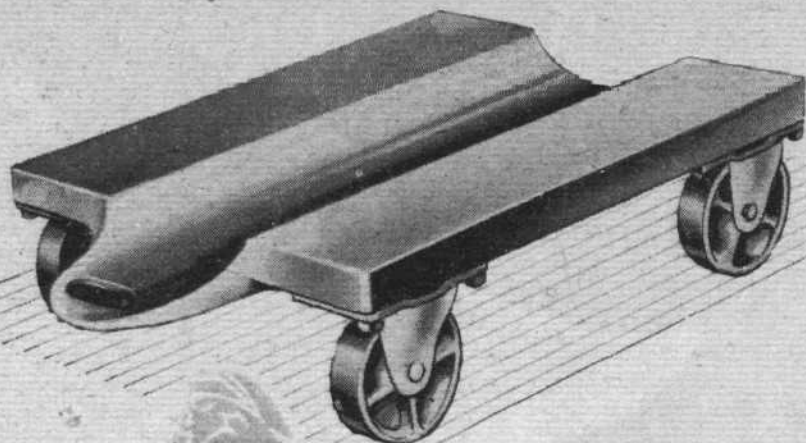
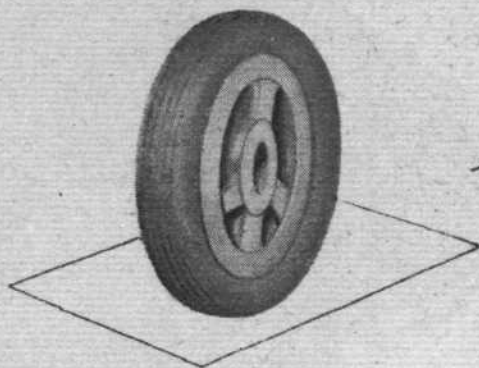


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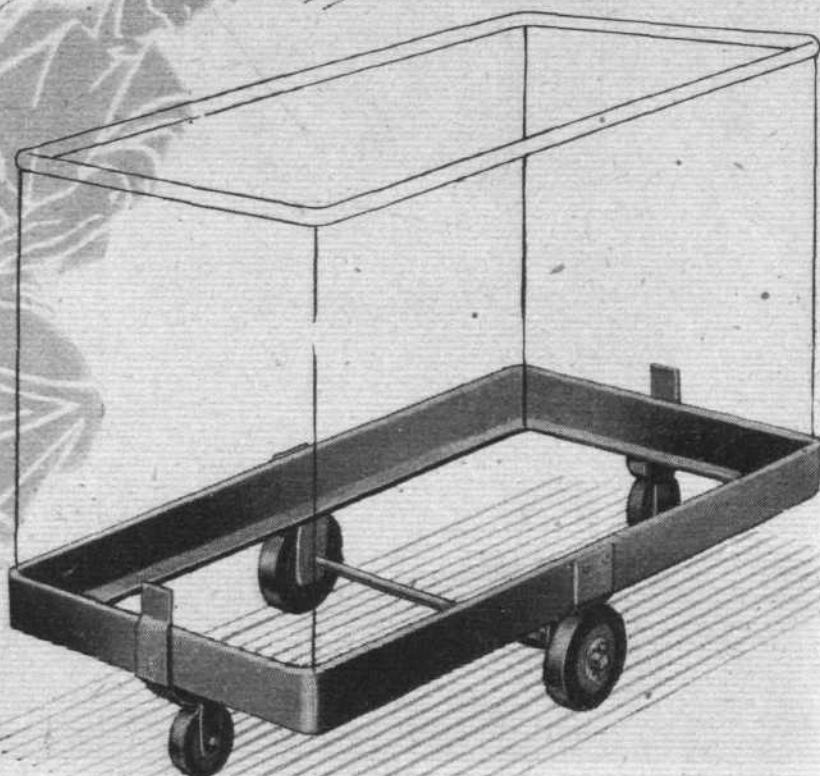
M A S T E R S O F T H E A I R

The Lightest Structural Metal



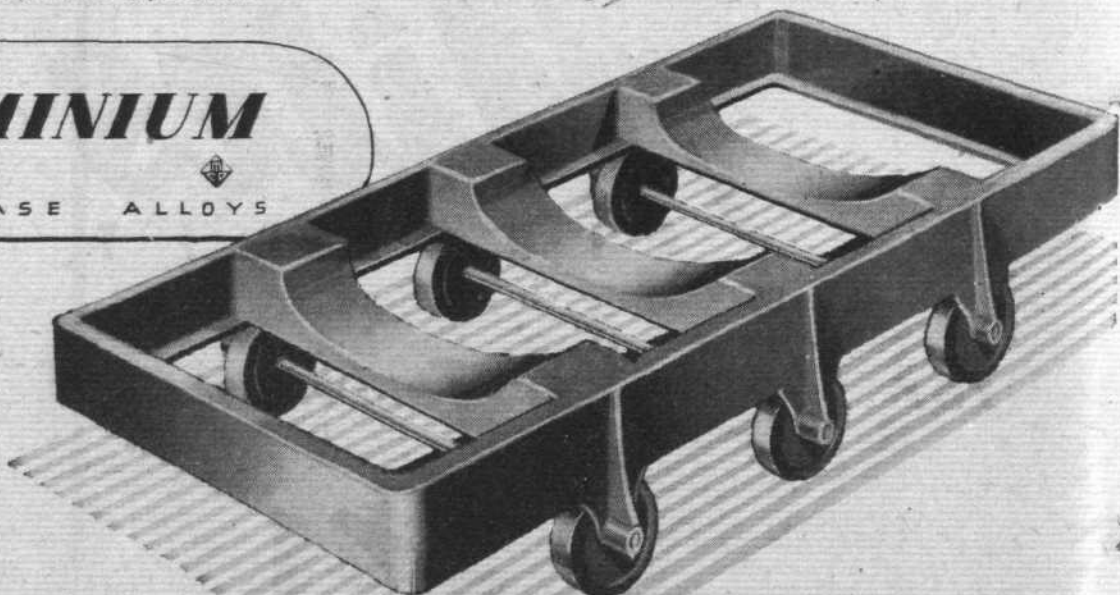
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The ultra-lightness and strength of Magnaluminium magnesium base alloys make them most desirable in the manufacture of all portable equipment. The use of this material—weighing only a quarter of steel—makes for speedier operation and bigger loads. Reciprocating parts of machinery, portable electric tools, domestic and office machines, are other uses for Magnaluminium. The alloy has excellent machining properties, is readily fabricated by ordinary methods and has a strength/weight ratio not approached by any other metal. Full technical details from Sales Department.



MAGNUMINIUM

MAGNESIUM BASE ALLOYS



D.H. Gipsy Major I

Now 1,500-hour Overhaul
Period

THE maximum permissible running time of the de Havilland Gipsy Major I engine between complete overhauls has been extended by the Director of Engine Development from 1,260 hours (already claimed to be longer than for any other engine) to 1,500 hours. This quite exceptional figure represents about double the overhaul period for the average aero engine, and that despite the fact that the Gipsy Major operates under the most arduous conditions that aviation can impose on a power unit, the conditions of the elementary flying schools, which involve endless repetitions of taking off, climbing on full power, gliding, taxiing and cooling down, this embodying a great deal of handling by inexperienced pupils. Thousands of these engines are in service and almost all the scores of thousands of pilots of the British Empire and Commonwealth have learned to fly behind the Gipsy Major. Its faithful dependability has meant much to the building up of their confidence in the air.

The first Gipsy engine was designed in 1937 (the prototype establishing a world speed record for its class) and entered service having an overhaul period of 450 hours with an output of 100 horse-power. Later increases in these figures are shown in Table I.

As early as 1938 a Gipsy engine completed 600 flying hours under seal, without top overhaul, but in view of its steadily increasing power no extension was then made to its overhaul life. With the entry of the Gipsy Major into service in 1932, however, it was decided to eliminate the top overhaul period of 150 hours and to run the full 450 hours with no attention to the engines other than routine checks. At first this caused aircraft operators some misgivings, but the step was soon proved to be justified and in 1933 world history was made by an increase of overhaul life to 750 hours. Since then the life between overhauls has in stages been increased by 100 per cent. Even the latest approval does not call for intermediate top overhauls, but in the Royal Air Force a schedule of inspections is laid down and if operating conditions have been such as to make one necessary it is undertaken.

After a complete overhaul an engine is restored literally to new condition, and is ready for a further full flying period. Many engines are now doing their third or fourth tours of duty, making a total time of up to 5,000 hours flying. The number of engines returned before they have completed their full period is small and it was mainly the very high average overhaul life shown by the 1943 figures (about 1,200 hours, excluding those which have crashed) which led to an investigation into the advisability of an increase to 1,500 hours flying time. Six engines in service at various Royal Air Force stations, picked at random from the records, were allowed to run on in service for a period of 1,500 hours under normal operating conditions. They were then sent to de Havillands and were stripped under inspection supervision. The following is a typical case history:—

The engine servicing time expired at 1,499 hours running time and the following major parts were found to require replacement, these being in addition to standard replacements such as joint gaskets, rubber connections, washers and split

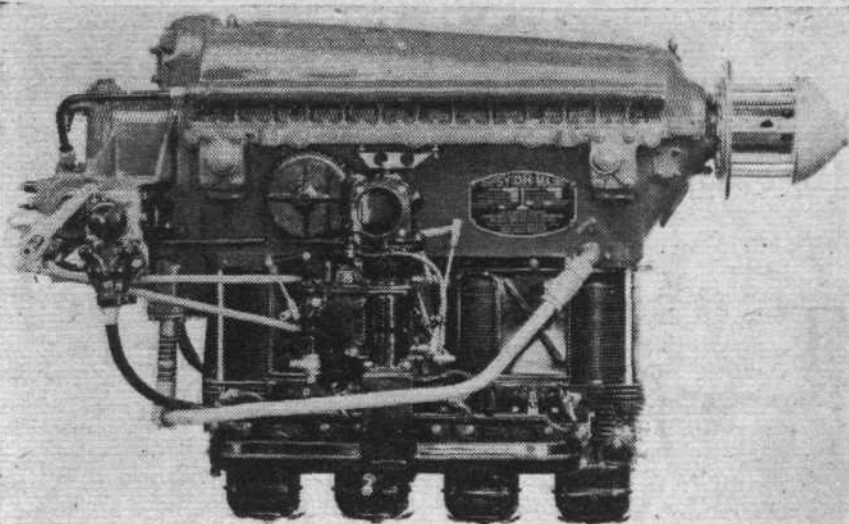


TABLE I

Year	Type	Description	Horse-power	Top overhaul	Complete overhaul
1928	Gipsy I ...	Four cylinder upright	100	150 hrs.	Hrs. 450
1930	Gipsy II ...	" " "	120	150 hrs.	450
1930	Gipsy III ...	Four cylinder inverted	120	150 hrs.	450
1932	Gipsy Major I	" " "	130	No top overhauls	450
1933	Gipsy III ...	" " "	120	" "	500
1933	Gipsy Major I	" " "	130	" "	750
1937	Gipsy Major I	" " "	130	" "	1,000
1944	Gipsy Major I	" " "	130	" "	1,200
1945	Gipsy Major I	" " "	130	" "	1,500

pins: 2 main bearings (due to modification, not wear); 2 connecting rods; 8 compression and 4 scraper rings; 8 valve guides; 8 rocker pads; 1 oil pump relief valve; 1 induction manifold elbow; 1 flame trap valve; 1 valve tappet. A number of control bushes, levers, etc., which do not receive positive lubrication, were also replaced.

As a further check of particular severity, one engine was completely re-assembled, using parts worn beyond maximum permissible limits, and submitted to 300 hours testing under type-test conditions which are so severe as to be equivalent to 1,000 hours of normal flying. No troubles were experienced and the engine completed its test in a most satisfactory way, the full throttle output being 111.5 h.p. at 2,100 r.p.m. and the oil consumption 3.2 pt./hr., as compared with 122 h.p. and 2pt./hr. for a new engine. Thus in the equivalent of 2,500 hours there is a drop of only 10.5 horse-power and an increase of 1.2 pt./hr. oil consumption compared with a new engine, both of which figures could be considerably improved by fitting a new set of piston rings.

The engine was then again stripped and examination showed that all parts had stood up to test extremely well, there being no sign of incipient failure anywhere. The de Havilland Engine Company, however, state that they wish to make it quite clear that this information is not intended to encourage or permit the building of engines to a lower standard than that laid down, and that this test was only undertaken to prove their belief that the established overhaul life, although in excess of any other engine, is in fact conservative.

Besides the Gipsy Major four-cylinder engine there are also in service a large number of de Havilland Gipsy Six engines (or Gipsy Queen) of the type originated in 1933. In those days a maximum power rating of 200 h.p. and an overhaul period of 500 hours was given to the Gipsy Six I, but as shown in the figures of Table II the life was progressively increased. The main difference between the Six I and Six II is that provision for a controllable-pitch airscrew is made on the latter and it is modified to use leaded fuel.

During the war the de Havilland production of six-cylinder engines has been concentrated on the Gipsy Queen variants for the Royal Air Force for installation in both communication and training aircraft. For this work reliability and easy maintenance are essential, and as a result of the very large number of engines completing their overhaul life the South African Government have agreed to an extension for the Queen III to 1,000 hours.

In order to meet the post-war needs of both civil and military aircraft designs a new series of Gipsy Majors and Queens incorporating superchargers and reduction gear airscrew drives has been developed. Full particulars of these will be released in the very near future.

TABLE II

Year	Type	Description	Horse-power	Complete overhaul (No top overhauls)
1934	Gipsy Six I	Six cylinder Air cooled inverted	200	500 hrs.
1935	Gipsy Six I	" " "	200	Increased to 600 hrs.
1936	Gipsy Six II	" " "	205	600 hrs.
1938	Gipsy Six I	" " "	200	Increased to 750 hrs.

NOTE.—Gipsy Queen II and III engines, except for minor alterations, are similar to the Gipsy Six II and I respectively, being militarised versions.

Fuel Development

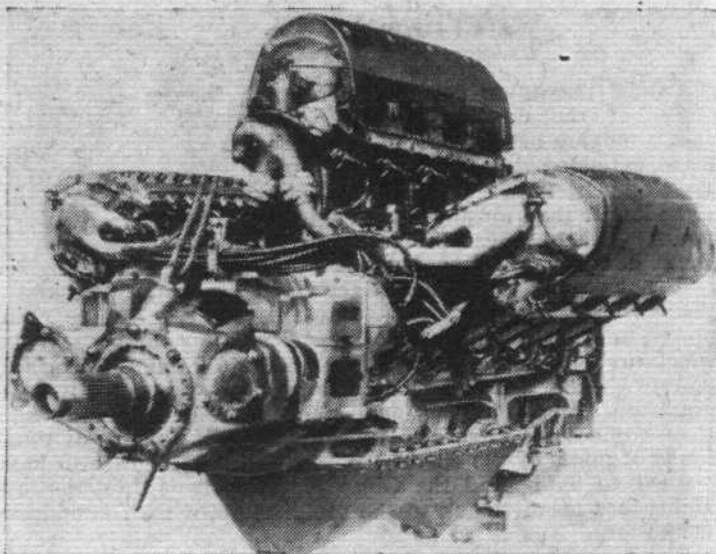
How Chemists and Scientists have Helped in Making Possible the Present High Specific Power Output of Aircraft Engines

THERE has recently been a good deal of mention regarding the high-grade fuels developed for aircraft engines which enabled the R.A.F.—more particularly the fighters—to attain such a great measure of success. But to obtain an accurate overall picture one must go back to 1927 and consider the Schneider Trophy seaplane contest—in fact, this series of races was in large measure responsible for the intensive development of fuels, and consonantly of engines. The lineage of the Spitfire is often said to embrace the Supermarine racing seaplanes built for the Schneider Trophy contests, and there is, no doubt, a certain amount to be said for this postulate; but there is emphatically not the slightest doubt that we have to thank the incidence of those contests for providing the incentive to obtain really high power outputs which brought about the tremendous development of fuels and engines.

In 1927 the Supermarine S.5 which won the race was fitted with a Napier engine which, although unsupercharged, by the use of a compression ratio of 10:1 and a special straight-run petrol with a high concentration of lead, developed 880 b.h.p. This was probably the first major aviation event where the engine could give of its best, without detonation limitations, and where the fuel was "tailored" for the engine. It was certainly the first instance where such a fuel was put to a practical purpose as distinct from laboratory experiment.

With the advent of a high-performance fuel, greater scope was given the engine designer—a point which is underlined by the example that in the space of two years, that is by 1929, the Schneider contest was won by the Supermarine S.6 powered with a Rolls-Royce "R" engine, supercharged and developing over 1,800 h.p. The increase in power of nearly 1,000 h.p. in two years was not the result of difference in engine size, design or supercharging by themselves; in those two years the fuel technicians had produced a semi-synthetic fuel containing tetra-ethyl-lead and certain other constituents which gave an enormous increase of power at rich-mixture ratings.

By 1931 the maximum power output of the same "R" engine had gone up by 50 per cent—again, largely due to the development of the fuel. The race was once more won



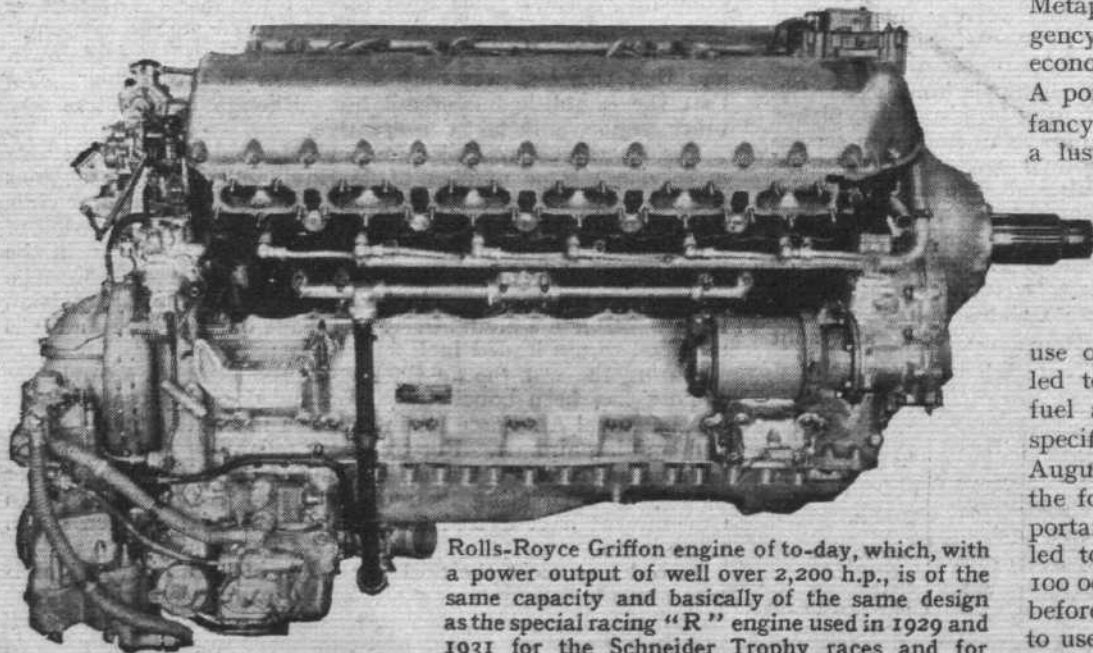
Napier Lion VII B, which won at Venice in 1927. The 12 cylinders are arranged in three banks of four; bore and stroke are $5\frac{1}{2} \times 5\frac{1}{2}$ in.; power-weight ratio is 1.05 lb./h.p., and for the race the fuel consumption was 50 gallons/hour.

by a Supermarine S.6 aircraft, the engine now developing 2,350 h.p. A successful attempt was also made on the world's speed record, and for this the power output of that magnificent engine was stepped up to no less than 2,650 h.p., practically entirely due to the fuel. As mentioned before in *Flight*, the present-day Rolls-Royce Griffon, latest of the company's aircraft engines, is of the same capacity and basic design as the "R" engine which was first used to win the 1929 Schneider Trophy.

From this brief survey and the latter remarks one can see two points very clearly: (i) how vitally important the Schneider Trophy contests were in bringing about so tremendous a development in aircraft, engines and fuels; and (ii) how the high-efficiency, delicate sprint engine of one decade becomes the tool of common usage in the next.

Metaphorically, what were the emergency ratings of yesterday are the economical cruising ratings of to-day. A pointer is also seen here to the infancy of aviation—we are still only in a lusty childhood.

The rate and extent of engine and fuel development from the late '20s very clearly demonstrated to the authorities the scope for obtaining higher powers by the use of selected fuels; this eventually led to the employment of 87 octane fuel as standard in the R.A.F.—the specification DTD 230 being issued in August, 1933. The Air Ministry had the foresight to realise the critical importance of high-duty fuels, and this led to the issue of a specification for 100 octane in March, 1937—sufficiently before the war to enable our fighters to use it from the very start, although it did not come into general use



Rolls-Royce Griffon engine of to-day, which, with a power output of well over 2,200 h.p., is of the same capacity and basically of the same design as the special racing "R" engine used in 1929 and 1931 for the Schneider Trophy races and for establishing the world's speed records.

throughout the whole of the R.A.F. until August, 1940.

The standard fuel at present used for military purposes by the Allied Air Forces is known as 100/130 grade. This grading system, however, must not be confused with octane number. Very briefly, the meaning of "100/130 grade" is that the figure of "100" relates to the octane number of the fuel tested under laboratory conditions at maximum knock, weak mixture strength. The figure of "130," however, indicates the "rich mixture" value of the fuel when related to a full-scale engine at "take-off" or "combat" condition. It has been found that fuels of different composition, but of the same octane number under laboratory test, respond differently in full-scale engines. And a fuel grading of 100/130 means, at weak mixture strengths, the anti-knock value equals that of iso-octane, whereas at rich mixtures it is about 30 per cent. better than iso-octane and will, therefore, allow an equivalent increase in engine power at "take-off" or "combat" condition.

Full information on fuel grading is given in a recent R.Ae.S. Paper by Air Commodore F. R. Banks.*

* "The Importance of Power Unit Development" by Air Cdre. F. R. Banks. *Journal of the R.Ae.S.*, April, 1945.

Fog Dispersal

"Fido" Out of His Kennel : A Brilliant British Development

BEFORE the war the worst enemy of flying was fog. Instruments and radio could guide an aircraft to the vicinity of the airfield, but the final approach and touch-down had to be accomplished by the pilot, often a hazardous business. It required the urge of war to solve the problem of fog dispersal in an effective and by no means extravagant way. How many times have the public read in their newspapers the official statement: "All our aircraft returned"? That looked good in a communiqué, but it did not state how many crashed on landing at their base, or at some alternative station.

As usual, Mr. Churchill was not slow to appreciate what all this meant, and on September 26th, 1942, he sent a personal minute to Mr. Geoffrey Lloyd, Minister of Petroleum Warfare, urging immediate action. Sir Donald Banks, the chief executive, at once started things humming, and a series of experiments was begun. Firms which might be expected to contribute knowledge and equipment were called into consultation and asked to participate in the experiments. The L.M.S. built a coke-burning plant at Derby. The Gas Light and Coke Co. made experiments in the empty reservoir at Staines. Imperial Chemical Industries experimented with hot-air blowers driven by Rolls-Royce Merlin engines. The Anglo-Iranian Oil Co. experimented with artificial fog production at the Earls Court skating rink.

The upshot of all this experimentation was that it was proved that fog dispersal by heat was possible. Kent farmers had helped by lending their orchard heaters. It was found that a

A tremendous amount of valuable research and development work on aviation fuels has been done by British and American scientists. And the harmonious state of fuel research which exists on both sides of the Atlantic is due to the cordial attitude of joint effort which has marked work in this field for so long a period.

In so far as waging a war has been concerned, our fuel position was helped enormously by the discovery and production of certain fuel constituents evolved as a direct result of work in this country.

The production plants which were constructed for fuel production in this country are deserving of the highest praise, although this sphere of activity is not quite within the ambit of *Flight*. Suffice to say that our fuel technicians in all their fields of endeavour have attained a plane of success comparable with their fellow scientists in other spheres, and to whom we must accord equal honour for working so diligently in obscurity for so many years in order to give their country the fruit of their labours in her greatest hour of need. The importance of their contribution is not generally realised.

temperature increase of 7 deg. F. was sufficient to clear the fog from the area necessary.

Heat generation by coke burners was found too slow and required too long preparations. Petrol burners had the advantage of being quick-starting, and they could, in many instances, be supplied with fuel from the network of pipelines then being laid.

The first practical success was achieved on November 4th, 1942, at Worthy Down, Hants. On February 18th, 1943, Air Vice-Marshal Don Bennett landed on a Pathfinder airfield. That, however, was not in a fog. It was not until July 17th that conditions of real fog were tried. Then his aircraft took off and landed four times on a fog-cleared length of runway 1,300 yards long.

The first operational use of "Fido" was on November 19th, 1943, when four Halifaxes landed after an operational flight to the Ruhr. Visibility outside the cleared area was but 100 yards.

Since those days 15 airfields (14 on the east coast and one in Cornwall) have been equipped. They helped to make possible the stemming of von Rundstedt's break-through last December, and the 36 consecutive Mosquito raids on Berlin, many of which started from fog-bound airfields in East Anglia, to mention but two examples. Altogether it is estimated that 2,500 heavy bombers and their crews were saved at the expenditure of 100,000 tons of petrol.

Incidentally it may be mentioned that "Fido" represents the initial letters of Fog Investigation Dispersal Operations.



A Lancaster heavy bomber takes off, its outline blurred by the haze of the fires of the two "Fido" pipelines.

Aviation's Place in Civilization

Mr. T. P. Wright's Inspiring Wilbur Wright Memorial Lecture : Avoiding War : International Interdependence and Co-operation

THE 1945 Wilbur Wright Memorial Lecture to the Royal Aeronautical Society (the 33rd of the series) was delivered last Thursday by Theodore P. Wright, D.Sc., Hon. F.R.Ae.S., F.I.Ae.S., Administrator of Civil Aeronautics, U.S.A. Mr. Wright had finally chosen as his title "Aviation's Place in Civilization," after having first considered and abandoned titles such as "Aviation and the Neanderthal Man" and "Aviation—A Benevolent Spiral."

Mr. Wright made a totally unnecessary apology for introducing a personal note concerning his career. He felt, and we are sure his audience agreed, that only by so doing could they share his speculations on the need for universal appraisal of the fundamental import of aviation and his emphasis of a desire to see aviation so used as to make it a positive force in the progress of civilisation.

For convenience in visualising the plan of his lecture Mr. Wright dealt with his subject under ten headings: The problem; the scientific approach; historical aspects of transportation; military aviation and war; technical development; government and civil aviation; fields of usefulness for aircraft (comprising economic uses, transportation, communications, cultural considerations, and the international field); the Chicago Conference; collective security; conclusions.

The problem to be solved was summed up by the lecturer as: "Can we so manage aviation that it will contribute to the development of civilisation?" Stated in its simplest form, the problem of the scientific approach was the attainment of ability to apply the scientific approach to science itself; the ability to develop technical improvement towards desirable ends; to direct our machines to useful purposes. The scientist and the engineer must reflect upon the social import of their findings. Past experience tended to show that a league of States, unarmed, was powerless to prevent war. Possibly a group of nations united in peaceful purpose and collectively possessing a police force of sufficient speed and mobility could prevent wars. On the economic side, attempts at national self-sufficiency, prestige, subsidies and tariff walls had built up depressing influences elsewhere that had led to wars, and possibly over-emphasis of

nationalism and sovereign rights was inimical to the peace and prosperity of nations. Geographical isolation had been effective in keeping certain nations away from war, but this was now a thing of the past. Possibly an international air police force might work.

In reviewing the history of transportation Mr. Wright pointed out that air transport is simply transportation principally characterised by speed and a complete independence of surface conditions. Giving a four-to-one superiority over long-distance rail traffic and a seven-to-one superiority over water transport, the magnitude of the step was apparent. Air transport was also sharply distinguished from other means by introducing the third dimension.

Military aviation and war was dealt with next. In bombers, loads had risen to over 20,000 pounds, and in fighters speeds had reached 500 m.p.h. This growth, coupled with robot and rocket bombs and the likelihood of future use of lethal gas, pointed to the need for subordinating every other consideration to the prevention of future wars. Acres of gas-filled rockets, poised and aimed at distant cities, could only be stopped by preventing their production and installation. It was appropriate to stress the fact that warfare has changed from a conflict between armed forces to total war which encompassed whole populations, both as targets and as producers of weapons.

U.S. Production Programme

Mr. Wright thought this might best be illustrated by indicating the extent of the U.S. aircraft production programme. Fig. 1 indicates the output from July, 1940, to the present time in airframe weight, airframe employees, and resultant efficiency as pounds per employee per month. On Fig. 2 is shown the climb in output during the same period, repeating the airframe weight curve and adding the story on engine horse-power and number of aircraft. The magnitude of the effort is also depicted in terms of increase in airframe weight. Compared with July, 1940, production, the war period shows a 4,500 per cent. increase! The three-fold increase in the average size of aircraft during the period is of interest. In round numbers, the annual aircraft deliveries in the U.S., starting with 1940, were 6,000; 19,000; 48,000; 86,000, and finally in 1944, 96,000. But because of this increase in average size, the yearly output in terms of airframe weight increased from 21 million pounds in 1940, to 1.1 billion in 1944—over 50-fold.

In terms of overall national economy it is found that the manufacture of aircraft completely equipped for waging war has attained in the U.S. (when compared with total munitions output) 27 per cent.; with total manufacturing output of all kinds, of 20 per cent.; and with total national income of 10 per cent. Upward trend of costs was illustrated as follows: The *per capita* cost of killing one German or Jap is now 50,000 dollars. To kill each enemy soldier cost Napoleon but 3,000 dollars, and Caesar 75 cents!

Of great significance was the development of air transport during the war. With the exception of the specifically military character of some of its cargoes, all uses developed during the war for the air transport aircraft would have direct application to peacetime functions.

On the subject of government and civil aviation, Mr. Wright outlined the functions of the American Civil Aeronautics Board and the Civil Aeronautics Administration (of which he

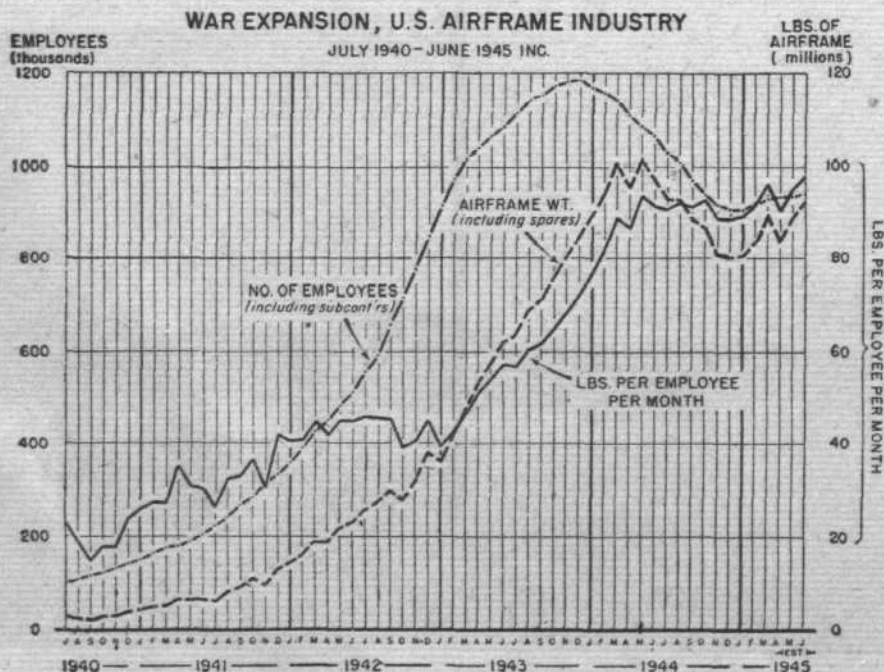
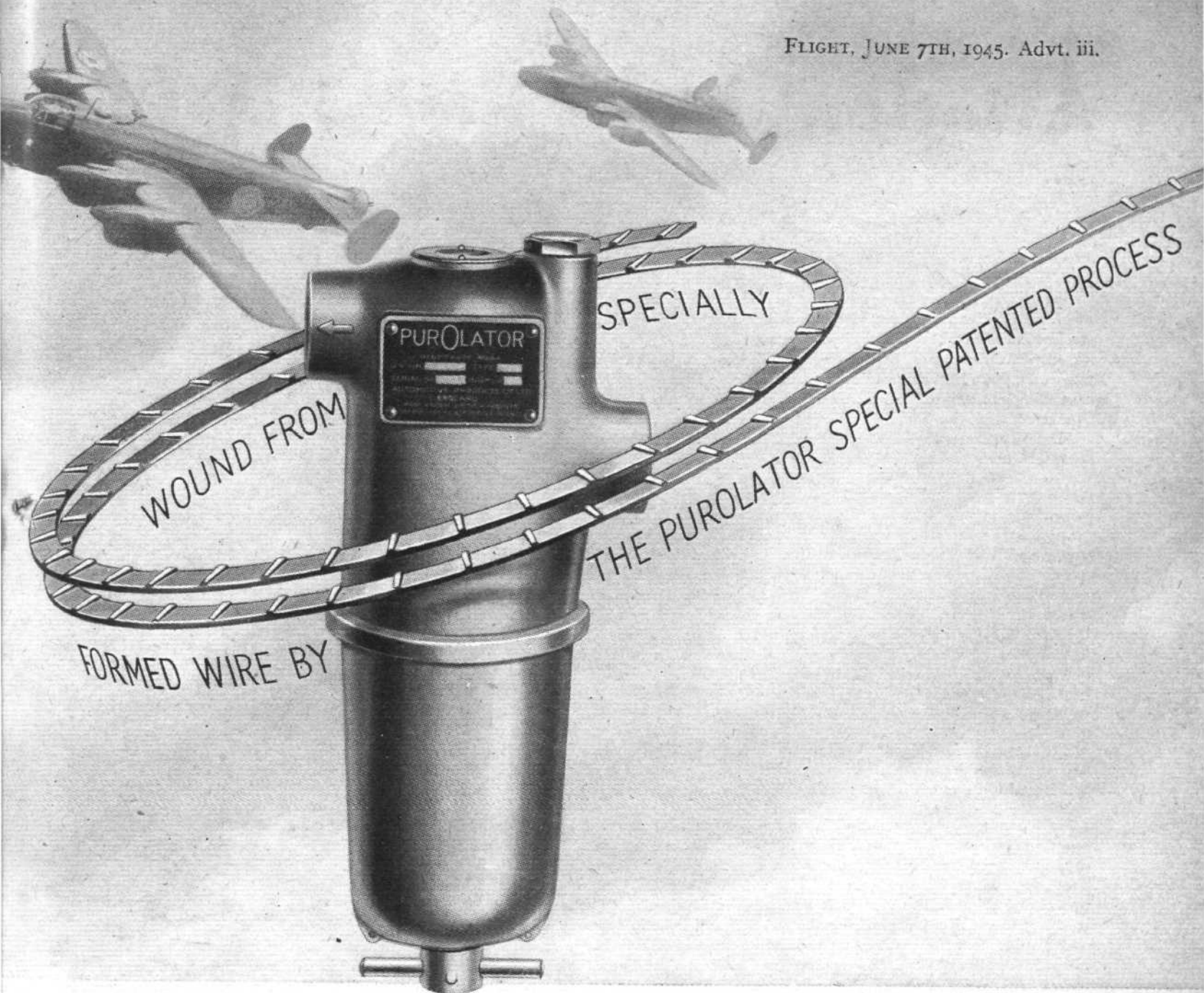


Fig. 1. American airframe output.



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strength, which enables them to be used for pressures up to 5,000 lbs. per sq. in.

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AUTOMOTIVE PRODUCTS COMPANY LTD., LEAMINGTON SPA, ENGLAND

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METAL REGD TRADE MARK ELEMENT FILTERS

FLIGHT
June 7,
1945.

Of every 5

heavy bombers produced between
1940 and June 1944

2 were

**HANDLEY PAGE
HALIFAXES**



AVIATION'S PLACE IN CIVILIZATION

is now chief). The functions of the former are mainly regulatory, while the second is executive, its purpose being, as summed up in the directive it has received from Congress, "to encourage and foster the development of civil aeronautics and air commerce in the United States and abroad." This promotional aspect is applied to the development of airports, training and education, preparation and dissemination of information and statistics, and participation in activities involving the furnishing of assistance to foreign countries. Its only operational function is the operation of federal airways. Here it establishes, maintains and operates all aids to air navigation which form part of the federal airways system.

In connection with personal aircraft, or, as we should call them, private-owner types, Mr. Wright made the interesting disclosure that it is the goal of the C.A.A. to have a total of 400,000 aircraft in ten years' time. This would necessitate improvements in the aircraft themselves, such as a reduction in price, enhanced safety, improved performance, decrease in noise, and improvements in undercarriages, possibly along the lines of the British Maclaren steerable landing gear, which makes cross-wind landings safe and practicable.

On the subject of technical development Mr. Wright said that advances in this direction and plans for the use of improved equipment must move in parallel. It should be appreciated that as the physical sciences advance, development is analogous to a regenerative furnace, feeding upon itself and ever accelerating. "It is always a mistake," he said, "in planning an operation or a use not to take these factors into account, and not to assume in advance improvements concerning which in many cases the hard-headed engineer will only shake his head."

Each Country's Share

Mr. Wright stressed the co-operative nature of development. During his many trips to England during the war he found that whereas America had something to contribute in line-production, turbo superchargers, pressure cabins, laminar-flow wings, precision bomb-sights, and types of naval aircraft, we in Great Britain showed great foresight on many scientific applications and design innovations, starting with the early appreciation of the value of the multi-gun fighter and the power-operated turret, and then such developments as the gyro-stabilised gun-sight, bubble canopy, sleeve-valve engine and automatic controls, and finally the gas turbine and jet power plant. To the Soviet Union we must ascribe the original conception of the potential importance of paratroops, and to Germany the development and use of the glider, the buzz bomb and the rocket. "So, too," Mr. Wright continued, "in a world concerning itself with the advancement of civilisation, there will be need for the national characteristics and aptitudes of all people to supplement the individual effort of a particular State if optimum progress is to be achieved. It is important that we use this vast reservoir of knowledge, acquired during the war, for advancing the general welfare thereafter. Through intensification of research and implementation of technical education, and with the groundwork in technical development in aviation which we now inherit, we are, I believe, on the threshold of the greatest period of aeronautical development that has yet been witnessed."

Among the items which might revolutionise development Mr. Wright mentioned the gas turbine and jet power plant, which will increase in efficiency as speeds go up, thus making aerodynamic development a limiting factor

NUMBER OF AIRCRAFT, AIRFRAME WT. & ENGINE H.P.*

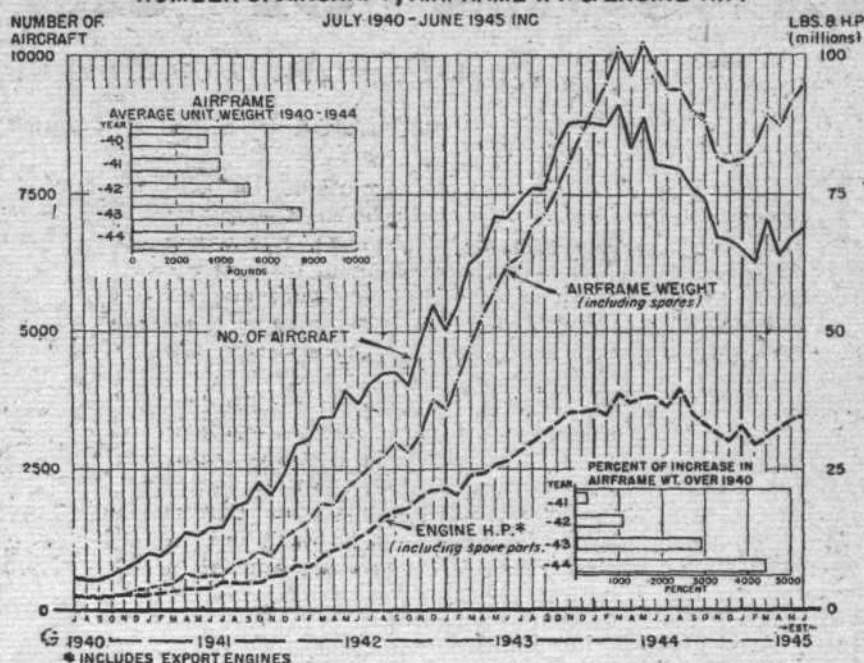


Fig. 2. Growth in aircraft numbers and horse-power.

in speeds to be attained as distinguished from the power-plant limitations already reached at speeds of 475 m.p.h.; laminar-flow wings; and the development of structural designs suitable for thin wings. Our greatest effort in research would be the investigation of aerodynamic phenomena at supersonic speeds. We might have far to go before transcending the speed of sound, but rapidity of development indicated that this might be accomplished in the not too distant future. In passing, having exceeded the speed of sound, there was some reduction in drag coefficient.

Developments of comparable magnitude were found in the electronic field. Electronic devices which would make all-weather operation safe were in the offing, and further developments, probably using radar, would make traffic control a matter of individual separation, as on the roads, rather than by ground instruction and control. Each pilot would "do his own flying."

The helicopter (which Mr. Wright said "is only just getting itself off the front pages of popular magazines") would experience an intensive development which bids fair to make it a popular private aircraft of the future. It would supplement the air transport aircraft as the automobile does the railway. There were possibilities of combining rotating and fixed-wing aircraft. Thus we might achieve both low landing speed and high cruising speed, the latter apparently not attainable by the helicopter itself.

Summing up this part of his paper Mr. Wright said that he thought technical development will be greater in the next ten years than in the past, and that we must foresee and anticipate this development to a considerable extent in order properly to evaluate the fields of usefulness of aviation in the future. (This evaluation, and the remaining portions of Mr. Wright's paper, will be published in next week's issue.—Ed.)

A reprint of the third edition of
GAS TURBINES AND JET PROPULSION FOR AIRCRAFT
by G. Geoffrey Smith

will be available next week and booksellers will then be in a position to execute orders which they have in hand. A further limited number of copies will be available and orders should be placed with booksellers. The price is 6/- or 6/4 post free direct from FLIGHT Offices, Dorset House, Stamford Street, London, S.E.1.

Lessons of the Air War

Part IV—Air Power and Land Power

By MAJOR F. A. de V. ROBERTSON, V.D.

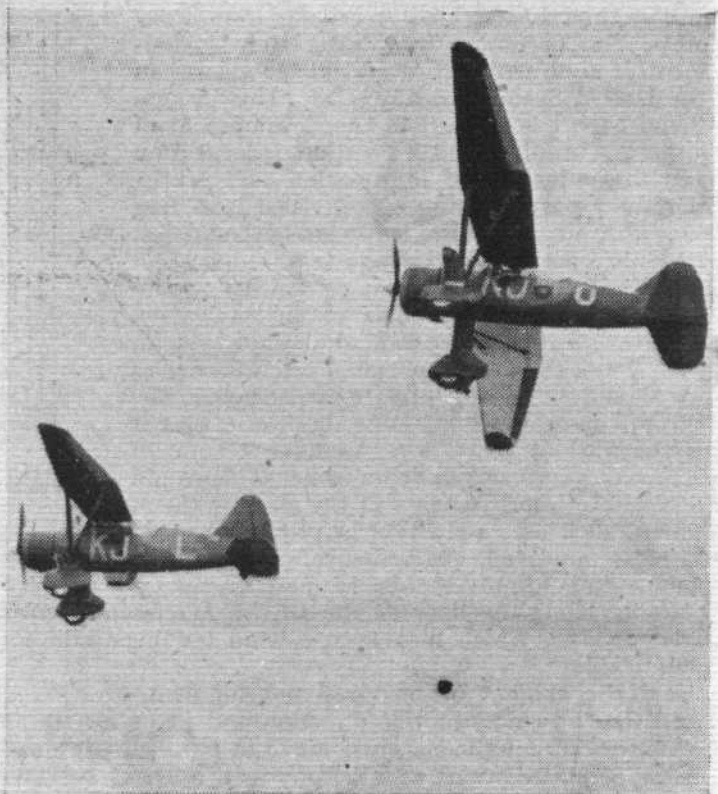
THE German war brought home to most of the belligerents lessons which they ought to have learnt for themselves in the days of preparation, but which had not been grasped in full. Some of them realised the importance of those lessons as the conflict went on and tried to put them into practice. Of these some were successful, while others found that they had started too late.

History nearly always exerts its influence on warlike doctrines, as upon other spheres of human progress—or lack of progress. It was only to be expected that the major tactics of the 1914-1918 war should affect the thoughts of the General Staffs which were, consciously or unconsciously, preparing for the struggle which broke out in 1939. The first world war, despite the pressure applied to Germany by the relentless blockade maintained by the British Navy, took the form of a land war. Germany was beaten to her knees by the infantry and artillery of Britain and France, aided in the last two years or so by the British invention of the tank. Throughout the four years of fighting the air arms of both sides acted almost entirely as ancillary arms of the armies. In saying that we do not intend to depreciate the valuable services of the Royal Naval Air Force. It did much useful work, especially in escorting convoys of ships; but it was on the whole an undeveloped Service, and could never play an important part in a major battle.

It is true that during the last seven months of the war Britain had formed the Royal Air Force as a separate Service. The Independent Air Force gave the German industrial cities in the Rhineland a foretaste of what strategic bombing might one day come to be; but the period was too short and the bombs were too light to make much impression on military thought. The broad fact remained that the Royal Air Force, like the air arms of France and Germany, existed chiefly to help the armies on the ground.

In the inter-war years the High Commands of France, Russia and Germany remained army-minded. It was natural enough that that should be so. All three are continental Powers, accustomed to rely on their armies for defence or aggression. All proceeded to develop their air arms as branches of their armies—even though France, for one, established a separate Air Ministry. All three devoted much thought and experiment to developing the help which the air could give to ground troops, and never seemed to let their thoughts stray beyond that one idea.

British thought moved in the opposite direction. Only at a few crises in her history has Britain ever been army-minded. After a major war is over, the British tendency always is to reduce the Army to a minimum, just sufficient to deal with frontier wars against savage or semi-civilised



The distinctive Westland Lysander which was the standard British Army co-operation type at the outbreak. An extensive system of slots and flaps gave short take-off and landing characteristics.

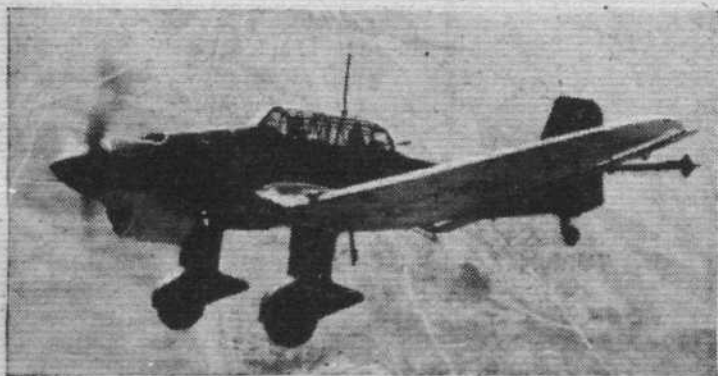
opponents. The public consoles itself by listening to music-hall songs such as "The little British Army goes a damned long way."

In a previous article it has been described how the Air Ministry decided that in a future war the best help which Britain could give to her continental Allies would be to raise an aggressive force of bombers which could attack the enemy's centres of war production. Experience has shown how effective this policy became.

No Close Support

It was less creditable to British military thought that the question of using air power to assist land power was scarcely studied at all. One must admit that for many years the Government's policy of economy and disarmament prevented the Air Ministry from raising as many air squadrons as it would have liked to do. But this is not an excuse for what can only be called the shelving of the whole question of air support for ground troops. No serious attempt seems to have been made to formulate an air-land doctrine. The blame must be distributed between the War Office and the Air Ministry, and probably the former was most culpable. The Army Estimates were also cut to the bone; and it seems that the Army Council thought it wisest to spend what little money it had on experiments with tanks, and to accept without demur what air support the Air Ministry felt able to provide. For several years only four squadrons (Nos. 2, 4, 13 and 16) were allotted for permanent service with the Army. There was also a School of Army Co-operation. The cost of these was borne on the Air Estimates, and the War Office made no appropriation-in-aid, as the Admiralty did in the case of the Fleet Air Arm.

Consequently, when war broke out in 1939, the strange



The one-time famous Junkers Ju 87 dive bomber which the Germans used in the early stages of the war in a close-support role.

position existed that in Germany and Russia the air force was extravagantly army-minded, while in Britain it was hardly army-minded at all. Russia, perhaps, was justified by results; it is rather hard to say. Germany and Britain, in turn, had to pay dearly for concentrating to excess on one or two aspects of air power and for failing to realise that in these days the air enters into every sort of military operation, and that to forget or neglect air power is asking for trouble. Britain's first bitter lesson was when her Army was driven out of France and the Low Countries. Germany had to swallow her first dose of medicine in the Battle of Britain. In that decisive struggle it was air attack versus air defence, and the *Luftwaffe* was like a lost sheep.

Mention has been made of the four squadrons which for a number of years constituted the whole permanent provision made by the Air Ministry for the needs of the Army. When rearmament began at the time of the tension with Germany over Czechoslovakia, the number was increased. In fact, if we remember right, it was actually doubled. These units were called Army Co-operation Squadrons, and it is not improbable that this high-sounding name misled even Members of Parliament and Treasury officials into thinking that they provided for all the needs of the Army. Actually they were only tactical reconnaissance squadrons, trained and equipped to reconnoitre up to 50 miles behind the enemy's lines, and to spot for the artillery. They were very highly trained in these forms of work, but they could not be expected to hold their own against fighters, or to do anything but the mildest bombing. When Army manoeuvres were held it was the custom for squadrons of fighters and day-bombers to be lent to each side by the Command known as Air Defence of Great Britain. It was also laid down that when an expeditionary force went overseas it should contain an Air Component of fighter and bomber squadrons in addition to the Army Co-operation Squadrons, and that the General Officer Commanding should have operational control over this Component.

Lord Gort took an Air Component with him when he led his Army into France in 1939. It was pitifully small, and the squadrons of fighters and bombers had not been specially trained to work with the Army. We need not recount the melancholy story which ended at Dunkerque. It is enough to say that it was obvious to everyone that air support for an Army was a subject on which British authorities were lamentably ignorant; while the Germans, by using dive bombers and tanks in unison had worked out a technique which at first was highly successful, and had taken Poles and Frenchmen by surprise. Nor need we spend time on the short-lived Army Co-operation Command which the R.A.F. formed after Dunkerque.

The Scene Changes

The scene changes to the Middle East. There at first General (now Lord) Wavell commanded the Army and Air Chief Marshal Longmore was A.O.C.-in-C. of the Air Force. We have been told that they lived in the same house in Cairo and worked together in the closest co-operation. The R.A.F. fighters, mostly Gladiators at first, speedily established a superiority over the Italians. All went well with the first year's campaign, until the decision to help Greece against the Germans robbed us of our strength in Africa. The Air Force was presently reinforced, but then the Germans superseded the Italians. Again the R.A.F. got on top and beat the *Luftwaffe*. But we had no air weapon which was effective against tanks, and the German tanks



Rocket-armed fighter-dive bombers, typified in the Hawker Typhoon, proved to be the best close-support aircraft. They were called up on the radio as required.

were superior to ours. So, in spite of our air superiority, General Auchinleck was driven back to Alamein.

The Prime Minister visited the Middle East, and on his return he told the House of Commons that he had directed the Air Force to carry out the intentions of the Army Commanders, even if it meant abandoning some tempting targets. From that order dates the 1st Tactical Air Force, and from that moment all went well. No doubt Sir Arthur Coningham had a stronger and better-equipped force at his disposal than his predecessors had had; but the sudden change in our fortunes makes it almost certain that not only new methods had come into vogue but a new spirit of co-operation. Our aircraft began to intervene effectively in land battles, and sometimes to blast a way open in front of our troops. Britain had at last learnt how to combine land power and air power with effect.

Command of 2nd T.A.F.

If further proof were needed of the change which had come over the scene and of its appreciation in the highest circles in London, it would be found in the abolition of the Army Co-operation Command, the formation in its place of the 2nd Tactical Air Force in Great Britain, and the transference of Air Marshal Coningham from command of the 1st to command of the 2nd Tactical Air Force. As usual in all British successes during the war, it was Mr. Winston Churchill who first saw what ought to be done, and ordered that it should be done. In this case it was Sir Arthur Coningham who put the orders into effect, and made a brilliant success of the business. Credit must also be given to those whose brains conceived the idea of arming Beaufighters with rockets, and to those who made those formidable weapons available.

The list of those who contributed in one way or another to the success of 2nd T.A.F. must be a long one. But special mention must be made of those who planned the sequence of operations before and after the landing in Normandy. The basis of air power is the fighter; and so a whole series of attacks was made on German fighter factories. Then came the concentrated attacks on German oil supplies, and overlapping them were the destructive blows on German communications. Bomber Command shared largely in these operations, and it is a proof of a true realisation of air-army work that the offensive against production was slackened off when every possible bit of air assistance was needed by the Army. It did not matter whether the factories were producing weapons or not, so long as those weapons could not be transported up to the battle fronts.

Without intelligent and effective air assistance, the Allied Armies could never have made good their landing in Normandy. With that assistance they broke the German forces in the West in eleven months at comparatively light cost.

The lesson for the future needs no further stressing.

CIVIL AVIATION NEWS

NON-PRIORITY

BO.A.C. transatlantic flights open to non-priority travellers are expected to start within the next few months.

The service is to be operated on a four-times-a-week schedule with flying boats from Poole to Baltimore. Only a limited number of fare-paying non-priority passengers will be carried at first, but civilian allocation will increase as new aircraft become available.

WATERPROOF

WATER-PROOFING of soil runways is reported to have been perfected with a new compound named Stabinol.

By a simple application of the compound to the runway top soil, the latter retains a uniform all-weather load-carrying capacity without suffering under rain or capillary action.

All surfaces must, however, be self-draining because of the non-absorbent properties of the product. But since tests have shown that soil completely submerged for 90 days was still waterproof, formation of pools does not impair the load-carrying capacity.

LINK WITH AUSTRALIA

BRITISH OVERSEAS AIRWAYS last week inaugurated a new through service to Australia, the longest air route in the world.

A Lancastrian aircraft left the B.O.A.C.'s landplane base at Hurn, Dorset, manned by B.O.A.C. crews for Karachi. There crews of Qantas Empire Airways take over for the remainder of the 13,257 miles voyage.

A Qantas Lancastrian mail plane left Sydney in the opposite direction.

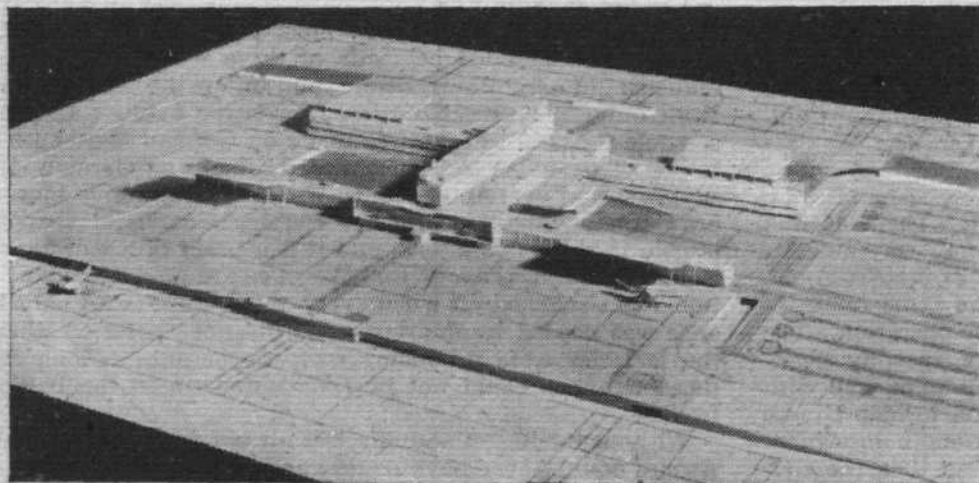
The new service, which for the present will be operated jointly by B.O.A.C. and Qantas Empire Airways and will fly once weekly in each direction, has been undertaken to serve the needs of the Far Eastern theatre of war and will carry freight and a small number of official passengers. The route is via Lydda (Palestine), Karachi and Ceylon. Sydney will be reached in under 70 hours.

AIRPORT FOR WARSAW

AMONG schemes for the rehabilitation and development of civil aviation in Poland prepared by the Aeronautical Department of the Polish Ministry of Industry and Shipping is a plan for a central airport in Warsaw. This airport has been selected to serve the future Polish network as well as European trunk routes.

The scheme provides for a division of traffic into two different zones, one for take-off and one for landings. Covering a surface of 2,530 acres, the airport comprises four main runways varying in length from 9,150ft. to 10,700ft., three auxiliary runways and a central section where the terminal buildings, hangars, etc., are located.

The terminal building consists of two wings, each facing arrival and departure platforms. One wing to be used for international traffic, the others for inland services.



WARSAW AIRPORT PROJECT: Terminal building with loading platforms in two levels. Transversal block houses control, radio and weather offices, etc.

To reduce the distance between the terminal building and aircraft in handling, platforms facing both wings are divided in two levels, the upper one serving for disembarkation, the lower for embarkation of passengers. A separate platform serves the transit traffic. The central part of the terminal building contains the main hall with booking offices and other facilities.

The central part of the airport accommodates an underground railway station, a bus terminal and parking facilities for taxis and private cars. Helicopter parking is provided between the parallel wings of the main building.

RENFREW—

AIR passengers from London are now being taken direct to Renfrew Airport instead of stopping at Prestwick.

The new service permits much quicker access to Glasgow. Passengers whose destination is the South of Scotland will have to travel by train from Glasgow.

—AND PRESTWICK

SCOTTISH AVIATION, LTD., owners of Prestwick Airport, have offered to hand over their enterprise to be run by the State, or a public corporation appointed by the State.

FARES

MR. PERKINS, Parliamentary Secretary, Ministry of Civil Aviation, told Mr. Woodburn (Lab., Clackmannan) that there are two air services available between Scotland and London. On one, London, Liverpool, Renfrew, the single fare is £9 and the return fare £14 10s., on the second service, London, Belfast, Renfrew, the single fare is £10 10s. and the return £17.

Saying that a Scottish firm has issued a booklet advertising a single fare at £3 9s. and a return fare of £6, Mr. Woodburn asked the Minister if this is the best he can do with his new policy.

In reply, the Parliamentary Secretary said that the pamphlet, though attractive, is not very accurate and has been produced by a company which has neither the experience in airline operation nor the aircraft to run airlines. The company hopes, he added, to rebuild crashed foreign aircraft, which is opposed to the Government's policy, which is that British airlines should use British machines.

By way of explaining the high fares, Mr. Perkins said that the aircraft at present available carry a crew of two and five passengers; thus, overheads are out of all proportion to payload. In twelve months, with Vikings becoming available, there should be a reduction of fares.

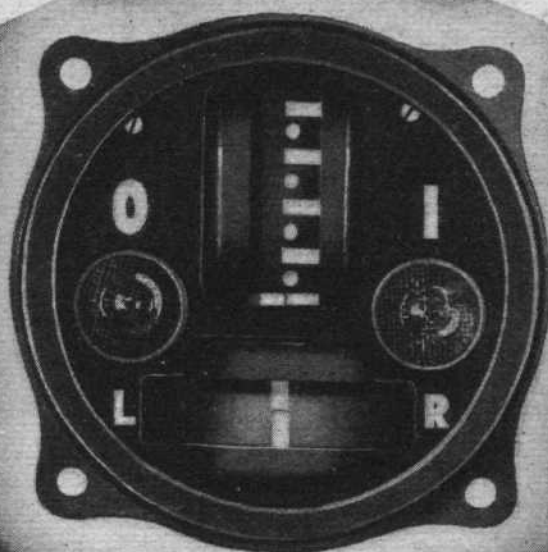
A.T.C.

ELEVEN United States airlines have contracts in all parts of the world which afford use of their aircraft and crews to the U.S. Army Air Forces. Such contract operations, however, account only for about 18 per cent. of the overall foreign transport activity of the U.S.A.F. Air Transport Command.

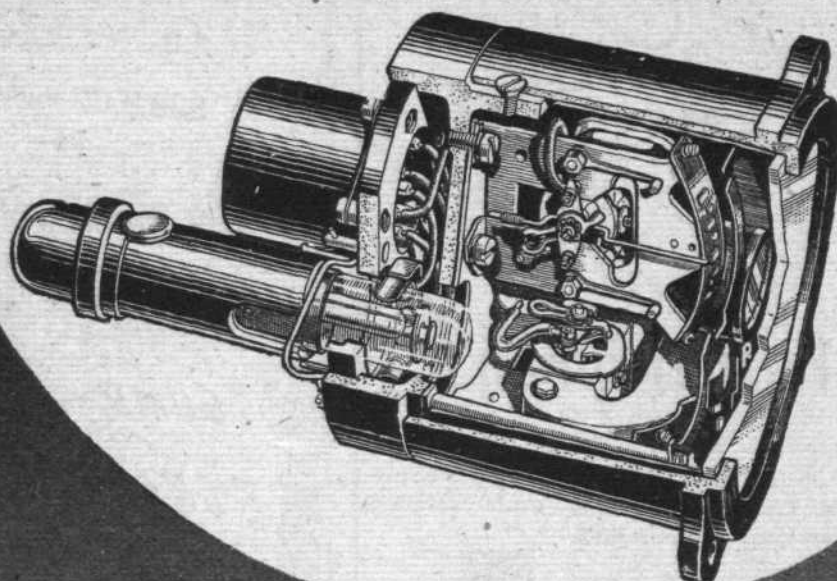
Starting in 1941 with two officers, four enlisted men and "a map of the world," the A.T.C. to-day operates routes stretching more than 160,000 miles. The fourth anniversary which the Command is now celebrating marks the conclusion of the period during which it grew into a truly global organisation: its aircraft fly more than 2,000,000 miles every 24 hours, about 25 per cent. in ferrying operations and 75 per cent. in transport service. During 1944 the A.T.C. flew 2,434,854,439 passenger-miles.

The operations of the A.T.C.'s European Division alone might be the envy of any air transport organisation of first magnitude. Headed by Brig. Gen. Earl S. Hoag, one of the most experienced men in U.S. military aviation, the European Division controlled more than a score of airfields in the U.K. and on the Continent, and has operated 14,500 route miles. Over that network the division's aircraft have flown almost 36,000,000 miles during the past 28 months.

FEATURES OF WESTON AIRCRAFT INSTRUMENTS



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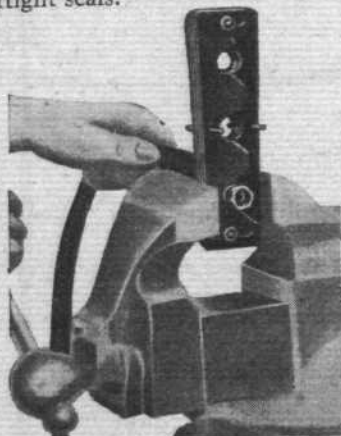
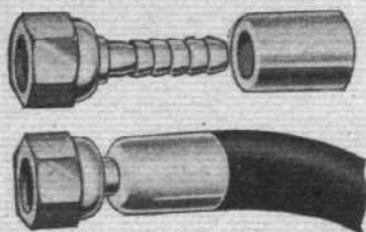
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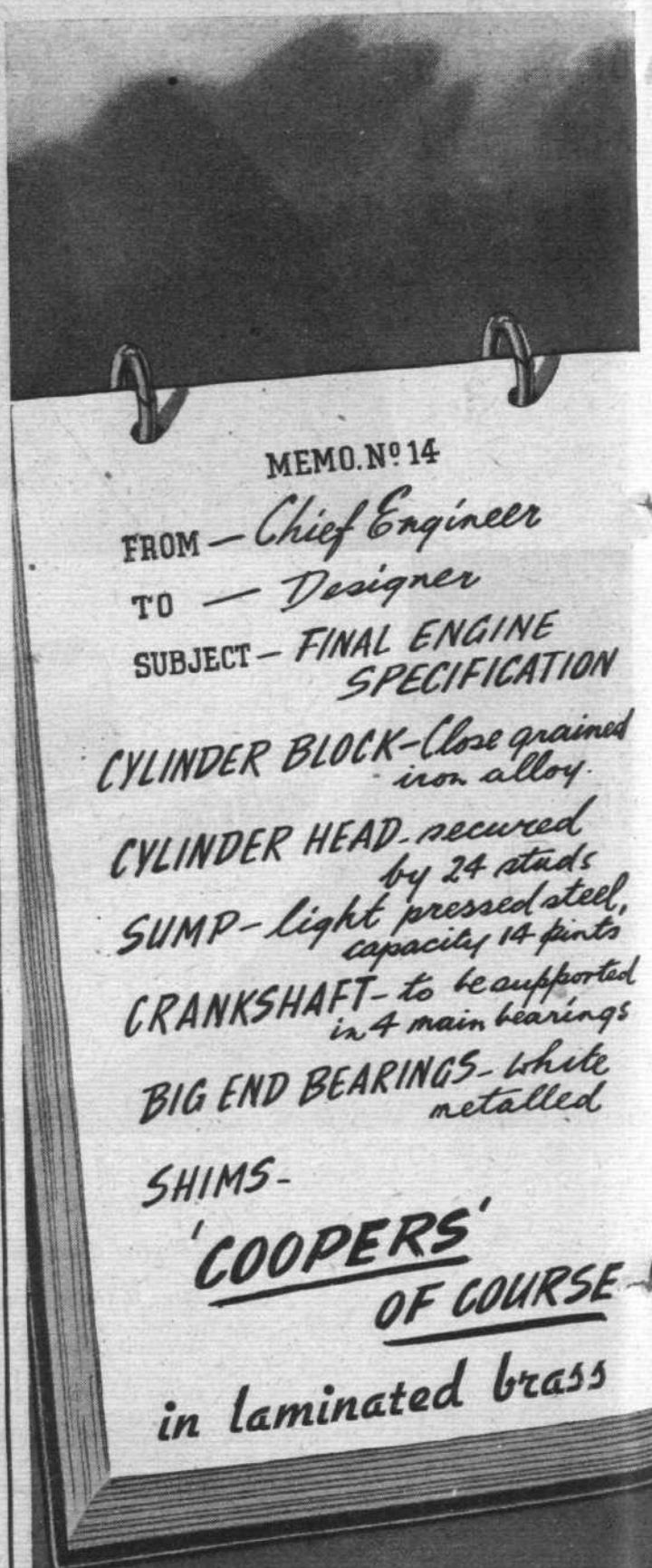
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The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers; not necessarily for publication, must in all cases accompany letters.

NATIONAL AIR MUSEUM

Britain's Part in Aeronautical Development

THE following suggestion is submitted for your opinion and for that of your readers all over the world.

That, in view of this country's vast contribution to aeronautical science, a National Museum should be founded to perpetuate such development. The exhibits should comprise every famous or unusually interesting British aircraft ever built. Subsidiary exhibits of airborne equipment and accessories should also be represented.

This should be backed up with a comprehensive record of the airmen and airwomen who have by their flying skill spread the fame of British aircraft to the corners of the earth. (But do not omit the technicians, amongst whom have been the world's finest designers.)

There can be only one site for such a monument—the new London Airport on the Bath Road.

The advantages of this choice are so obvious and the selection so appropriate, that I will only stress one of them: that here at least the flying public of foreign countries will be brought face to face with the realities of British achievement. What a fillip for the aircraft industry!

As for organisation, what body could be more suited for the job than the Air League? (They made a good job of the A.T.C. to the national benefit.) With the co-operation of the Air Ministry, the S.B.A.C., R.Ae.S., R.Ae.C., and the Kensington Science Museum authorities, a competent National Advisory Council should be formed and a start made at the earliest possible moment.

The premises of the Science Museum are wholly inadequate to keep pace with aeronautical development, and the entire aircraft section should be removed *en bloc* to form the nucleus of this project. The room vacated would be of greater value to the other phases of science and engineering.

There is a lot I feel tempted to write on the tremendous scope of this scheme, but I prefer to leave this to the imagination of your readers. I am happy merely to present the idea.

G. A. CHAMBERLAIN.

FLYING BOATS FOR FREIGHT

Using Existing Port Facilities

WITHOUT attempting to enter the lists on behalf of either the large landplane or the flying boat, but at the same time professing a little knowledge of the technical problems involved in the development of each, I cannot see how it is possible in the early stages of civil aviation to develop the freight service, at least, without bringing in the flying boat.

If the rail and shipping companies are to develop their own passenger and freight air services, which must of necessity be a gradual build-up, they will at the outset use much of their present machinery, and by that I mean their terminal ports, both to begin and end a journey. The present rail-shipping link-up is the result of centuries of experience throughout the world. What difference is there, then, in loading from the present rail-shipping docks system into a boat that will rise from the water other than the question of size? It is true that certain new methods of actual loading will have to be devised, but I see no reason why a flying boat cannot be brought bow on to a wharf and loaded, even in a river, in much the same way as a surface freighter is loaded. It then sheers off into mid-stream and sails merrily away, to alight in a similar manner and unload at its destination—or is this all too simple?

Four-fifths of the earth's surface is composed of water, and what remains, in almost every country I have visited, has at least one navigable river already highly developed in handling passengers and freight, with good rail links up to the interior. Often there are several such rivers. This is particularly true of the Far East. We have just been told through the medium of *Flight* that the longest non-stop flight in the world (3,500 miles entirely over sea) was operated by a twin-engine flying boat and/or a landplane.

If this, then, is a fact, what are we waiting for? Surely both types are urgently required—landplanes for the passengers and flying boats for freight. Hong-Kong pre-war handled the largest tonnage of any port in the world. Just look at its geographical position and its dock system! I have seen as many as ten to a dozen 10,000-ton British liners loading

or unloading at one time, as against one of any other nation, and each one of these had to cross great expanses of sea to get there, either from Liverpool, Seattle, or Vancouver. Substitute fleets of flying boats for these and you have the answer. China, French Cochin China, Thailand, etc., are all well supplied with good navigable rivers, within easy reach of Hong-Kong. All main ports on these rivers handle freight and have good unloading facilities.

What a hunting ground for the flying boat!

The trip either eastbound or westbound could be done in three long hops, in one-fifth of the time taken by surface freighter. The safety factor for either type of aircraft is about equal. Both can cover long distances. In the event of trouble the landplanes seek the nearest airfield, and the flying boat the nearest river. Over the sea it is the landplane that has to worry. What we require, then, at least for the early development of air-rail shipping freight services, is a long-range economical flying boat fitted with an underwater screw for taxiing up to the wharfs, or coming up or down river for take-off, which can be loaded through the top at any wharf and in any river where such work is now done by the surface freighter, and I believe that any concern which can have such a machine ready, to hand on a plate to the shipping companies at the right moment, will be the pioneer of air-freight, whilst the remainder are still arguing for or against the landplane versus the flying boat. There is plenty of scope for both types in their own prospective spheres of operation. Both types should and must be developed.

J. F. TRAINOR.

FLYING-BOAT MOORINGS

R.A.F. Adopted the Short Method

IN *Flight*, May 24th, I read Mr. John Grierson's letter on "Flying Boat Moorings." I am very pleased to hear of him again. When he made his first flight to Greenland with a de Havilland Moth fitted with Short all-metal floats to convert it into a seaplane, he sent me photographs and an account of his experiences.

My late brother, Eustace, who took his pilot's certificate at the age of 52 and flew for six years, always for preference when it was rough and stormy, was dying in the air from a heart attack. He managed to put the Mussel down safely on the Medway, but was dead when they got to him.

He was the man who invented rubber mooring buoys and also a long floating cable supported by cork. When this cable was picked up with a Grabbit boat hook and tied on the bollards of a flying boat, the machine was anchored to its main moorings in a temporary manner. By the use of a boat the anchorage was made fast to the main rubber buoy.

This method of mooring was adopted by the R.A.F. and used throughout the British Empire. The main rubber buoy prevented damage to hulls in collision.

In 1914 I constructed a floating platform which rose and fell with the tide, a distance of about 14ft. A seaplane could come alongside to embark or disembark passengers. It is still in use. Later I invented and put into practice at Rochester two platforms which rode up and down the slipway with the tide.

Press photographs show me demonstrating the device to the King of Spain and to the Duke of York, our present King, at Olympia in July, 1920, with a water tank in which I could reproduce the effect of rising and falling tides by means of a pump and an upper and lower water chamber. Later I secured a patent for a large floating hangar, into which flying boats could taxi and land passengers at platforms. Such hangars could be used in tidal waters with the possibility of a world-wide application of the invention. I should also mention that when it was proposed to use the harbour of Stranraer as a flying-boat station, my late brother Eustace proposed a rubber buoy with a long steel cable lying on the bed of the harbour.

The boat would first anchor at the buoy, pick up the cable and then be drawn ashore between two floating platforms. The drawings were made at Rochester, and Mr. Parker will remember them. It was not put into practice as Stranraer was considered by the local authorities to be unsuitable as a harbour for flying boats.

The patents of the brothers Short can most readily be found in the book "Abbreviated Patent List," issued by H.M. Patent Office.

HUGH OSWALD SHORT. F.R.Ae.S.

SERVICE AVIATION

Royal Air Force
and Fleet Air
Arm News and
Announcements



Gurkha paratroopers putting on their parachutes and equipment before taking-off for the invasion of Rangoon.

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations:—

Bar to Distinguished Service Order

Act. Group Capt. G. H. WOMERSLEY, D.S.O., D.F.C., R.A.F., No. 139 Sqn.—Group Capt. Womersley has now completed three tours of operations as pilot. His achievements on the many sorties which he has completed have been of a very high order. He has taken part in attacks against many of the most heavily defended targets in Germany, such as Berlin, Munich, Hanover, Mannheim and Frankfurt. On one occasion while over the heavily defended target of Mannheim, he descended to a low level to ensure accuracy. He also played an important role in a mine-laying operation in the Kiel Canal. Group Capt. Womersley has shown himself to be a most capable squadron commander. By his magnificent example and superb leadership he has raised the standard of efficiency in the squadron to a very high level. His devotion to duty at all times has been worthy of the highest praise.

Distinguished Service Order

Act. Wing Cdr. F. S. GONSALVES, D.F.C., R.A.F.V.R., No. 85 Sqn.—Since the award of the Distinguished Flying Cross, this officer has continued to display sterling qualities as a pilot and squadron commander. He has shown great courage and determination in several extremely dangerous and difficult situations. During November, 1944, Wing Cdr. Gonsalves shot down two enemy aircraft by night and, while under his command, the squadron has destroyed 41 enemy aircraft, all over enemy territory. He has always been distinguished for fine leadership and outstanding courage, and has done much to build up the efficiency of his squadron.

Act. Wing Cdr. A. J. OGILVIE, D.F.C., A.F.C., R.A.F., No. 90 Sqn.—Wing Cdr. Ogilvie is an outstanding officer who has always displayed great courage and devotion to duty. He has shown himself to be an efficient and determined pilot, and he has taken part in all operations which have required any special degree of skill. As squadron commander he has displayed excellent leadership and fine organising ability, and he has spared no efforts to ensure the operational success of his squadron. Since the award of the Distinguished Flying Cross, Wing Cdr. Ogilvie has completed many further sorties, which have included attacks against heavily defended German targets.

Act. Wing Cdr. J. M. VINEY, D.F.C., R.A.F., No. 640 Sqn.—Wing Cdr. Viney has completed

his second tour of operations, which has included attacks against such vital and heavily defended targets as Magdeburg, Essen, Brunswick, Duisburg, Munster and other important targets in occupied territories. On one occasion in September, 1944, this officer, as captain of aircraft, led his squadron on a daylight formation attack against Munster. His aircraft was subjected to intense anti-aircraft fire which caused considerable damage. One engine and the hydraulic system were rendered unserviceable and the bomb doors jammed. Undaunted, Wing Cdr. Viney continued to the target, but he had to remain over the target area for a considerable time before the bomb doors were opened. Although additional damage was sustained from the ground defences, this gallant officer completed a successful attack and obtained an excellent photograph. Both in the air and on the ground, Wing Cdr. Viney has displayed exceptionally fine leadership, the utmost keenness to operate against the enemy and skill and initiative of a very high order. By his magnificent example he has achieved and maintained a high standard of efficiency and enthusiasm in his squadron.

Act. Sqn. Ldr. F. W. W. CHANDLER, D.F.C., R.A.F.V.R., No. 156 Sqn.—Throughout his exceptionally long and successful operational career, Sqn. Ldr. Chandler has shown magnificent courage, determination and devotion to duty which have been worthy of the highest praise. He has nearly completed his fourth tour of operations and has participated in a very large number of attacks against heavily defended German targets. He has always remained undaunted despite the many hazards he has encountered, and has proved himself to be an outstandingly skilful and reliable navigator. By his great coolness and operational zest he has set a superb example to all members of his squadron.

Act. Sqn. Ldr. R. G. CHURCHER, D.F.C., R.A.F.V.R., No. 627 Sqn.—Since the award of a Bar to the Distinguished Flying Cross, this officer has taken part in numerous operational sorties, including two attacks against Berlin. In December, 1944, he was detailed as leader of a force attacking enemy shipping in a Norwegian naval base. The target was extremely well-defended, but, in the face of intense anti-aircraft fire and whilst illuminated by the flares which had been dropped, Sqn. Ldr. Churcher coolly placed his marker in position. His great skill and devotion to duty have been ably demonstrated in attacks against strongly defended major targets in Germany. In addition, he has taken part in the destruction of the enemy's transport system. At all times this officer has set an inspiring example of courage, skill and devotion to duty. He has never let either enemy opposition or adverse weather deter him from completing his allotted task.

Act. Sqn. Ldr. R. G. WOODMAN, D.F.C., R.A.F.V.R., No. 169 Sqn.

—Since the award of the Distinguished Flying Cross, Sqn. Ldr. Woodman has completed numerous bomber support operations. He has destroyed a further three enemy night fighters, which has brought his total victories to six enemy aircraft destroyed. He has flown on many varied operations, high and low-level sorties, and both night and day missions. At all times Sqn. Ldr. Woodman has set a magnificent example of gallant courage, superb tenacity and unflinching devotion to duty.

Act. Lt. G. W. McC. NEILL, R.A.F.V.R., No. 10 Sqn.—Act. Lt. Neill has completed numerous operational sorties against a wide range of targets. His gallantry and fine fighting spirit in the face of very heavy enemy opposition have set an inspiring example to all members of his crew. In September, 1944, he was captain of an aircraft detailed to attack Gelsenkirchen. On the approach to the target area severe damage was sustained from anti-aircraft fire, and one engine was rendered unserviceable. Undeterred, this officer pressed on to the target and successfully completed his mission. On another occasion during a sortie against Vaires, his aircraft was hit by heavy anti-aircraft fire while on the run-up to the target. Although the port main plane, starboard fin and mid-upper turret were damaged, he made an accurate bombing run. Act. Lt. Neill has played a major part in the training of new crews, and the successes achieved by his flight have been in a large measure, owing to his perseverance and planning. Throughout a long and varied operational career this officer has consistently displayed outstanding leadership, high courage and unflinching devotion to duty.

Bar to Distinguished Flying Cross

Act. Sqn. Ldr. P. L. ARNOTT, D.F.C., R.A.F.V.R., No. 234 Sqn.—This officer has led the squadron on more than 100 sorties and has displayed skill and keenness of a high order. He has invariably displayed great courage and throughout has set an example of efficiency and determination which has impressed all. His sterling qualities have been well reflected in the success of the squadron he commands.

Act. Lt. C. L. F. TALALA, D.F.C., R.A.F.V.R., No. 122 Sqn.—This officer has participated in a very large number of varied sorties. He has displayed the greatest keenness to engage the enemy and has invariably pressed home his attacks with determination. Among his successes is the destruction of four enemy aircraft.

Act. Wing Cdr. L. H. STYLES, D.F.C., R.A.F., No. 600 Sqn.—Since the award of the Distinguished Flying Cross, Wing Cdr. Styles has completed a further tour of operational duty. Under his inspiring leadership the squadron has destroyed 28 enemy aircraft, this officer being personally responsible for the destruction of three. The success the squadron has achieved is largely owing to the careful planning and untiring efforts of Wing Cdr. Styles.

Act. Sqn. Ldr. J. C. JOHNSON, D.F.C., R.A.F.V.R., No. 104 Sqn.—This officer has completed two tours of operational duty. Since the award of the Distinguished Flying Cross, he has attacked many major targets in Rumania, Austria, Yugo-Slavia and Northern Italy. Sqn. Ldr. Johnson has achieved particular success in



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mine-laying operations in the River Danube. During night bombing attacks he has also shown a high standard of efficiency. This officer is a flight commander and pilot of exceptional ability and courage who has invariably set an inspiring example to all.

Sqn. Ldr. R. A. SUTHERLAND, D.F.C., R.A.F.O., No. 602 Sqn.—This officer has consistently displayed skill and gallantry of a high order. In March, 1945, he led a small formation of aircraft in a low-level attack on an enemy patrol installation. In spite of fierce opposing fire the attack was well pressed home. The success obtained reflects the greatest credit on the efforts of Sqn. Ldr. Sutherland, who displayed exceptional skill and resolution throughout.

Act. Sqn. Ldr. R. W. A. MACKICHAN, D.F.C., R.A.F.V.R., No. 56 Sqn.—This officer continues to show the highest standard of skill and gallantry. Since being awarded the Distinguished Flying Cross he has led the squadron on many successful sorties far into enemy territory. During these operations Sqn. Ldr. Mackichan has, himself, effectively attacked a good number of locomotives, set several mechanical vehicles on fire and severely damaged many more; he has also shot down an enemy aircraft. In February, 1945, he led the squadron in an attack on an oil refinery east of Hanover. Six large oil containers and four smaller ones were set on fire; the refinery buildings were also set ablaze, and, before the formation turned away, a train of oil containers was machine-gunned. By his skilful leadership and exceptional determination, Sqn. Ldr. Mackichan contributed materially to the success achieved.

Act. Wing Cdr. H. P. CONNOLLY, D.F.C., A.F.M., R.A.F., No. 635 Sqn.—Since the award of the Distinguished Flying Cross, Wing Cdr. Connolly has completed many further sorties against such vital targets as Stuttgart, Essen and Munich. He has pressed home his attacks with the utmost determination and vigour and has always completed his tasks, however arduous, with outstanding cheerfulness and confidence. As flight commander, Wing Cdr. Connolly has displayed fine leadership and he has always maintained a high standard of courage and devotion to duty.

Act. Sqn. Ldr. J. H. DAY, D.F.C., R.A.F.V.R., No. 139 Sqn.—On the last sortie of his first tour in 1941, Sqn. Ldr. Day lost a leg as a result of enemy action. Undaunted by this physical handicap, he has completed many more sorties against the enemy since the award of the Distinguished Flying Cross. Throughout, he has displayed exceptional ability as a navigator. He has at all times set an inspiring example by his courage and devotion to duty.

Act. Sqn. Ldr. J. W. JORDAN, D.F.C., R.A.F.V.R., No. 105 Sqn.—Since the award of the Distinguished Flying Cross, Sqn. Ldr. Jordan has completed many more operational missions. He has maintained a high standard of skill and has displayed exceptional courage, fortitude and determination. Very many of his missions have been to heavily defended targets in Germany, and during the crucial period following "D" day he rendered outstanding service in attacking small and vital targets. Sqn. Ldr. Jordan's skill, courage and devotion to duty have always been of the highest order.

Act. Sqn. Ldr. B. J. REDMOND, D.F.C., R.A.F.V.R., No. 550 Sqn.—Sqn. Ldr. Redmond has completed a second tour of operations as deputy squadron commander and captain of aircraft. Since the award of the Distinguished Flying Cross he has completed many sorties against a variety of well-defended targets. Despite the adverse and hazardous circumstances he has encountered, he has always pressed home his attacks with the utmost determination and courage. The fine leadership and devotion to duty Sqn. Ldr. Redmond has always displayed have been most praiseworthy.

Act. Sqn. Ldr. A. A. ST. CLAIRE-MILLER, D.F.C., R.A.F.V.R.—Since the award of the Distinguished Flying Cross, Sqn. Ldr. St. Claire-Miller has completed further operational missions which have included attacks against Berlin, Königsberg, Danzig, Modane and Schweinfurt. Although acting as station navigation leader, Sqn. Ldr. St. Claire-Miller volunteered for these missions in order to keep himself conversant with operational practice. Throughout this long succession of volunteer sorties which have been of great assistance to the squadrons at his station, Sqn. Ldr. St. Claire-Miller has shown faultless navigation, high courage and great devotion to duty which have set a magnificent example to all navigators.

Act. Sqn. Ldr. W. SPOONER, D.F.C., R.A.F.V.R., No. 582 Sqn.—As captain of aircraft, Sqn. Ldr. Spooner has completed a large number of operational sorties against a wide range of targets. Since the award of the Distinguished Flying Cross he has consistently maintained a high standard of skill, cool courage and devotion to duty which has been most commendable.

Flt. Lt. J. C. CHAPMAN, D.F.C., R.A.F.V.R., No. 582 Sqn.—Since being recommended for the Distinguished Flying Cross this officer has completed many further operational sorties which have included attacks against heavily defended targets in Germany and enemy occupied territory. He has proved himself to be a very keen and skilful wireless operator and has materially contributed to the many successes achieved by his crew. Flt. Lt. Chapman's courage and devotion at all times have been most noteworthy.

SERVICE AVIATION

Flt. Lt. C. R. JACOBS, D.F.C., R.A.F.V.R., No. 608 Sqn.—Since being awarded the Distinguished Flying Cross, Flt. Lt. Jacobs has participated in numerous sorties, against very strongly defended German targets. He has displayed outstanding gallantry in pressing home his attacks, and as captain of aircraft he has displayed exceptional skill. His keenness and ability have set a sterling example to less experienced crews.

Distinguished Flying Cross

Act. Group Capt. U. Y. SHANNON, R.A.F., No. 10 Sqn.
Wing Cdr. S. P. COULSON, R.A.F., No. 35 Sqn.
Act. Sqn. Ldr. J. P. CRUMP, R.A.F.V.R., No. 109 Sqn.
Act. Sqn. Ldr. K. C. GOOCH, R.A.F., No. 35 Sqn.
Act. Sqn. Ldr. P. P. HAGUE, R.A.F.V.R., No. 103 Sqn.
Act. Sqn. Ldr. A. W. D. JAMES, R.A.F.V.R., No. 142 Sqn.
Act. Sqn. Ldr. R. I. P. MACKENZIE, R.A.F.V.R., No. 571 Sqn.
Act. Sqn. Ldr. C. D. OWEN, R.A.F., No. 162 Sqn.



THE QUEEN TAKES TEA: A scene at the garden party at Buckingham Palace, given by the King and Queen to 2,000 repatriated prisoners of war.

Act. Sqn. Ldr. V. G. OWEN-JONES, R.A.F.V.R., No. 582 Sqn.
Act. Sqn. Ldr. B. G. F. PAYNE, R.A.F.V.R., No. 15 Sqn.
Act. Sqn. Ldr. R. M. SLEEP, R.A.F.V.R., No. 109 Sqn.
Flt. Lt. A. W. BATCHELOR, R.A.F.V.R., No. 109 Sqn.
Flt. Lt. C. S. BELL, R.A.F.V.R., No. 608 Sqn.
Flt. Lt. A. E. R. BEXTON, R.A.F.V.R., No. 35 Sqn.
Flt. Lt. B. BOOTHRIGHT, R.A.F.V.R., No. 692 Sqn.
Flt. Lt. R. O. DAY, R.A.F.O., No. 139 Sqn.
Flt. Lt. P. FULLERTON, R.A.F.V.R., No. 142 Sqn.
Flt. Lt. S. HEMINGFIELD, R.A.F.V.R., No. 578 Sqn.
Flt. Lt. R. A. HORTON, R.A.F.V.R., No. 578 Sqn.
Flt. Lt. W. D. S. JACKSON, R.A.F.V.R., No. 103 Sqn.
Flt. Lt. D. C. JAMES, R.A.F.V.R., No. 105 Sqn.
Flt. Lt. D. JONES, R.A.F.V.R., No. 90 Sqn.
Flt. Lt. R. A. LOCATELLI, R.A.F.V.R., No. 109 Sqn.
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Flt. Lt. V. F. J. TORRISI, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
Flt. Lt. R. VOLLUM, R.A.F.V.R., No. 158 Sqn.
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Flt. Lt. R. F. WATKINS, R.A.F.V.R., No. 635 Sqn.
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Flt. Lt. R. MCC. WILLIAMS, R.A.F.V.R., No. 142 Sqn.
Flt. Lt. H. J. WORLEY, R.A.F.V.R., No. 218 Sqn.
Flt. Lt. H. O. YATES, R.A.F.V.R., No. 75 (N.Z.) Sqn.
Act. Flt. Lt. A. YATES, R.A.F., No. 166 Sqn.
Act. Flt. Lt. J. F. W. YATES, R.A.F., No. 415 (R.C.A.F.) Sqn.
Act. Flt. Lt. A. D. YOUNG, R.A.F.V.R., No. 550 Sqn.
F/O. A. BOUVET, R.A.F.V.R., No. 77 Sqn.
F/O. V. R. BROWN, R.A.F.V.R., No. 77 Sqn.
F/O. J. R. FORD, R.A.F.V.R., No. 57 Sqn.
F/O. J. GIBSON, R.A.F.V.R., No. 49 Sqn.
F/O. J. R. GRAY, R.A.F.V.R., No. 186 Sqn.
F/O. R. K. HART, R.A.F.V.R., No. 44 Sqn.
F/O. R. E. HEMMINGS, R.A.F.V.R., No. 514 Sqn.
F/O. G. A. MALLINSON, R.A.F.V.R., No. 57 Sqn.
F/O. R. W. L. PANTLING, R.A.F.V.R., No. 622 Sqn.
F/O. J. PARKIN, R.A.F.V.R., No. 49 Sqn.
F/O. D. W. PARKS, R.A.F.V.R., No. 514 Sqn.
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Act. F/O. D. CROME, R.A.F.V.R., No. 514 Sqn.
Act. F/O. R. S. ENGLISH, R.A.F.V.R., No. 640 Sqn.
Act. F/O. E. HANSON, R.A.F.V.R., No. 622 Sqn.
Act. F/O. H. C. RICHFORD, R.A.F.V.R., No. 514 Sqn.
F/O. A. R. HYDE, R.A.F.V.R., No. 640 Sqn.
F/O. F. W. J. FLIPPANT, R.A.F.V.R., No. 419 (R.C.A.F.) Sqn.
P/O. M. A. GERARD, R.A.F.V.R., No. 419 (R.C.A.F.) Sqn.
P/O. R. HUSTLER, R.A.F.V.R., No. 77 Sqn.
P/O. W. M. JONES, R.A.F.V.R., No. 193 Sqn.

Conspicuous Gallantry Medal (Flying)

Flt. Sgt. R. P. LONGLEY, R.A.F.V.R., No. 218 Sqn.—This airman was the wireless operator in an aircraft detailed to attack Neuss one night in January, 1945. During the operation the aircraft sustained severe damage. In spite of this, the pilot succeeded in reaching Allied territory, where he was forced to give the order to abandon as the aircraft had now become uncontrollable. One member of the crew, whose parachute had opened by accident inside the fuselage, was therefore unwilling to jump. He asked to be allowed to strap himself to Flt. Sgt. Longley's back. The latter, without the slightest hesitation, agreed. After the two airmen had been strapped together, they made their way, in total darkness, to the jumping point. On the way the ripcord of Flt. Sgt. Longley's parachute caught in a projection. Although the parachute opened, he was able to catch and hold the case intact, and, with his comrade on his back, jumped clear of the aircraft. Unfortunately, in the descent, his comrade fell away. Flt. Sgt. Longley came down on to a tall tree, from which he fell to the ground and badly injured his back. His action in allowing a comrade to descend with him on a single parachute, although unavailing, showed a spirit of gallantry and self-sacrifice which will long be remembered.

Distinguished Flying Medal

Flt. Sgt. P. H. EATON, R.A.F.V.R., No. 450 (R.A.A.F.) Sqn.
Flt. Sgt. D. G. REYGATE, R.A.F.V.R., No. 83 Sqn.
Flt. Sgt. H. H. SLATER, R.A.F.V.R., No. 83 Sqn.
Flt. Sgt. J. J. SMITH, R.A.F.V.R., No. 77 Sqn.
Flt. Sgt. R. H. UTTING, R.A.F.V.R., No. 97 Sqn.
Sgt. A. GREEN, R.A.F.V.R., No. 402 (R.A.A.F.) Sqn.
Sgt. (now P/O.) C. H. HUGHES, R.A.F.V.R., No. 622 Sqn.
Sgt. (now P/O.) J. R. MACKINTOSH, R.A.F.V.R., No. 90 Sqn.
Sgt. N. R. MASON, R.A.F.V.R., No. 77 Sqn.
Sgt. J. SMITH, R.A.F.V.R., No. 582 Sqn.
Sgt. J. W. THOMPSON, R.A.F.V.R., No. 51 Sqn.
Sgt. L. WOODROOPE, R.A.F.V.R., No. 514 Sqn.
Sgt. A. GIBB, R.A.F.V.R., No. 75 (N.Z.) Sqn.
Flt. Sgt. N. L. HUMPHRIES, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. G. A. R. KING, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. W. H. LANNING, R.A.F.V.R., No. 582 Sqn.
Flt. Sgt. J. R. LASLETT, R.A.F.V.R., No. 76 Sqn.
Flt. Sgt. D. A. LOVE, R.A.F.V.R., No. 90 Sqn.
Flt. Sgt. J. A. LYNE, R.A.F., No. 7 Sqn.
Flt. Sgt. W. E. MAYES, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. (now P/O.) W. A. MCLEAN, R.A.F.V.R., No. 158 Sqn.
Flt. Sgt. T. MCCORMICK, R.A.F.V.R., No. 578 Sqn.
Flt. Sgt. W. R. MCINTYRE, R.A.F.V.R., No. 218 Sqn.
Flt. Sgt. E. G. MEREDITH, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt. (now P/O.) S. J. MOORES, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. G. C. BRAGG, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Flt. Sgt. T. SAVAS, R.C.A.F., No. 550 Sqn.

SERVICE AVIATION

Sgt. J. E. BRIDGER, R.A.F.V.R., No. 50 Sqn.
Sgt. R. MARLOW, R.A.F.V.R., No. 70 Sqn.

THE KING has been graciously pleased to approve the following awards:—

B.E.M. (Mil.)

Cpl. S. A. J. CONNOLLY, R.A.F.V.R.—In October, 1944, Cpl. Connolly and his section were detailed to clear mines and booby traps from six hotels in Blankenberghe. One day, a trip wire was fouled and three of his section were badly injured. For a period of six weeks in 1944, this airman was continuously engaged in mine clearance at an airfield and, because of his exceptional courage, he was selected to lead breaching parties to locate mine belts and their patterns. He found numerous Schu-mine, Tellermine, "S" mine and Holzmine belts and volunteered for any operation of a specially hazardous nature. In December, 1944, whilst working on an irregularly laid minefield in tall grass, he fouled the igniter of an "S" mine, which fired. After warning other personnel Cpl. Connolly lay down in time to see the "S" mine ejected from its casing and thrown into the air. Fortunately the mine failed to detonate and, after exchanging his detector, which was damaged by the mine, Cpl. Connolly continued his work completely unperturbed. His example and personal bravery, shown throughout the operations, have been an inspiration to all.

Cpl. J. R. DENTON, R.A.F.—In October, 1944, Cpl. Denton was also detailed with others to clear hotels in Blankenberghe of mines and booby traps, and for a period of six weeks in 1944 he was engaged continuously on mine-field clearance at an airfield. Throughout this period he and his section detected, neutralised and lifted large numbers of anti-tank and anti-personnel mines, many of which were booby-trapped and buried in marshy land, flooded ditches and thick undergrowth. In November, 1944, a captured enemy tank was used to push and pull a heavy roller over unchecked areas between the mine belts which had already been located and cleared. Cpl. Denton volunteered to drive the tank and continued to do so for several days. Although no anti-tank mines were functioned by the tank, he was fully aware of the risk of serious injuries or death. Cpl. Denton has been employed on bomb disposal duties since January, 1941.

Cpl. C. D. LOVELL, R.A.F.V.R.—In June, 1944, three American Thunderbolt aircraft crashed at a R.A.F. station. Each aircraft carried bombs, some of which exploded and killed numerous R.A.F. personnel, including the entire station fire crew. In view of the serious situation the crash tender was called from an adjacent station. On arrival, the crew of this tender set to work on an aircraft which had been burning for some time and contained a fused H.E. bomb which was in imminent danger of exploding. Cpl. Lovell, with no thought of his personal safety and without aid, manned the nozzle of a hose from the foam tender until the foam was exhausted. He then helped to re-service the tender, returned to the scene of the crash and remained with the hose very near to

the unexploded bomb, until he had extinguished the fire. He set a fine example of devotion to duty in dangerous circumstances.

Roll of Honour

Casualty Communique No. 511.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of these, 200 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. W. R. Askew; Flt. Sgt. R. C. Battersby; F/O. G. R. P. Chaundy; F/O. W. G. Corewyn; Flt. Sgt. T. B. Darney; Sgt. R. Davies; Sgt. J. Davies; Sgt. J. Douglas; F/O. H. C. Duffield; Sgt. P. R. Earl; Sgt. G. C. Edwards; Sgt. J. G. Forrest; Flt. Sgt. W. S. Gamble; Sgt. V. L. Goddard; Flt. Sgt. P. B. Halle; P/O. G. S. Haslam; Flt. Sgt. D. C. Horn; Flt. Sgt. A. G. Humphrey; Flt. Sgt. S. J. James; Sgt. T. L. Lenton; Flt. Sgt. T. J. A. Lineton; Sgt. L. E. Miles; Sgt. R. Richardson; Flt. Lt. M. T. Simpson; Sgt. P. A. Sumpter; Flt. Lt. R. R. Tait; W/O. G. Tate; Flt. Sgt. M. H. Trice; Sgt. F. J. Wright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. H. Brown; Sgt. W. Docherty; Flt. Sgt. J. Knight; F/O. P. J. McGuire; Sgt. J. A. T. Maton; Sgt. G. A. A. Pound; F/O. F. G. Raine; Sgt. D. D. Roberts; F/O. R. W. Wilkins.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. F. J. Abernethy; Sgt. C. M. Allen; Sgt. R. P. N. Allison; P/O. J. Armstrong; F/O. R. Armstrong; Sgt. R. G. Arthur; W/O. F. W. Atherton; Sgt. R. G. Atkinson; Sgt. C. T. Baker; Sgt. G. H. Barrington; Sgt. H. Barron; Sgt. W. A. Bates; Flt. Sgt. L. A. Bolt; Sgt. F. Bolton; F/O. I. E. Bolton; Flt. Sgt. R. E. Bowler; F/O. P. A. Bradley; Sgt. G. E. Brown; Sgt. J. W. Brown; Flt. Sgt. J. M. Buckley; Sgt. R. Byth; Sgt. R. H. Cantwell; Sgt. J. E. Chapman; Sgt. A. Chappell; F/O. C. L. Chappell; Flt. Sgt. M. Churchman; Sgt. J. Clark; P/O. J. J. R. Clark; Flt. Sgt. D. L. Cohen; P/O.

A. Colvin; Sgt. W. W. S. Compton; Sgt. A. Cooke; Flt. Sgt. J. R. A. Cooke; Sgt. F. S. Coote; Sgt. R. Cottar; Sgt. F. T. Coulter; P/O. F. Crofts; Sgt. D. Cruikshank; Sgt. R. C. F. Davidson; Flt. Lt. B. Denman; Sgt. R. G. Dennis; Flt. Sgt. J. W. Devenish; Sgt. A. L. Dix; Flt. Sgt. L. Dixon; Sgt. A. Drake; Sgt. J. Duguid; Sgt. W. N. Ebsworth; Sgt. F. A. L. A. Farr; Sgt. R. J. Farrell; Sgt. T. Finnerty; Sgt. J. R. Forster; Flt. Sgt. H. W. Fox; F/O. N. R. Gamble; Sgt. J. M. Garde; Sgt. C. E. W. Gardner; Flt. Sgt. A. T. Garrett; Sgt. S. H. Geake; F/O. C. Gibson; Sgt. J. W. Gilbert; Flt. Sgt. J. T. Gill; Sgt. J. E. Glanville; Flt. Sgt. S. Godden; Sgt. F. A. Goodwin; Sgt. H. De G. Griffiths; P/O. J. C. Grindrod; Sgt. R. E. Hall; Sgt. J. J. Hanley; Sgt. D. G. Harris; Sgt. J. W. Harry; Sgt. A. Hartley; Sgt. S. Hayes; Flt. Sgt. A. D. Heath; Sgt. E. Hopcraft; Sgt. E. McP. Howard; Sgt. R. H. Hudson; Sgt. F. J. Huxen; Sgt. A. E. Jacks; Sgt. F. R. Jeffcoat; Flt. Lt. R. N. Jenkin; P/O. A. J. Jenkins; Sgt. J. L. Jolley; Sgt. G. Jones; F/O. V. L. B. Jones; Sgt. A. E. Jukes; Sgt. H. H. Kendall; Sgt. Ldr. T. S. R. King; Flt. Lt. L. J. Kingwell; Flt. Sgt. A. J. Kirk; Flt. Sgt. W. Kitson; Sgt. G. E. Knight; W/O. A. Little; Sgt. N. B. Lowlett; F/O. E. T. Lund; Flt. Sgt. J. D. Lyon; Sgt. C. H. McFadden; Sgt. F. W. Marchant; Sgt. H. A. Masters; Sgt. I. D. J. May; Sgt. M. H. Messenger; P/O. R. G. Messer; Sgt. W. J. Moore; Sgt. W. Moores; Flt. Lt. R. Morgan; F/O. J. G. Moxham; Sqn. Ldr. A. Muir, D.F.C.; Sgt. D. N. Murphy; Sgt. D. W. Newbury; F/O. R. F. Nice; F/O. F. J. Nixon; Flt. Sgt. R. S. Nurse; Sgt. W. Orr; Sgt. H. W. J. Pain; Sgt. R. Parsons; Sgt. F. J. Pearson; Sgt. G. Pearson; Sgt. J. Peers; Sgt. H. Perkins; Sgt. P. J. V. Pitcher; P/O. G. F. Polley; Sgt. A. Porritt; Sgt. J. C. L. Reed; F/O. R. S. Roe; Sgt. R. McS. Ross; Flt. Lt. A. W. Ruffhead; Flt. Sgt. G. A. Saunders; P/O. W. C. Sharp; F/O. M. H. Shelton; Sgt. R. B. Shuttleworth; F/O. J. E. Sidnell; Flt. Sgt. C. H. Simpson; Flt. Lt. W. Sinclair; Sgt. H. S. Slow; F/O. A. F. G. Smart; Sgt. A. N. Smith; F/O. D. Smith; Sgt. D. Smith; Sgt. G. W. Smith; Sgt. R. F. Smith; Flt. Sgt. R. L. Smith; Sgt. D. N. Stevens; Flt. Sgt. J. H. Sullivan; Sgt. W. J. Summers; Flt. Sgt. P. D. Syke; Sgt. H. Taylor; Sgt. R. S. C. Taylor; Sgt. D. J. Thomas; P/O. W. G. Tibbitts; Sgt. R. W. Tindal; Sgt. J. J. Tobin; Sgt. J. Tomlinson; Sgt. L. K. Topham; P/O. E. E. Tunstall; Sgt. A. Tym; Sgt. A. L. N. Vickers; Sgt. F. R. Webster; Flt. Sgt. H. M. Whichelow; Sgt. L. W. Whitefield; Sgt. E. A. Wilkes; Sgt. A. W. Wilkinson; Flt. Sgt. W. F. Williams; Flt. Sgt. K. G. Wilson; P/O. J. M. Woodburn; Sgt. C. Woodmass; Flt. Sgt. N. Woodward; Sgt. D. W. Young.

WOUNDED OR INJURED IN ACTION.—Sgt. J. Done; Sgt. R. H. Hunwicks; Sgt. W. H. Pridmore.



The Badge of No. 272 Squadron, R.A.F.
"On, On."

Sgt. R. McS. Ross; Flt. Lt. A. W. Ruffhead; Flt. Sgt. G. A. Saunders; P/O. W. C. Sharp; F/O. M. H. Shelton; Sgt. R. B. Shuttleworth; F/O. J. E. Sidnell; Flt. Sgt. C. H. Simpson; Flt. Lt. W. Sinclair; Sgt. H. S. Slow; F/O. A. F. G. Smart; Sgt. A. N. Smith; F/O. D. Smith; Sgt. D. Smith; Sgt. G. W. Smith; Sgt. R. F. Smith; Flt. Sgt. R. L. Smith; Sgt. D. N. Stevens; Flt. Sgt. J. H. Sullivan; Sgt. W. J. Summers; Flt. Sgt. P. D. Syke; Sgt. H. Taylor; Sgt. R. S. C. Taylor; Sgt. D. J. Thomas; P/O. W. G. Tibbitts; Sgt. R. W. Tindal; Sgt. J. J. Tobin; Sgt. J. Tomlinson; Sgt. L. K. Topham; P/O. E. E. Tunstall; Sgt. A. Tym; Sgt. A. L. N. Vickers; Sgt. F. R. Webster; Flt. Sgt. H. M. Whichelow; Sgt. L. W. Whitefield; Sgt. E. A. Wilkes; Sgt. A. W. Wilkinson; Flt. Sgt. W. F. Williams; Flt. Sgt. K. G. Wilson; P/O. J. M. Woodburn; Sgt. C. Woodmass; Flt. Sgt. N. Woodward; Sgt. D. W. Young.

WOUNDED OR INJURED IN ACTION.—Sgt. J. Done; Sgt. R. H. Hunwicks; Sgt. W. H. Pridmore.



ARIES CREW The members of the aircrew of the Lancaster which recently returned from experimental navigational flights over the North Pole. In all some 17,720 miles were flown and the final hop from Whitehorse, Yukon, to the Empire Air Navigation School at Shawbury was 4,170 miles.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. E. J. Boukes; Flt. Sgt. B. T. Cornell.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. J. G. Aspinwall; Sgt. G. Baker; Flt. Lt. C. B. Bryan; Sgt. W. C. Burrows; Flt. Sgt. C. Candlish; Flt. Sgt. R. H. Dixon; Flt. Sgt. M. V. Iretou; W/O. J. L. McKee; Flt. Sgt. P. A. W. Reader; Sgt. H. R. J. Rose; W/O. P. N. Sayer; Flt. Sgt. W. Watchman; Flt. Sgt. W. T. Watson; Flt. Lt. H. Wood.

MISSING.—Flt. Sgt. D. W. Andrews; Sgt. D. Atkinson; Flt. Lt. M. A. L. Balasse; Sgt. R. F. Batch; Flt. Lt. M. P. Braund; Sgt. A. G. Briggs; F/O. J. W. J. Pringle; Sgt. J. F. W. Catlin; F/O. A. C. Cockayne; Sgt. L. P. Connell; Sgt. J. Donaldson; Sgt. R. C. Fergie; W/O. E. J. Goudie; Flt. Lt. L. E. H. Graham; F/O. J. A. Grey; Sgt. A. W. Hall; Sgt. W. J. Harrison; F/O. H. W. Hazell; F/O. A. T. Hewett; Flt. Sgt. J. E. Hughes; Flt. Sgt. F. J. M. Ireland; Flt. Lt. K. O. Jenkins; Sgt. A. Kay; Flt. Lt. J. E. Langley; Flt. Sgt. J. M. McKay; Flt. Lt. D. M. Mansel-Pleydell; D.F.C.; F/O. J. A. Masheder; Sgt. O. J. Pulford; F/O. E. H. Rhodes; Sgt. G. F. Rutherford; F/O. R. T. Salvoni; D.F.C.; P/O. S. Sellers; F/O. M. J. Shenton; Flt. Lt. T. A. Smith; P/O. E. A. Steele; F/O. G. D. Warburton; F/O. R. T. Ware; F/O. J. Whitter; P/O. W. J. B. Williams.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. E. R. Kelsall; W/O. J. Robertson.

KILLED ON ACTIVE SERVICE.—F/O. R. A. Breeze; F/O. G. Day; Sgt. R. H. Edwards; A/C.2 A. L. Herbert; A/C.2 G. H. O. Hogg; Sgt. P. B. Joseph; P/O. M. Kealey; A/C.2 J. G. Kilby; Flt. Lt. T. Matthew; Flt. Sgt. W. S. B. Meek; Flt. Sgt. H. A. Purvey; Sgt. J. A. McK. Sturrock; Sgt. K. L. Sutton; Sgt. L. J. Tarr; Flt. Lt. H. Tricks; D.F.M.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.1 M. G. Calvert; A/C.2 J. Chance; L.A/C. A. Oliver; Sgt. A. L. Smith; F/O. W. Tague.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Sgt. J. Hollingworth.

DIED ON ACTIVE SERVICE.—L.A/C. P. S. Packman.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. J. J. Fernandez; Sgt. P. W. Hegarty; F/O. E. Jackson; F/O. N. E. S. Mutter; F/O. D. C. Percy; Sgt. E. K. Phelps; F/O. J. A. Stewart; D.F.C.; Sgt. F. S. Vinecombe; Sqn. Ldr. R. Wareing; D.F.O.

Royal Australian Air Force

KILLED IN ACTION.—F/O. A. E. Astill; Flt. Sgt. G. P. Ayre; Flt. Sgt. L. R. Burnden; W/O. S. R. Fuller; Flt. Sgt. B. C. Geeves; Flt. Sgt. R. W. Hamilton; W/O. K. H. Hutchings; Flt. Sgt. M. G. Isaac; W/O. S. J. Minett; Flt. Sgt. P. Swarbrick; P/O. G. D. Walker; Flt. Lt. J. D. Wallis; Flt. Sgt. E. R. Winton; P/O. C. L. Woodford.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sqn. Ldr. L. A. J. McLeod; D.F.C.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. W. McL. Chase; P/O. R. J. Dobbyn; Flt. Sgt. M. H. Foster; P/O. R. A. Kingston; F/O. W. T. Loftus; D.F.C.; Flt. Sgt. G. W. McLean; F/O. A. P. Whitford; D.F.C.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. B. B. Peterson.

MISSING, BELIEVED KILLED IN ACTION.—P/O. N. T. Biecard.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. E. Evers; Flt. Sgt. J. J. Griffiths; Sgt. C. W. Laing; F/O. R. T. Marstella; F/O. F. L. Pepper.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. N. W. Huggins; Flt. Sgt. J. V. Jenkins; F/O. E. R. Peace.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. K. B. Morris.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. E. N. Bagg; F/O. A. W. Crompton; Sgt. W. J. W. Freudenstein; Flt. Sgt. G. N. McLeod; Flt. Sgt. M. C. Pryor; Flt. Sgt. R. R. Waddell.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. W. L. Dalglish.

WOUNDED OR INJURED IN ACTION.—F/O. E. R. Hancock.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. J. C. Daze.

KILLED ON ACTIVE SERVICE.—Flt. Lt. H. S. Ellis; W/O. J. Firth; F/O. W. P. Retzer.

Royal New Zealand Air Force

KILLED IN ACTION.—Flt. Lt. T. D. Blewett; F/O. J. S. Wilson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. W. H. MacDonald.

MISSING.—F/O. D. Connop.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. B. L. Ireland; F/O. J. P. Morgan; Flt. Sgt. N. S. Shaw.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. F. Black; Lt.



AT THE ROYAL GARDEN PARTY: The King and Princess Elizabeth chatting with their returned prisoner of war guests.

C. H. Clark; Lt. W. Kempen; 2nd Lt. R. E. McWilliams; 2nd Lt. N. A. Smith.

KILLED ON ACTIVE SERVICE.—2nd Lt. H. L. Darvell.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Lt. S. P. Beuke.

Casualty Communique No. 512.

Of the names in this list 172 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—F/O. J. Bird; Flt. Lt. D. S. L. Crimp; Sgt. B. Pettigrew.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—W/O. A. Boulton; W/O. R. F. H. Cossins; Sgt. R. J. Evans; W/O. W. G. Harrison; Sgt. J. P. C. Johnstone; Flt. Sgt. T. L. Lamb; Sgt. S. Lister; Flt. Sgt. J. Pepper; Sgt. A. L. Pickering; Sgt. K. J. Power; F/O. J. M. Reed; Flt. Lt. A. G. Symons; Sgt. C. A. Warburton.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. J. L. Alves; Flt. Lt. A. A. A. Arnell; Flt. Sgt. S. B. Appleton; Sgt. A. E. Bachelor; Flt. Lt. A. S. H. Baillie; Sgt. H. S. Baker; Sgt. V. H. Bartlett; Sgt. C. G. G. Bateman; Sgt. G. H. Beavers; F/O. A. H. J. Begernie; Sgt. M. L. Belcher; Sgt. R. W. Berry; Sgt. H. P. Black; F/O. J. D. Blencowe; Sgt. W. Bowey; Sgt. C. M. Brewster; Sgt. F. C. Bright; Sgt. D. E. Brookler; Sgt. P. C. Brosnan; Flt. Sgt. H. F. Buckingham; Sgt. J. W. Burke; Sgt. J. D. Cairns; Sgt. B. P. Cane; Sqn. Ldr. P. J. Carpenter; F/O. R. Chandler; Sgt. R. W. Chandler; Flt. Sgt. J. W. Chapman; W/O. P. W. Chatter; P/O. E. H. Childs; Flt. Sgt. A. A. Clark; Flt. Lt. A. V. Collins; F/O. E. J. Davies; Sgt. R. J. Davies; Sgt. H. Deakin; P/O. H. L. Doherty; Sgt. J. Dowling; Sgt. C. D. Driscoll; P/O. A. G. C. Eason; Sgt. H. Eaton; Sgt. J. F. Ennis; Sgt. E. Fletcher; Sgt. J. W. Gibson; Sgt. A. W. Gotham; Sgt. W. W. Gould; Sgt. J. G. Gowans; Flt. Lt. W. E. Grantham; F/O. G. C. Greenacre; Sgt. J. H. E. Hales; Sgt. D. J. Halker; Sgt. R. Harrison; F/O. L. A. Hayward; Flt. Sgt. H. J. Heavener; P/O. M. Hewitt; Sgt. R. C. Hill; Sgt. W. P. Hinett; Sgt. S. Hopkinson; Sgt. D. W. Jenkins; Flt. Sgt. E. T. Jones; Sgt. H. W. Jones; Flt. Sgt. A. Kay; Flt. Lt. A. G. R. Kayll; Sgt. D. Kaeley; Sgt. G. Lackie; Sgt. G. J. MacPherson; Sgt. J. D. Manley; Sgt. E. G. Marchant; Flt. Sgt. K. H. Margetts; Sgt. A. Marper; Flt. Sgt. W. G. Morgan; Sgt. F. R. Morton; Sgt. S. Neale; P/O. S. W. G. Neighbour; F/O. B. G. Overton; Sgt. T. Parkes; Sgt. H. E. Pearson; Sgt. J. D. H. Pierce; Flt. Sgt. L. C. Pillinger; Sgt. R. A. Potter; F/O. G. T. Raymond; Sgt. N. W.

Reeve; Sgt. F. S. G. Reeves; P/O. P. I. Rhodes; Sgt. G. W. Rugg; Sgt. O. Scargill; Sgt. E. R. Seales; Sgt. C. W. Sherratt; F/O. J. M. Simpson; Sgt. D. Sleightholm; Sgt. T. H. J. Smith; Sgt. J. F. Street; Sgt. J. R. Trasier; Flt. Sgt. W. G. Udell; P/O. K. A. Underwood; Sgt. C. Waller; Sgt. V. J. Watson; F/O. R. J. Weller; D.F.M.; P/O. R. E. Whitehead; Sgt. D. J. Wilson; F/O. J. Wilson; Sqn. Ldr. R. Wood; Flt. Sgt. D. Yulie.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. E. J. Rowlands.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. G. Thompson.

MISSING, BELIEVED KILLED IN ACTION.—P/O. J. S. Ferguson.

MISSING.—Sgt. K. Ashworth; Sgt. E. Baxter; Sgt. R. W. Brook; Sgt. H. Burton; Sgt. V. A. F. Butt; W/O. K. E. Button; Sgt. D. R. G. Causer; Sgt. E. Christon; Flt. Sgt. O. L. Cullen; Sgt. R. W. Cullen; Flt. Sgt. H. E. Derrington; Sgt. J. Eadie; W/O. N. C. Eames; Sgt. J. A. Fallon; Sgt. E. H. Giles; Sgt. K. P. Gormally; Sgt. J. D. Griffin; Sgt. A. H. Griffiths; F/O. H. C. Grundey; D.F.M.; Sgt. J. D. Grundy; Sgt. S. Hall; Flt. Sgt. F. C. Hatcher; P/O. D. Hauber; Sgt. W. P. Heaton; Flt. Sgt. A. G. Hopkins; F/O. J. Hughes; Sgt. J. D. Hurcombe; Sgt. S. S. James; Sgt. H. Johnson; Flt. Lt. A. E. Jones; F/O. T. C. Jones; Sgt. C. C. Kellaway; F/O. G. B. Leighton; Sgt. R. K. M. Lewis; Sgt. D. J. MacDonald; Sgt. G. M. McDonnell; Sgt. T. S. McLoughlin; Sgt. N. MacNamara; Sgt. G. C. McNicol; Sgt. J. P. McTague; Flt. Lt. J. H. Marsh; F/O. A. J. Marshall; Flt. Lt. S. D. Mayhew; Sgt. F. W. Moore; Flt. Sgt. R. S. Must; Sgt. T. Myatt; Sgt. N. J. Osborne; Sgt. N. J. Pease; Sgt. L. N. Penn; Sgt. J. R. Perry; Sgt. R. Redmond; Sgt. W. G. Roberts; Sgt. A. Simpson; Sgt. H. J. Smalley; Sgt. L. R. Sykes; Flt. Sgt. R. J. Taylor; F/O. W. G. Thorby; Sgt. J. Thornley; Flt. Sgt. E. W. S. Tomkins; Sgt. R. V. Trafford; Sgt. T. R. W. Vincent; Sgt. D. J. Walters; Sgt. H. L. Watkins; F/O. W. E. L. Whitbread; P/O. T. S. H. Whitehouse; Sgt. R. Wilson; Sgt. C. W. Woods.

KILLED ON ACTIVE SERVICE.—Sgt. R. C. Bailey; L.A/C. A. J. Brodribb; Sgt. L. F. Cook; Sgt. A. J. Crittenden; L.A/C. T. H. Gibbons; Sgt. W. R. Jackson; P/O. G. W. Locke; L.A/C. A. J. McAuley; L.A/C. K. W. Sadler; Sgt. J. R. Small; Sgt. E. G. W. Smart; L.A/C. M. A. Taylor; Flt. Sgt. K. F. Tilston; L.A/C. A. J. Turner; Sgt. W. E. Warren; Sgt. T. Weetman; Sgt. R. A. Wells.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. F. O. Myall; L.A/C. J. Scott.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. L. M. Lewis; Sgt. D. M. Roberts; L.A/C. A. H. Rogers; F/O. J. M. J. Rowland; Flt. Sgt. E. Wright.

DIED ON ACTIVE SERVICE.—Cpl. H. G. Bacon; Cpl. D. J. Beeby; L.A/C. B. Bradley; A/C.1 J. L. Cohen; Cpl. G. R. Couchman; Sgt. F. J. Foreman; L.A/C. F. C. Harvey; L.A/C. W. Hodge; A/C.1 H. W. Jenner; L.A/C. K. Kitchen; Flt. Lt. D. H. Ogden; L.A/C. G. Parr; L.A/C. A. T. Picton; Cpl. J. A. Tait.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sqn. Ldr. J. Blackburn; Sgt. R. Bryden; F/O. F. Chadwick; Flt. Sgt. R. R. Hughes; Sgt. L. P. James; W/O.



The Badge of No. 55 Squadron, R.A.F. "Nil Nos Tremefact" (Nothing Shakes Us.)

SERVICE AVIATION

D. K. Measures; Sgt. F. Peirson; Flt. Sgt. J. Pinkney; Flt. Sgt. A. Rowe.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. G. J. Cheyne; F/O. C. J. Greenwood; F/O. R. H. Halsted; Flt. Sgt. E. E. J. Miller; Flt. Sgt. J. R. Power; Flt. Sgt. R. P. Quinn.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. G. R. Howe. MISSING.—W/O. J. E. Bateup; Flt. Sgt. J. J. L. McDonnell; Flt. Sgt. R. W. Mitchell; F/O. J. A. Schmidt.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. B. A. Atkinson; Flt. Sgt. B. T. De Vall; Flt. Sgt. R. T. O'Reilly; W/O. R. H. Strachan; Flt. Sgt. R. J. White.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. J. P. Gwilliam; Flt. Sgt. E. L. Johnston; Flt. Sgt. C. J. Kenley; F/O. K. W. Light, D.F.M.; Flt. Sgt. K. C. Mills; P/O. R. N. Mills.

Royal Canadian Air Force

MISSING.—F/O. L. W. Ferguson; Flt. Lt. E. B. McCutcheon; F/O. D. W. Ritchie; F/O. J. G. Welk; Flt. Lt. S. P. Whyte.

KILLED ON ACTIVE SERVICE.—P/O. W. S. McMullen.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. C. E. Armstrong; Flt. Sgt. E. W. E. Marshall; Flt. Sgt. D. B. Payne.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. G. H. Fowler; Flt. Sgt. V. G. Tunncliffe.

MISSING.—F/O. P. J. McVerry; F/O. A. G. P. Newman.

KILLED ON ACTIVE SERVICE.—W/O. T. D. Lloyd; F/O. R. B. Robinson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. W. M. Mulholland.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. J. R. Palmer.

South African Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Capt. J. A. Meiring; Maj. W. J. Wheeler.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. Anderson; Air Sgt. R. B. Bell; Lt. C. M. D. Booyen; Flt. Lt. J. E. Cowen; Flt. Sgt. J. De Groot; Lt. A. De Jong; 2/Lt. C. Du Toit; Lt. A. Earl; Sgt. R. R. Evert; Lt. G. C. Geerdts; Flt. Sgt. G. V. Hare; Lt. L. O. Howitz; Flt. Lt. G. K. Hurry; Lt. G. Josephson; 2/Lt. L. A. Legoff; Flt. Sgt. L. Lurie; W/O. P. B. McNeill; Lt. I. M. Meiring; 2/Lt. A. Nelson; Lt. P. C. D. Otto; Lt. O. P. Peachey; 2/Lt. M. Pines; Flt. Sgt. I. H. Potgieter; Flt. Sgt. C. J. Rapie; Capt. F. Ribbink; Lt. H. A. Schonen; Lt. N. C. Scott-Wimlow; Lt. N. S. T. L. Seaton; Flt. Lt. A. M. Shepherd; Lt. T. J. Simmons; Lt. E. E. Sisson; Flt. Sgt. T. Smallwood; Flt. Sgt. C. Sparco; Lt. J. F. A. Steyn; Flt. Sgt. G. J. Stone; Lt. E. A. Thomas; Flt. Sgt. H. C. Ungerer; Flt. Sgt. G. Van Alphen; Lt. L. Van Bergen; Capt. P. A. Van Velzen; Capt. N. M. Watermeyer.

MISSING.—Flt. Sgt. G. M. A. Denham; Lt. D. A. Farquhar; Flt. Sgt. H. D. Lugg; Capt. C. F. Marais; Lt. G. Meaker; 2/Lt. J. M. Moir. KILLED ON ACTIVE SERVICE.—Lt. W. H. Currie; A/Mec. T. C. Hiatt; A/Mec. J. A. Jordan; Lt. A. Klatskina; A/Mec. H. J. M. MacLaughlin; Lt. D. J. Sarson; Lt. J. S. Viljoen.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—2/Lt. J. D. Friend; Lt. D. P. Short.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Maj. F. A. Robertson.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Lt. W. Norval; Lt. W. B. Sobey.

Casualty Communique No. 513.

Of the names in this list, 177 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. G. H. Butler; Flt. Sgt. E. H. Calvert; Sgt. R. E. Fittall; Sgt. J. H. Hollis; Sgt. D. J. Jones; Flt. Sgt. P. H. M. Jones; Sgt. W. D. Kirton; Sgt. W. McCulloch; Sgt. J. Nolley; Flt. Sgt. J. Williams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. H. W. Aparicio; F/O. H. D. Ayliffe, D.F.M.; Sgt. G. Bagnall; Sgt. O. H. Baker; Sgt. D. A. Bean; Sgt. I. Bell; Sgt. S. T. Bishop; Sgt. H. F. Bore; Flt. Sgt. K. A. Bray; Sgt. J. W. S. Burden; Sgt. N. J. Capstick; Flt. Lt. W. M. Carruthers; Sgt. H. J. Chatterton; F/O. S. M. Clarke; F/O. S. P. Cooper; Sgt. D. Copley; F/O. W. P. Cragg; Sgt. D. Daley; Sgt. R. D. Davies; Flt. Sgt. G. Dixon; Flt. Sgt. J. A. Ellery; Sgt. A. S. Fordham; Sgt. C. S. Foster; Flt. Sgt. R. Golding; P/O. P. H. Hamby; Sgt. W. N. Hedges; P/O. J. E. Holden; Sgt. V. S. Holloway; Sgt. D. A. Hopper; Sgt. A. W. Horner;

Flt. Sgt. R. E. Howson; Sgt. H. Hughes; F/O. J. C. Lelliott; Sgt. G. S. Lind; Flt. Sgt. R. H. Little; F/O. R. E. Lomax; F/O. R. H. Long; F/O. D. W. Magan; Flt. Sgt. D. A. Morling; F/O. L. Moody; Sgt. J. E. Moore; Sgt. R. T. Muir; Sgt. A. Newnham; Sgt. J. R. Quicke; Sgt. G. A. Race; F/O. H. F. Raynham; Sgt. H. P. Riddle; Sgt. W. C. Robson; P/O. J. M. Rodger; F/O. R. A. Rosen; Sgt. R. G. Ryder; P/O. E. G. Sheil; Sgt. B. Simmet; Sgt. J. Strathearn; Sgt. D. C. Sykes; Flt. Sgt. R. W. Tudor; Sgt. V. L. Twydel; Sgt. A. H. Weller; Flt. Sgt. R. A. Werrett; Flt. Sgt. H. C. Williamson-Rattray; Sgt. R. A. Wilson.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. A. C. D. Gent; F/O. D. G. Law; Sgt. W. A. G. Milne; Flt. Sgt. R. V. E. Slowley; F/O. R. E. Stainbank; Sgt. C. Stapleton; Sgt. F. G. J. Wood.

WOUNDED OR INJURED IN ACTION.—Sgt. B. J. F. Lunn; F/O. N. T. Scott; Sgt. R. J. Willing.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. R. J. Beckett; Sgt. G. E. Carrington; Sgt. D. Conroy; W/O. D. Galbraith; Sgt. J. K. Holden; Sgt. J. R. McDowell; F/O. F. D. McGonigle; Sgt. E. E. Pope; Sgt. G. C. Teller; Sgt. J. Wilson.

MISSING.—Sgt. L. Annis; Flt. Sgt. J. J. Atkinson; P/O. J. B. Baxter; F/O. H. O. Berger, D.F.M.; Flt. Sgt. H. E. Bishop; Sgt. R. A. Boydell; F/O. T. D. Brown; Flt. Sgt. J. Bryson; Flt. Lt. E. B. Bunn; W/O. J. F. Carberry; Flt. Sgt. R. Chriss; Sgt. R. G. Coles; F/O. A. Cox; Flt. Lt. H. J. Cross; F/O. G. Ebbelwhite; F/O. R. C. Flutter; W/O. P. Ford; Sgt. J. H. Guy; Flt. Sgt. J. Hall; W/O. A. Handley; Sgt. R. Hutchinson; Sgt. A. James; Sqn. Ldr. A. H. Jarand; F/O. B. B. Job; Flt. Sgt. D. L. Johns; Sgt. J. B. M. Kelleher; Sgt. R. J. Knight; Sgt. E. Luke; Flt. Sgt. A. McGlone; Flt. Sgt. E. C. McLennaghan; Sgt. H. A. Marshall; Flt. Sgt. A. A. Muddiman; F/O. A. H. Nicholas; F/O. G. D. Orr; P/O. A. K. Parker; Flt. Lt. E. A. Pollock; F/O. E. M. Popplewell; Flt. Sgt. J. D. Rowbottom; Sgt. A. S. Scott; Flt. Sgt. G. Spencer; Flt. Sgt. N. J. Stebbings; F/O. J. A. S. Stewart; Sgt. R. H. V. Streetfield; Sgt. N. Tinsley; Sgt. P. V. Tiran; Flt. Sgt. F. Truman; Sgt. T. C. Walker; P/O. C. W. Way; Sgt. R. Werrill; Flt. Sgt. T. F. Wilcox; Flt. Lt. W. H. Wilson.

KILLED ON ACTIVE SERVICE.—F/O. G. H. F. Burgess; Flt. Sgt. J. B. De Mowbray; Cpl. R. J. Mason; A/C.2 J. D. Ogden; Sgt. M. O'Sullivan; Flt. Lt. T. W. Redfern; P/O. R. H. W. Stoneman; Flt. Sgt. G. Walton; F/O. H. Winder; F/O. A. F. Witt.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. V. G. Childs; Sgt. R. A. Fuller; Sgt. W. H. Lamond; A/C.1 G. Robinson; Flt. Sgt. N. Turner; Sgt. P. F. Whale; Sgt. A. Whitehead; Sgt. W. Winkley.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. N. S. Birch; Flt. Sgt. W. Hazen; Flt. Sgt. F. A. Wilkinson.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sqn. Ldr. N. Bicknell, D.S.O., D.F.C.; A/C.1 R. Edwards.

DIED ON ACTIVE SERVICE.—LA/C G. T. Lester; Cpl. E. I. Pears; A/C.1 J. D. Robertson; Sgt. F. C. A. Wakeham; LA/C R. Watson.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. A. J. Chinn; Flt. Sgt. J. Clarke; Sgt. P. Dowdeswell; F/O. L. Williams.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. A. B. Gossip; Flt. Lt. E. A. L. Smith.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. V. W. Bath; Flt. Sgt. C. R. Buckridge; F/O. E. Iveson; Flt. Sgt. R. L. Robertson; Flt. Sgt. H. F. Smith.

MISSING, BELIEVED KILLED IN ACTION.—P/O. J. M. Carter; W/O. L. Collins.

MISSING.—P/O. W. R. L. Hart; P/O. J. E. Knight.

WOUNDED OR INJURED ON ACTIVE SERVICE.—W/O. S. J. Sandilands.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. T. V. McKee. PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. V. A. Knox; F/O. A. D. Gavel; Flt. Lt. H. L. Helmbecker; P/O. J. H. G. Senecal.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. J. F. Acer; F/O. H. C. Aley; F/O. F. A. Arnston; P/O. J. J. Astles; W/O. J. G. Bachand; P/O. W. S. Ball; P/O. L. S. Beer; P/O. B. W. Bergquist; Flt. Sgt. G. MacM Bessette; W/O. H. F. Binder; F/O. R. B. Black; F/O. L. A. Bland; P/O. W. H. Boles; F/O. W. D. C. Boyd; F/O. C. McN. Broadfoot; P/O. J. P. Brooks; P/O. E. R. Burns; W/O. J. A. Castle; Flt. Sgt. W. R. Clarke; Sgt. D. Crawley; Flt. Lt. W. D. Grimmins, D.F.C.; F/O. W. L. Cruise; Flt. Sgt. L. G. Davey; P/O. L. L. N. Decelles; W/O. J. D. Dadding; P/O. E. A. Dowe; P/O. L. J. Dunn; Sgt. W. P. Dunbar; W/O. H. N. Dunnatt; P/O. J. B. Ewen; Flt. Sgt. G. J. Ferguson; P/O. J. M. W. Filmer; F/O. B. C. E. Fortin; P/O. H. A. Frizzell; Sgt. S. Glaister; Flt. Lt. H. C. C. Goodyear; P/O. A. E. Hammond; F/O. F. Hartnett; P/O. M. F. Heady; Sgt.

G. Heider; Flt. Sgt. D. E. Hilker; Sgt. H. E. Hirst; P/O. A. C. K. Heison; F/O. J. A. Houston; F/O. J. Howell; F/O. W. A. Hughes; Flt. Sgt. J. F. R. Hurtean; P/O. O. F. Hyndman; P/O. H. N. Jackson, D.F.C.; F/O. R. H. Jackson; P/O. S. D. Jenkins; P/O. R. G. Jennings; F/O. J. G. Johnson; W/O. E. C. Johnston; P/O. A. Jones; F/O. R. W. Kemp; F/O. H. L. Kemp; P/O. F. L. Kennedy; P/O. M. A. Knight; P/O. H. W. Lessing; F/O. D. A. Robinson; P/O. F. W. Topping; Flt. Sgt. G. D. Torbet; F/O. B. A. Trewin; Flt. Sgt. J. G. Vaughan.

WOUNDED OR INJURED IN ACTION.—F/O. R. V. Houston; F/O. T. Jordan-Knox.

MISSING, BELIEVED KILLED IN ACTION.—F/O. J. K. Armour; Sgt. J. McI. Davidson; F/O. J. W. Shirey; F/O. W. Webb.

MISSING.—P/O. R. J. Ashley; F/O. D. J. Bird; F/O. W. F. Bridgman; F/O. R. R. Broadfoot; Flt. Sgt. J. A. Bruggeman; F/O. C. W. Byers; Flt. Sgt. S. Camerman; P/O. A. G. Carolan; F/O. W. M. Chapman; Flt. Lt. M. J. A. Cote; W/O. R. K. Orow; Flt. Sgt. B. R. Cunliffe; P/O. E. L. Davis; W/O. R. A. Deck; F/O. W. L. Dennis; F/O. A. L. Evans; F/O. N. G. Fadden; Flt. Sgt. M. Frank; Flt. Lt. R. H. Galbraith; F/O. D. W. Gaunt; Flt. Sgt. J. D. Gibbons; W/O. A. Hissette; F/O. P. Hyde; F/O. R. A. Ireland; Flt. Sgt. F. C. Irving; Flt. Lt. A. Kiehlbauch; Flt. Sgt. A. M. Laccia; F/O. Q. T. Louie; P/O. T. E. Lynch; F/O. D. G. McKay; Flt. Sgt. M. S. McMaster; Flt. Sgt. B. W. McNicol; P/O. W. D. Martin; F/O. M. L. Matkin; P/O. A. B. Miller; F/O. H. E. Novak; P/O. W. J. D. Partridge; Flt. Lt. H. L. Payne; Flt. Sgt. L. J. Penny; Sgt. F. W. Pook; Flt. Lt. F. T. Quigley; Flt. Sgt. R. C. Roller; Flt. Sgt. S. G. Rundle; F/O. G. G. Shaw; Flt. Sgt. R. C. Shilliday; Flt. Sgt. N. L. L. Smith; Flt. Sgt. D. Turner; Flt. Lt. E. W. Watson; P/O. W. T. Wilson.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—W/O. D. G. Cotter.

KILLED ON ACTIVE SERVICE.—Sgt. E. M. Bowman; Flt. Sgt. K. I. Gove; F/O. J. A. McCrea; Sgt. A. J. MacDonnell; F/O. D. P. McGregor; F/O. G. M. MacLean; F/O. F. W. Mooney; Sgt. A. R. Robson; Flt. Sgt. J. A. Savy; Sgt. L. C. Stavenow; F/O. M. F. Stevens; Flt. Sgt. W. O. Watts.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. W. Hirst.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—W/O. H. C. Bizard.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. L. L. Butler; Flt. Sgt. S. A. Cook; Sqn. Ldr. J. A. Hegman, D.S.O., D.F.C.; Flt. Sgt. A. McR. McLachlan; Flt. Sgt. B. O'Brien; Sgt. F. A. J. Scott; Flt. Sgt. A. W. Todd; P/O. L. Williams.

MISSING.—P/O. G. J. Hooper.

South African Air Force

MISSING.—Lt. M. P. Farrell; Lt. R. C. Mackintosh; Capt. D. L. Robinson.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Lt. D. S. De Jager.

Official Corrections

Casualty Communique No. 504.

Under MISSING, delete F/O. W. Agnew, Flt. Sgt. M. A. Belcher, P/O. I. A. H. Croad, Sgt. D. T. Darby, Sgt. R. H. Dickson, Sgt. A. J. Ralph, F/O. J. H. Robinson, Sgt. D. E. F. Thomsett, P/O. F. A. Toplis, Flt. Sgt. P. D. Watson; also delete Flt. Sgt. H. J. O'Keefe and place him under KILLED IN ACTION.

Under PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR, Sgt. B. C. Winsor should read Flt. Sgt.

Casualty Communique No. 505.

Under MISSING, delete Sgt. R. L. Cundy, J. A. Heenan, Sgt. J. B. Mulholland, Sgt. J. Thayer, and place them under KILLED IN ACTION. Delete F/O. P. H. Fitzgerald.

Delete all names under the heading PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.

Under Royal Australian Air Force, MISSING, alter spelling of McCulloch to McCullough.

Delete Flt. Lt. J. A. Rowland.

Delete the heading PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR, and the name F/O. C. D. G. Small beneath it.

Under R.C.A.F., DIED ON ACTIVE SERVICE, W/O. J. F. Cartman should read P/O.

Delete the heading PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR, and all names beneath it.

Casualty Communique No. 506.

After Flt. Sgt. R. Dudley, add D.F.M.

After P/O. F. D. Roberts, add D.F.M.

Under MISSING, delete Flt. Lt. E. N. Armstrong, F/O. G. B. Chapman, F/O. H. Ellis.

Sgt. Brand should read Flt. Sgt.

Delete Flt. Lt. I. G. Handyside, P/O. A. Hepworth, W/O. N. McKay, Flt. Lt. H. J. Pryer, F/O. H. Shaw, W/O. E. C. Temple, Sgt. K. I. Winstanley, W/O. A. L. Winston.

Sgt. T. Pollard is now P/O.

Delete the heading PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR, and all names beneath it.

Under R.C.A.F., MISSING, BELIEVED KILLED IN ACTION, W/O. W. L. Washbrook is now P/O.

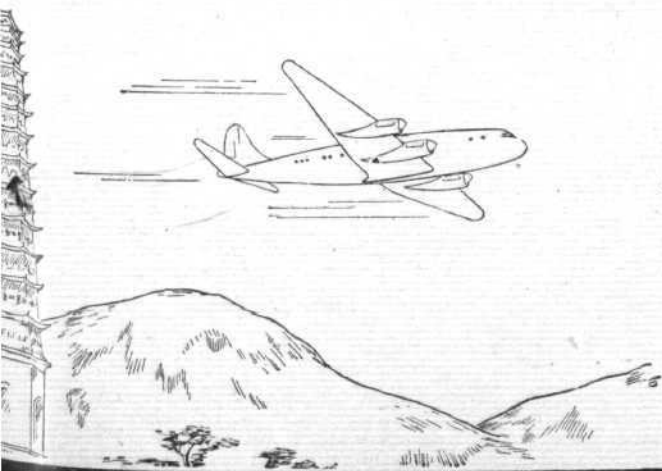
Under MISSING, Flt. Sgt. W. E. Archer is now P/O.

Flt. Sgt. J. W. Vandenberg is now P/O.

Delete F/O. J. G. Agnew, F/O. K. W. Landers. Delete under R.C.A.F. and S.A.A.F. PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR, and the names beneath.



THE DORTMUND-EMS CANAL.—
The Lancasters' heavy load, accurately
placed despite especially vicious defences,
successfully breached the Dortmund-Ems
Canal—vital to German communications.
A. V. ROE & CO., LIMITED.



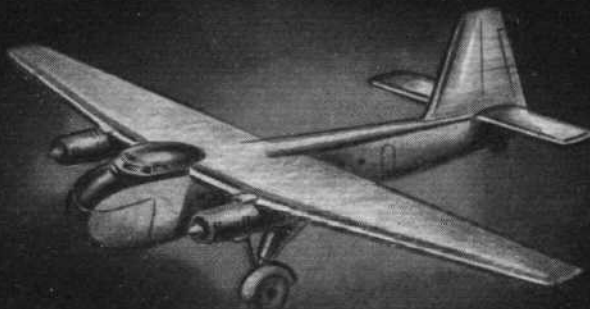
*They take the strain in War
-they'll carry the load in Peace*



SUPERPLANES BY

... PRODUCTION STOPPED PENDING ARRIVAL REPLACEMENTS BROKE

SHAFT AND DERRICK



INACCESSIBILITY

STOP SUGGEST AIR ONLY LOGICAL METHOD STOP

As a "flying handyman" aiding industrial development in inaccessible or remote regions, the aeroplane demonstrates but one of the many ways in which it can assist a post-war world getting down to really worth-while work. On considering the variety of purposes for which air transport can be used, it becomes obviously apparent that post-war aircraft will need to be adaptable, versatile and economical above almost all other considerations. Into such a category comes the "Bristol" Freighter... an aircraft evolved with these facts predominantly in mind. The Freighter is an economical aircraft in every respect... easily operated... easily maintained and designed to be easily adaptable to any specialised project or circumstance.

"Bristol"

... aircraft designed to aid industrial revival

THE BRISTOL AEROPLANE COMPANY LIMITED

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