

# FLIGHT

and  
AIRCRAFT ENGINEER

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Editor  
C. M. POULSEN

Managing Editor  
G. GEOFFREY SMITH, M.B.E.

War Correspondent  
JOHN YOXALL

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1  
Telegrams: Truditur, Sedist, London. Telephone: Waterloo 3333 (35 lines).

**COVENTRY:**  
8-10, CORPORATION ST.  
Telegrams: Autocar, Coventry.  
Telephone: Coventry 5210.

**BIRMINGHAM, 2:**  
GUILDHALL BUILDINGS,  
NAVIGATION ST.  
Telegrams: Autopress, Birmingham.  
Telephone: Midland 2971 (5 lines).

**MANCHESTER, 3:**  
260, DEANSGATE.  
Telegrams: Iliffe, Manchester.  
Telephone: Blackfriars 4412.

**GLASGOW, C.2:**  
26B, RENFIELD ST.  
Telegrams: Iliffe, Glasgow.  
Telephone: Central 4857.

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## The Outlook

### Bomber Range and Economy

IN the Superfortress (all the available information on which appears on pages 40, 41 and 42) the Americans have undoubtedly produced one of the outstanding military aircraft of this war. Its ability to bomb targets at extreme long range has altered the whole complexion of the campaign in the Far East.

By reason of the stepping-stone tactics of the ground forces, enabling airstrips to be built on captured islands, the distances to be flown between the forward bases and the targets in Japan get smaller and smaller. Eventually, mostly by virtue of the good work they have done, there must come a time when the Superforts will cease to be economical by reason of insufficient bomb stowage for size of aircraft. It may be at this stage that Bomber Command, now released from duty on the Continent, will put in an appearance to let the Japs feel the weight of really heavy stuff.

It would be interesting to know just why the Americans, even in their latest bombers, adhere to the tier system of bomb stowage. It has so many drawbacks. In the Fortress and Liberator it makes movement between the forward and rear part of the aircraft most difficult for the aircrew, especially when wearing the bulky kit always associated with high flying.

This difficulty of movement also occurs in the Superfortress and the reason is mostly attributable to the position and shape of the bomb bays. It appears as if pressurising was not included in the original layout, otherwise a single complete pressure cabin could have been designed over a horizontal bomb bay. This would have saved compartmentation and inter-connecting tunnels.

However, in all types of aircraft where the vertical tier system is used, it cramps choice in both the size

of the bombs to be carried and the order of selection over the target.

In the British system of single-layer stowage, any bomb can be selected for dropping at any time. One monster missile, many feet long, can be installed in the same space as easily as can thousands of 2 lb. incendiaries, and the aircrew can move freely up and down an unrestricted fuselage at all times.

### Good Work by Sunderlands

WHEN one comes to think of it, not many types of aircraft have continued to do good service right through the war up to the present day. It would be tedious, and perhaps invidious, to give a list of types which were eminent in 1939, and now have passed into the limbo of "has-beens." But right from the beginning the Short Sunderland flying boat has always been on the job. Quite early in the war surprise was felt and expressed that a machine whose top speed was never more than 210 m.p.h. should be able to beat off attacks by such German types as the Ju 88; for by the time that versatile bomber had got into production the average speed of air warfare had so increased that 210 m.p.h. had come to be considered quite slow.

Yet in the June report of operations by S.E.A.C. there is noted a new phase of the campaign against the Japanese, taking the form of intensified attacks by Sunderlands on enemy shipping in the Gulf of Siam. It is a campaign by itself, and in two weeks of June these flying boats sunk by bomb and depth charge more than twenty enemy vessels. Among the victims was a 10,000-ton tanker, the largest ship seen in that neighbourhood for many months past. The tanker was escorted; but, nevertheless, the Sunderlands sent it to the bottom.

At the start of the S.E.A.C. operations the flying boats

were based on a harbour in Ceylon; but lately they have moved up to Akyab and other liberated harbours. One of their most spectacular feats was to alight on an inland lake and carry away some 500 sick and wounded from the Wingate Chindits; thus permitting that force to push on to join hands with the forces of General Stilwell.

Considering the continued usefulness of the Sunderlands after nearly six years of warfare, it is appropriate that the Society of British Aircraft Constructors should have just elected Mr. Arthur Gouge, the designer of the type, as its new president.

### Atlantic Competition

SO Pan American Airways have lost their fight for a monopoly. In that fact there is food for thought. Three American airlines, Pan American, American Export Airlines, and T.W.A., are to operate air services across the North Atlantic. B.O.A.C. is to be entrusted, if the White Paper is "implemented" by the Government after the General Election, not only with the Commonwealth routes but with the North Atlantic route to Canada and the United States. One wonders whether even a General Critchley is equal to the task of fighting opposition from three separate and very energetic American companies, especially when it is remembered that the Americans will have available usable aircraft types almost at once, whereas we must wait for the Tudor I, not to mention the huge Bristol Brabazon I, before we can consider ourselves really equipped for the route. True, a start can be made with converted flying boats, but no matter how good they may be, they cannot equal specialised types designed expressly for the particular route. And as for converted bombers, while they might be used as mail carriers, they cannot be adapted to give any acceptable degree of passenger accommodation.

B.O.A.C. will certainly have the incentive of the keenest competition from America, but our good friends on the other side will have the advantage that each of

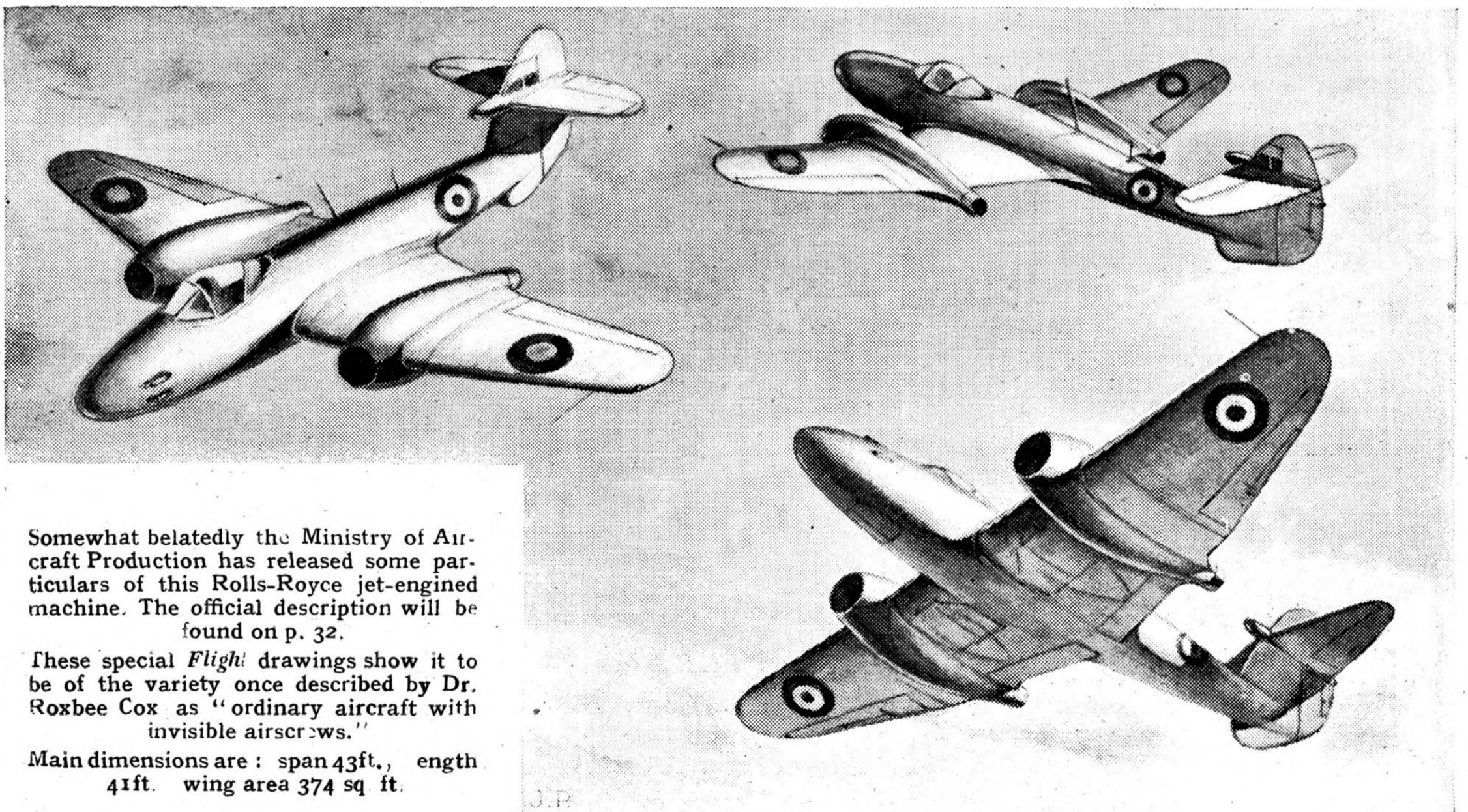
CONTENTS	
The Outlook	29
War in the Air	31
Here and There	33
Kellett XR-8 Helicopter	35
Hitting with a Vengeance	36
What Does the Private Owner Want?	38
Boeing (B-29) Superfortress	40
Speed-Range Indicator	42
Over the Pole	44
"Any Aircraft, Anywhere"	45
Ignition Testing Unit	47
Civil Aviation News	49
On a British Escort Carrier in the Far East	50
Correspondence	52
Service Aviation	53

their three companies will be in competition with two of their own and one of ours. It is probable that different methods and different aircraft types will be employed by the three American companies, and so the United States will be in a position to discover much more quickly the type of service which attracts the greater volume of traffic.

On this side of the Atlantic we shall have a single corporation which will be preoccupied with routes to South Africa, Canada, India and Australia, and to which the route to the U.S.A. is but a "side line," whereas it ought to be the main concern of the company that operates it.

It is to be expected that France, and possibly Spain and Portugal, will in time wish to operate services to North America, so there we shall meet still more competition. Altogether the situation promises considerable scratching of heads in the Victoria district of London. The fight is on, or will be very soon. It will be interesting and instructive to watch the results.

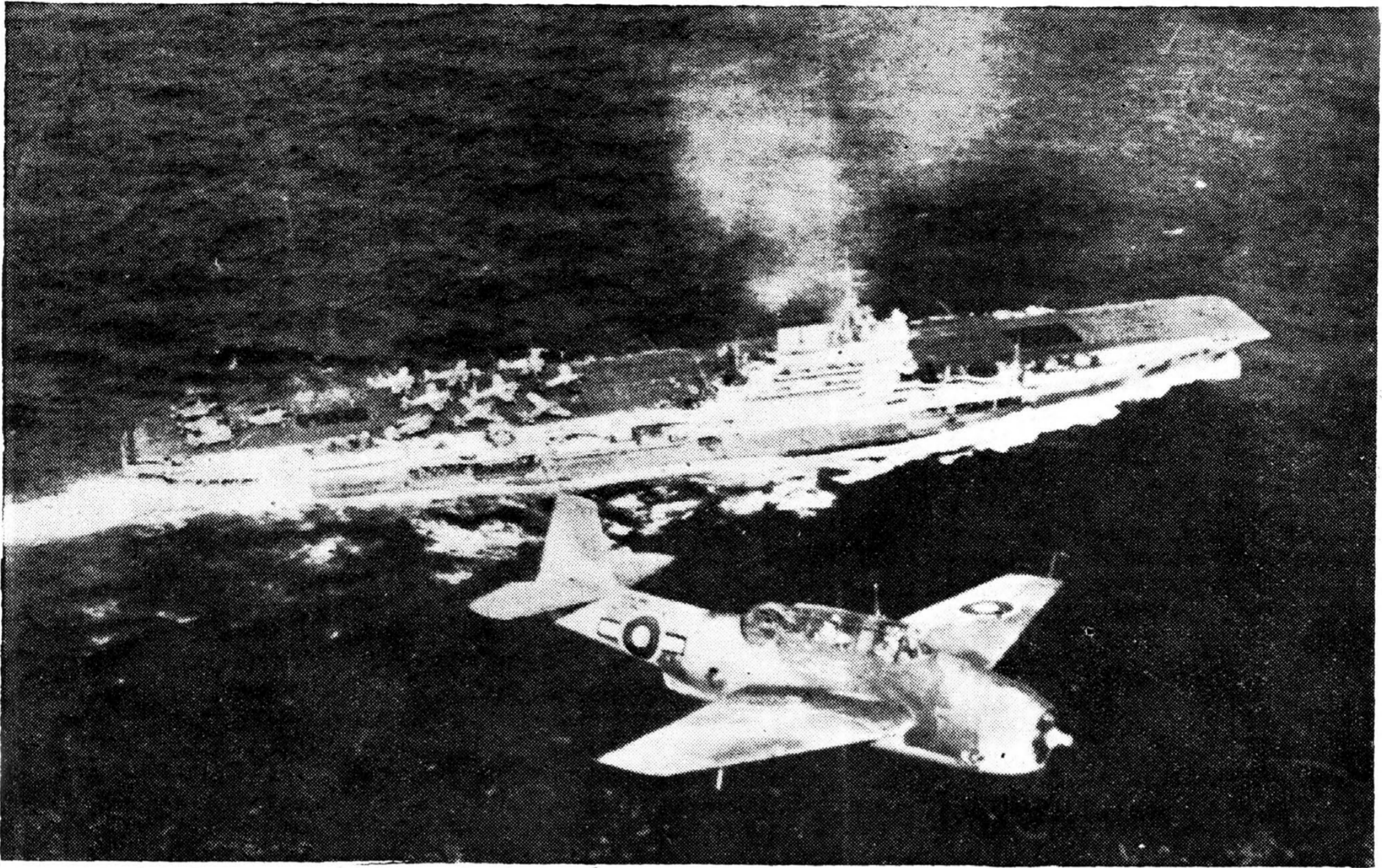
## THE GLOSTER METEOR JET FIGHTER



Somewhat belatedly the Ministry of Aircraft Production has released some particulars of this Rolls-Royce jet-engined machine. The official description will be found on p. 32.

These special *Flight* drawings show it to be of the variety once described by Dr. Roxbee Cox as "ordinary aircraft with invisible airscrews."

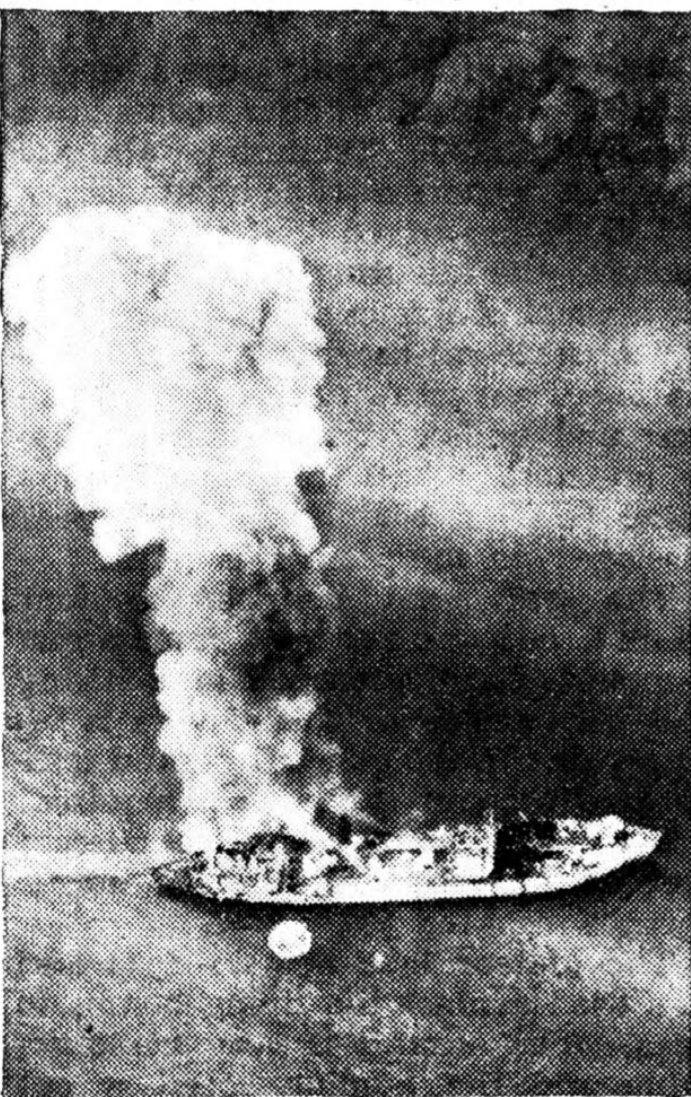
Main dimensions are: span 43ft., length 41ft. wing area 374 sq ft.



An Avenger returns to the aircraft carrier H.M.S. *Indomitable* after taking part in an attack on the Sakishima Islands to support the American landing on Okinawa.

# WAR in the AIR

## Japanese Suicide Pilots : Contrast between Burma and the Pacific



UP IN SMOKE : An attack by the R.A.F. on a 10,000-ton Japanese tanker 300 miles south of Bangkok. The tanker was trying to make a northward run through the Gulf of Siam.

IN "The Drums of the Fore and Aft" Kipling remarked that in battle the man who was really anxious to be killed had an advantage over an opponent who would prefer to survive. The case of the Pathan Ghazi of whom Kipling wrote does not afford an exact parallel with the Japanese suicide bomber, for the opponents of the two are not similar. But the suicide bomber has certainly done some damage to Allied warships. Washington has now told the story of the loss of the U.S. destroyers *Twiggs* and *William D. Porter*, and also of the damage and heavy casualties sustained by two other destroyers, the *Newcomb* and *Luetze*, when suicide bombers crashed on to them. The loss of American lives was deplorable. The *Newcomb* lost 91 of her crew and the *Luetze*, which came to her assistance in trying to extinguish the fires, had 84 casualties when she was also struck. Both vessels reached repair yards. These losses, however, do not make any appreciable difference to the Allies' naval and air superiority in the Pacific. The airfields from which the suicide bombers mostly take off have been attacked by American bombers; but suicide is a form of death so highly

respected in Japan, that in all probability the supply of desperate pilots is not likely to run short.

One cannot help comparing the fight which Japan is putting up in the air in the Pacific with the way in which she threw up the sponge in Burma. At first she was superior in the air in Burma, but after the Spitfires arrived in strength the Japanese Air Force softly and silently vanished away, like the unfortunate hunter of the *Snark*. It may have been the case that the higher authorities in Nippon decided to cut their losses in Burma. It was the air supremacy of the British Indian forces which made possible the rapid advance which overran the country, and with that air supremacy the Japanese did not attempt to interfere. That meant that they sacrificed their Army in the country. Did they of set purpose withdraw their Air Force? It may be so; but all the indications were that their pilots were afraid of the Spitfires. The contrast between the Japanese pilots in Burma and the desperadoes who hurl themselves on to the decks of Allied warships is striking—even though one allows for the effects of the threat of invasion to Japan herself. Many a

## WAR IN THE AIR

man will fight hard for his home, though he is willing to give up distant conquests without too much of an effort to save them. Even so, one is surprised that there was not more of the suicide spirit in evidence among the Japanese pilots in Burma.

The British Admiralty has also announced that during the recent attacks on the Sakashima Islands three of our carriers, H.M.S. *Indefatigable*, *Victorious*, and another, were hit by five *Kamikaza* (suicide) aircraft. The vessels suffered only minor damage and continued operations. The destroyer H.M.S. *Ulster* was put out of action. On the other side of the ledger, our carriers during two months accounted for 140 enemy aircraft, some destroyed, others damaged.

Obviously the Japanese are prepared to lose many aircraft and crews in the hope of scoring a success. Our defences are very formidable; but we must reckon ourselves fortunate that the damage done by the five bombers which got home on the carriers did so little damage. We must hope that our luck will continue; for if the Japanese were to put one of our large carriers out of action, the result would be worth many aircraft.

In Burma the enemy has launched a series of determined attacks along the Sitang river. They have gained a few local successes; but the object of holding up our advance has not



HANDING OVER: German airmen assist an R.A.F. sergeant to make an inventory of their stores at Kjeller airfield near Oslo.

been successful. Many boatloads of enemy troops have been sunk by Spitfires and Thunderbolts on the river, and R.A.F. aircraft have kept up their attacks on villages where the Japanese have congregated. Our infantry have had a trying time fighting in the mud of *padi* fields, and forcing their way through patches of dense elephant grass. Still the medical services have kept malaria in check. The

Japanese are known to be suffering heavily from that disease. Not long ago they actually ventured to send over one aircraft which dropped one canister full of medical supplies. This incident illustrates their desperation, for only once before during the Burma campaign have they tried to supply their troops by air. In this case the canister fell into the hands of British-Indian troops.

## “Meteor” Jet Fighter

### Official Description of the R.A.F.'s First Twin-engined Jet Fighter

**T**HE Meteor is a single-seat fighter aircraft powered with two gas jet turbine “Welland” or “Derwent” engines manufactured by Rolls-Royce to the basic design of Air Commodore Whittle in collaboration with Power Jets, Ltd., British Thomson Houston Co., Ltd., and the Rover Co., Ltd.

The aircraft, although a comparatively recent development, is now right in the forefront of the world's finest fighters. It was designed and constructed by the Gloster Aircraft Co. from the experience gained in the design and construction and flight testing of the E28/39, which was the first jet turbine-propelled aircraft to fly successfully in this country and possibly in the world. Some leading characteristics and the principle dimensions of the aircraft are given in the succeeding paragraphs.

The Meteor is a low-wing monoplane of all-metal construction with tricycle alighting gear. It is constructed of separate units, these being fuselage nose, front fuselage with nose wheel, centre section (embodying centre plane with the two undercarriage units and the two nacelles),

the outer plane with aileron, rear fuselage complete with tail portion and the tail unit which consists of the upper fin, upper and lower rudders, tailplane and the two “half-elevators.”

The two undercarriage bays, the upper and lower air brakes and the flaps are all between the nacelles and the “centre fuselage.” The internally mass-balanced ailerons are all-metal structures with automatic balance tabs.

All components are of stress-skin construction. The high tailplane, necessitated by the jet from the propelling nozzles, splits the rudder into two parts. Trimming tabs are fitted to each half-elevator and to the lower portion of the rudder. The hydraulically operated lever suspension alighting gear consists of two independent undercarriage units which retract in-board and a nose wheel unit which retracts rearwards, the wheel itself being housed between the rudder pedals in the front fuselage. In addition to the normal electrical indicators there is a mechanical down-lock indicator for the nose wheel unit showing just forward of the windscreen. The

stick-type control column has a hinged spade grip and the rudder pedals have parallel action. Trimming tabs are operated by normal-type hand wheels.

The engine-driven hydraulic pump operates the alighting gear, flaps and air brakes. An emergency hand pump will operate all services. The pneumatic system operates the gun-cocking gear and undercarriage brakes, there is no nose wheel braking. There being two air containers in the rear fuselage; no compressor is fitted.

The armament consists of four 20 mm. Hispano guns. A camera gun is mounted in the fuselage nose fairing and the control for this camera is incorporated in the gun button and may be used without the guns if required.

The main dimensions of the Meteor are: span 43ft., length 41ft., height 13ft., wing area 374 sq. ft.

The Meteor first flew in 1943 and was used against the flying bombs in 1944. The aircraft is very manoeuvrable and the landing speed is not high. There is very little noise in the cockpit in flight and the usual vibration is absent. Engine controls are simpler than with reciprocating engines.

# HERE AND THERE

## High Tribute

BRITAIN'S aircraft industry is paid a great compliment by the Government's Select Committee on National Expenditure in its report for 1944-45.

Referring to the "unremitting work" carried on before the war despite heavy disabilities (from Governmental neglect), it cites the Hurricane and the Spitfire as examples of some of the excellent results achieved.

"What the possession of these aircraft, developed on the initiative of the aircraft industry, meant to this country is a matter of history," the report declares.

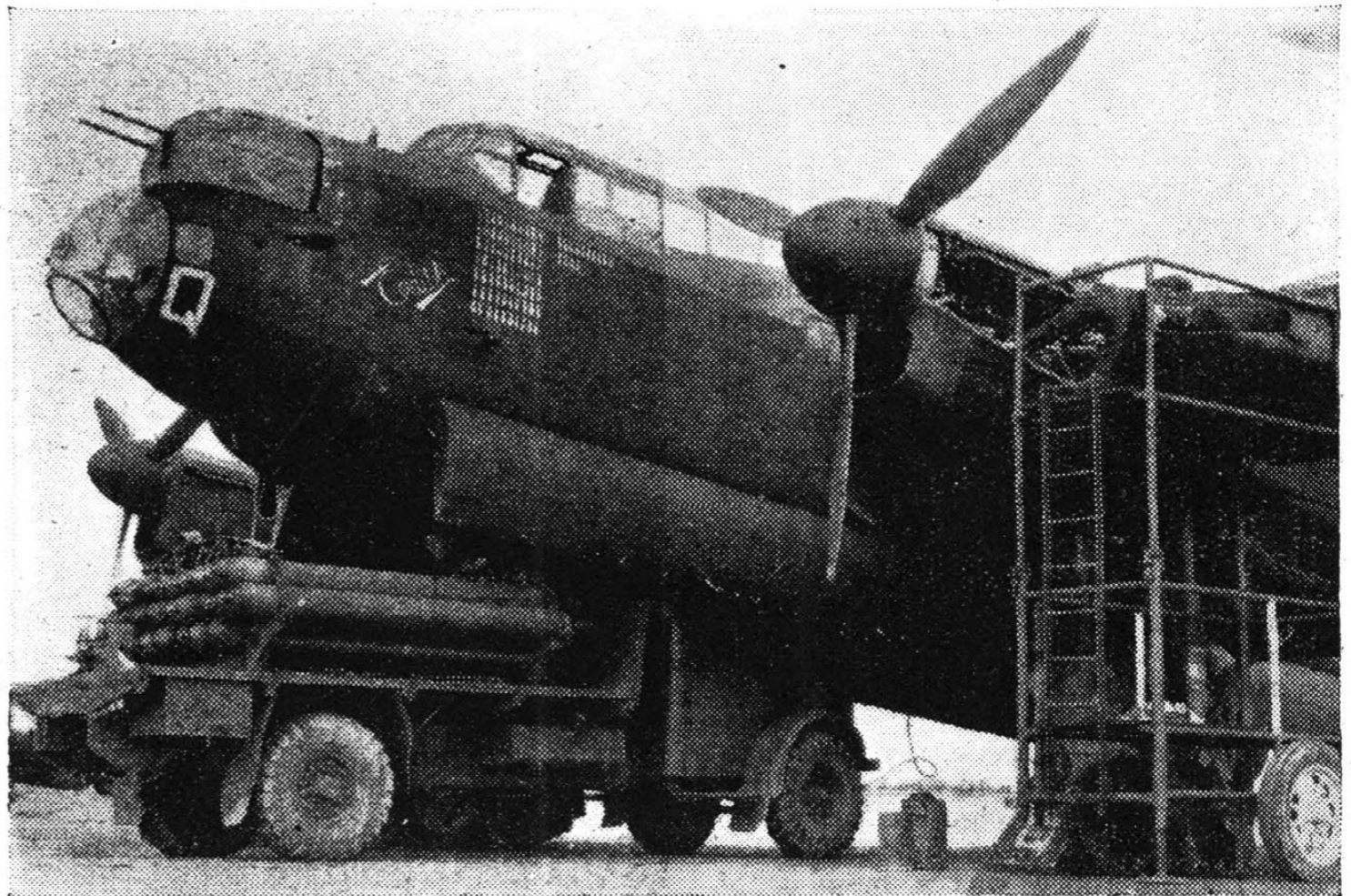
In a report which is mainly a critical document, this is indeed praise.

## Modern Magic

A REPORT of the Allied Press Service to Germany, quoted by Reuter, concerns the use of a device fitted to British and American bombers and long-range fighters by means of which second-by-second pictorial navigation is permitted in blind conditions.

The instrument in question is, of course, the ground position indicator which projects a spot of light in the form of an arrow on to the chart, and, working in conjunction with the air position indicator, will inform pilot and navigator of their aircraft's position.

The actual A.P.S. description of this



"EDITH'S" DAILY TOILET: The veteran Lancaster of the R.A.F. station at Chedburgh, christened Edith by her crew, has 84 bombing raids to her credit and 14 post-VE Day "ops" of a more benevolent kind—dropping food supplies and bringing home released prisoners. "Edith" has more flying hours than any of her sisters on the station and is now on training duties.

device, which it calls the "Magic Arrow," is couched in terms more popular than accurate.

## Documentary Films

THREE films of unusual interest and considerable merit were shown last week at Shell-Mex House. Two of them, "Merchant Aircraft Carrier" and "How an Aeroplane Flies" (Part 1), were produced by the fuel company's own film unit which has been working for Government ministries during the war, and the third, "Mosquito," is de Havilland's film.

The story of how British tankers were converted into "flat tops" (while still retaining their normal function) for convoy protection in mid-Atlantic is both

informative and entertaining, and includes some excellent "landing-on" "shots" featuring the dear old "String-bag."

The Mosquito film is equally admirable, both in matter and treatment, telling as it does how this famous aircraft was evolved and produced, and illustrating its many functions with thoroughly satisfying combat "shots."

Finally, the instructional film, the first of a series yet to be completed, is a model of lucidity and has the none-too-common virtue of stimulating interest as it instructs; we have seen nothing better of its kind.

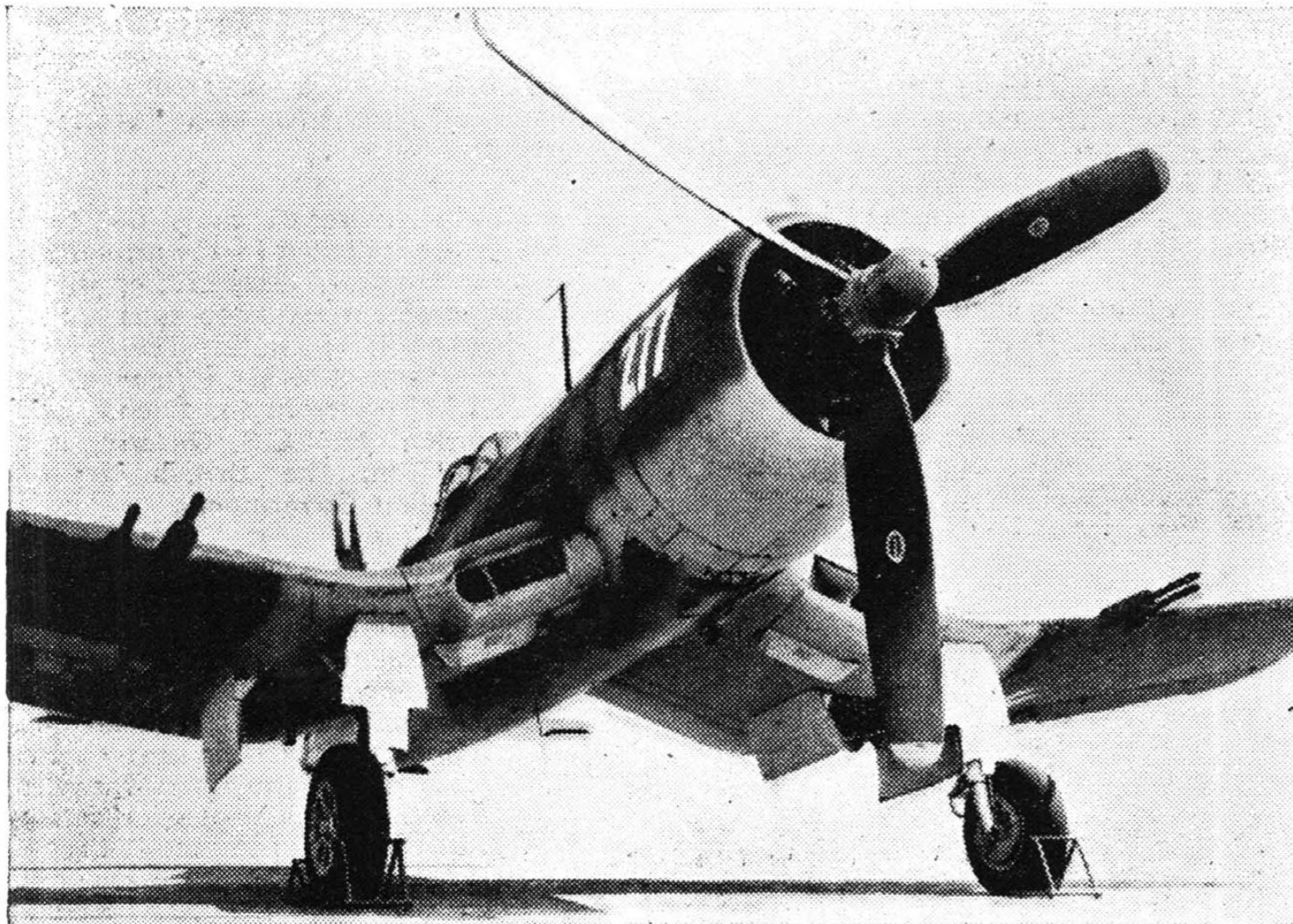
## Austin Activity

AN impressive account of their wartime products has just been issued by the Austin Motor Co., Ltd., in respect of their factories at Longbridge, Birmingham and elsewhere. They were, from September, 1939, onwards working for all three armed Services and also the Merchant Navy and Civil Defence Services, but we are only concerned here with the air.

In addition to their considerable output of fighters, bombers and aircraft engines, the firm's products ranged from cable-cutters and hydraulic units for gun-turrets to Beaufighter and Master wing and centre-section assemblies and Horsa fuselages covering over 5,000 aircraft, some 15,000 bomber fuel tanks, 120,000 bomb tails, and 300,000 machine gun magazines. Among the wide range of engines for land, sea and air were power units for airborne lifeboats.

## Use of Cameras

ALTHOUGH cameras may now be used again, without let or hindrance, in any place to which the public has unrestricted access, it is as well to remember that it is still prohibited to take one on board a ship or aircraft without a permit. In fact, you may photograph anything, anywhere, so long as you do not need a pass to see it, with the exception of one or two "regulated areas" in Northern Scotland where local restric-



CANNON CORSAIR: Latest version of the Chance-Vought Corsair, the F4U-1D, is armed with four 20mm. cannon instead of 0.5in. machine guns. The Corsair, one of the most successful American carrier-fighters, is being used by British and U.S. naval air units in the Pacific.

## HERE AND THERE

tions apply; details of the restrictions in these areas can be obtained at a local police station.

Military factories, airfields and dockyards are, of course, still "prohibited places" where a camera may not be carried, so if you get permission to go over such a place, leave your camera outside even if they forget to ask you for it at the gate—a not unknown oversight.

### Coincidence

A CORRESPONDENT points out that the death of Sir Trafford Leigh-Mallory, the wreckage of whose aircraft was recently discovered among Alpine peaks after he had been missing since November, 1944, bears a tragic coincidence to the death, in 1924, of his brother, Mr. C. H. Leigh-Mallory, who was also lost amid high mountains.

Mr. Leigh-Mallory was a member of Gen. Bruce's Everest expedition and, with Mr. A. C. Irving, was last seen climbing at a height of 28,200ft.

As the pair were never seen again it was never established whether or not they managed to reach the 29,000ft. summit.

MR. CLIFFORD B. HARMON, pioneer balloonist and pilot, founder of the International League of Aviators, and donor of the National Aviation Trophy, has died at Cannes at the age of 80.

According to the French radio, quoted recently by Reuter, half of the men due to be called up in France very shortly (the 1940-43 classes) will be drafted into the French Air Force now in process of being built up once again.

Lt. Gen. Hoyt Vandenberg, formerly commander of the U.S. Ninth Air Force based in Great Britain, was last week appointed assistant chief of staff of the U.S.A.A.F.

The first R.A.F. ex-prisoner of war to return to civil life under the general release scheme (he was released last week) was 47 year old W/O. A. L. Cartwright, of Blackpool, who enlisted in August, 1939, and was a wireless operator in Transport Command. He is a foreman builder by trade.

It was arranged for a Spitfire pilot of the R.C.A.F. to photograph last Monday's eclipse of the sun from a height of 35,000ft. over Western Canada in order to avoid interference from cloud.

The W.A.A.F. Central Voluntary Band received a great ovation when, with Drum Major Sgt. T. E. Althoff leading the forty-seven girls, it played at Rotterdam Stadium during the first football match between Holland and a British team since 1938. The B.L.A. team won 3-0.

Aluminium alloy is now being



TOP SEA DOGS: Air Apprentice G. Randle, of Leicester, receives the Sebastian Cup on behalf of the Raleigh Division (best all-round division) from the Fifth Sea Lord, Rear Adml. T. H. Troubridge, at a passing-out inspection recently held at the Royal Naval Air Training Establishment, Newcastle-under-Lyme.

## News in Brief

recovered from obsolete and unserviceable aircraft in India and is being diverted to the cast-ware industry under the name of aero scrap. Not only all kinds of office and household equipment is being made from this scrap, but also fittings for railway rolling stock.

A merger has been arranged between the Beech Aircraft Corp. and the Cessna Aircraft Co. Walter H. Beech (president of the former concern) and Clyde Cessna (founder of the latter firm) were associated in the Travel Air Co. in the earliest days of the U.S. aircraft industry.

More than 2,300 aircraft carrying upwards of 35,000 troops from Continental and United Kingdom bases were flown to America during the first month of the U.S.A.A.F. Air Transport Command's programme of redeployment and return of Army personnel.

As a tribute to their employees' valuable war effort, Dowty Equipment, Ltd.,

decided to give every weekly and hourly paid worker who had been with them for more than 12 months an additional week's wages at the time of the works' annual July holiday. "You all made a most important contribution to the country's armaments at a critical period," Mr. G. Dowty told them.

The Dunlop exhibition, which opened on July 2nd and closes to-morrow, covered more than 400 war products from 30 factories in Britain and Northern Ireland. Some of them were also made in Australia, Canada, India, South Africa and the U.S. Effectively staged at the Royal Empire Society, Northumberland Avenue, London, W.C.2, it demonstrated the amazingly wide field of rubber (natural and synthetic) as a "strategic material."

Ten 4in. anti-aircraft guns on twin mountings are included in the armament of the new *Swiftsure* class cruiser which has a displacement of 8,000 tons and a designed speed of 31 knots. The first of this class, H.M.S. *Swiftsure*, is on active service in the Pacific, and another, H.M.C.S. *Ontario*, is a gift from the British to the Canadian Government.

German scientists now in Allied hands are reported to have stated that the wind tunnel built at Peenemunde and used in the development of the V2 and other rocket experiments, was able to produce wind speeds up to 3,000 m.p.h. and enabled von Braun to solve the problem of overheating through air friction. Peenemunde is reputed to have cost Germany £50,000,000. Some startling claims were made about the things they would have perfected had the war continued—these included rocket bombs capable of reaching New York.



# Kellett XR-8 Helicopter

*Intermeshing Rotors : Balanced Torque Reaction : No Tail Rotor*

AMERICAN interest in helicopters continues unabated. Information has recently been released regarding a new two-seater built for the American Army Air Force by the Kellett Aircraft Corporation, of Philadelphia. Termed the XR-8, it is a genuine helicopter having the characteristics of vertical ascent and descent, the ability to fly backwards and sideways as well as forward, and also to hover motionless. It is claimed to possess good manoeuvring capabilities.

The outstanding feature of the design is the arrangement of the two three-bladed rotors. These are closely pitched at a slightly divergent angle and overlap as they rotate in opposite direction. The torque reaction from the rotors balances out and thus the need for the familiar transverse tail rotor is eliminated. The two rotors have a combined blade area of 84.5 sq. ft., with an overall span of 40ft. As the gross weight of the craft is 2,975 lb. the blade loading is 35.2 lb./sq. ft.

Power is supplied by an air-cooled engine developing 245 h.p., thus giving a power loading of 12.1 lb. per h.p. For short trips 34 gallons of fuel are carried, but tankage is available for a maximum of 81 gallons. This is sufficient for more than four hours' operation. Fuselage length is 22ft. 7in., and the total height is 11ft. The track of the tricycle undercarriage is 10ft. No particulars are as yet available of the specific need for the vertical and horizontal stabiliser surfaces at the tail. At this stage it is difficult to assess relative merits. The advantage gained by eliminating the tail rotor and its transmission is offset by the provision of a second rotor and its driving gear. Aerodynamic drag may be somewhat reduced but controls will not be markedly simplified.

The XR-8 helicopter was first flown on August 7th,

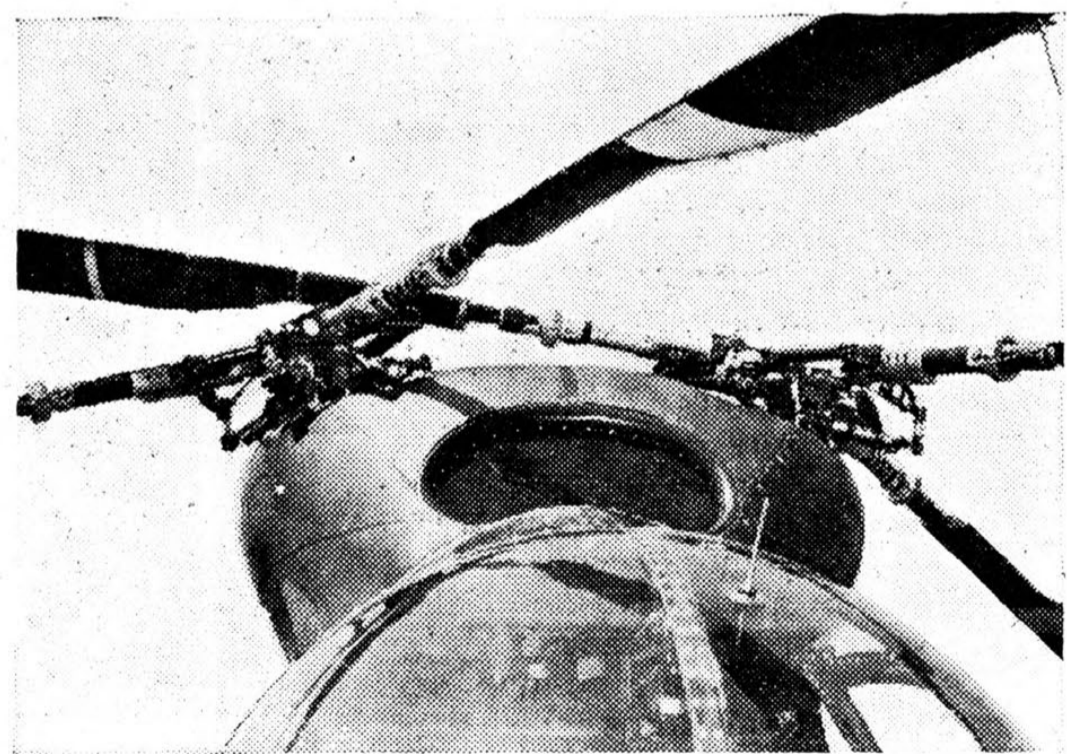


Vertical and horizontal stabilisers occupy the place of the more usual tail rotor.



The XR-8 flying within the confines of the small field used for testing the prototype. It first flew in August last year.

1944, and since then continued tests have been undertaken to develop and co-ordinate performance data of the intermeshing rotor type. A large number of flying hours have been accumulated and a number of cross-country flights have been made. The entire test programme has been carried out from a small field, approximately 220ft. by 450ft., adjacent to the Kellett plant. It is pointed out that the XR-8 is a military experimental type and the firm is not contemplating going into production on this design, although later models are expected to incorporate the intermeshing rotor arrangement. All experi-



Rotor head of the XR-8 showing the two intermeshing three-bladed rotors.

mental work has been undertaken in co-operation with the U.S.A.A.F. Air Technical Service Command at Wright Field.

The Kellett Aircraft Corporation is currently engaged on other helicopter projects but, whilst specialised applications are immediately possible, is of opinion that a substantial amount of additional engineering and flight experience is still required before the helicopter can be established for general use. The rather exuberant statements and pictures in the non-technical Press are deprecated. No disclosure is made of the company's post-war plans for helicopters in the private and commercial fields.

# Hitting with a Vengeance

*Dive Bombing from 11,000ft. : Ninety per Cent. Hits : Royal Indian Air Force Lends a Hand*

By Flt. Lt. S. H. SWAFFER

**S**PITFIRES, Typhoons and Mosquitos made front-page news during the European conflict, as well they should, but many have scarcely heard of the Vultee Vengeance dive-bomber.

With an unloaded weight of more than 10,000 pounds, this all-metal, stressed skin, mid-wing, cantilever monoplane, fitted with a Wright Cyclone 14-cylinder engine of 1,600 h.p., packs a useful sting of four 0.05 machine guns in the wings and two in the rear of the elongated glass-house in which sits the wireless operator/air gunner. Bomb-load varies, depending on the target, but usually consists of 2 x 250 lb.

In general appearance the Vengeance is massive and appears to be of extraordinarily solid construction. Flying in one reminded me of riding up Regent Street in an L.P.T.B. omnibus. There is a great sense of safety. During a vertical dive, which accidentally occurred through my answering "yes" to a question from the pilot which was inaudible on the intercom., the aircraft maintained a stable equilibrium, and the hydraulically operated diving brakes, fitted on both upper and lower wing surfaces, checked any excessive gravitational speed. The Vengeance squadrons of the Royal Air Force and Royal Indian Air Force mostly sally out unescorted to the specialised job of close support work in which they have become adept. The army commanders call upon these squadrons when there are targets to be attacked which require precision bombing—sometimes only fifty yards from our own positions.

## Method of Attack

It was early in 1943—at the beginning of the first Arakan campaign—when the Vengeances made their world debut attacking Japanese pill-boxes in the Donbaik sector, and from then on right up to the fall of Rangoon in May this year they have appeared to the astonished Japanese out of a clear tropical sky. Flying at something like 11,000ft., then peeling off, one by one, to scream down on to the minute target ordered by the brigade commander through the air

liaison officer. One of the few Japanese prisoners captured informed the interrogation section that the moral effect upon his fellow-men had been quite alarming. At first they thought that the Vengeance was out of control and about to crash.

## Small Targets Hit

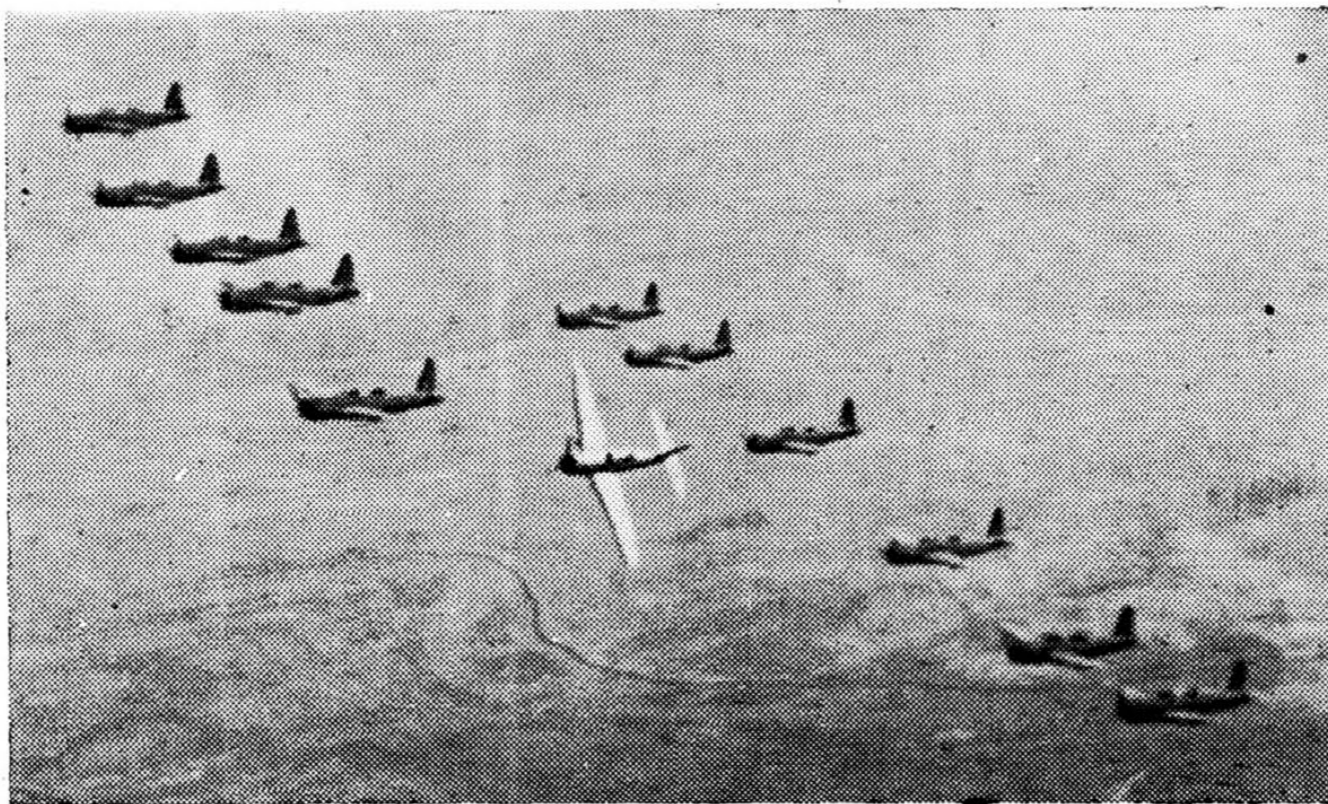
The results of these first sorties were most satisfactory, and I noted on the intelligence signal that 90 per cent. of the bombs had hit the target. Considering that these were

a number of quite small specially constructed pill-boxes, the satisfaction was warranted. They consisted of deep dug-outs roofed in with concrete and then topped off with three feet of earth camouflaged with tangled undergrowth. They were unassailable, since at first we could never find the entrance. Later, it was discovered that they were linked by underground passageways. The strategy behind these pill-boxes was that our troops, coming upon and investigating something that looked a bit suspicious, were brought under accurate mortar fire which was trained

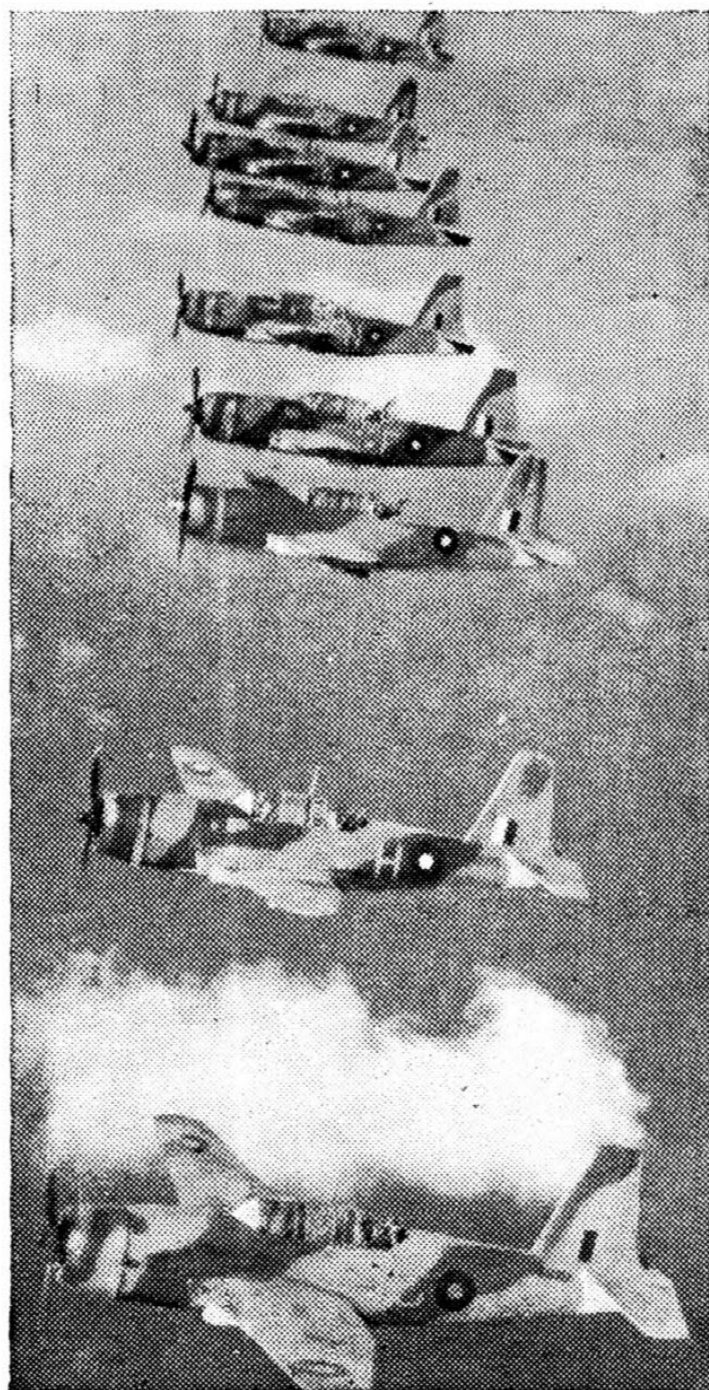
directly on to the levelled earth forming the roof.

From that day on the Vengeances, and the crews who flew them, were hailed as the answer to a lot of the army's problems. The fact that the enemy also realised that important point was borne out by their frantic desire to ascertain just where these bomb-accurate aircraft were based. Photo reconnaissance on their part naturally revealed one of these bases, and we were treated to a dawn strafe by "ois" which came in at tree-top level, avoiding detection by radar. It was all over in a few minutes—the ground gunners saw to that—and the total casualties amounted to one burnt-out Blenheim and a couple of parked Vengeances damaged.

There followed a short period during which modifications were carried out on the Vengeances. The "teething troubles" presented no difficulty, and in clearing these, performance and accuracy became improved. Lessons learned during the initial sorties were



(Below) A formation of Vultee Vengeances flying in echelon over the Arakan coast.



(Above) The leader of a Vengeance dive bomber squadron peels off to attack a target.

elaborated upon and a definite programme laid down for the future of these "close-support" bombers.

At this time, still early in 1943, we had designs on the island of Akyab, forming part of Arakan in Burma, and commenced a campaign driving south from Maungdaw-Buthidaung, which was not altogether successful, due partly to the monsoon rains. The Japanese had concentrated considerable supplies in small dumps covering a very wide area on the island, and they were carefully concealed. But photo/rece showed them up, and, whilst Blenheims hammered the larger targets in the form of shipping and jetties, the Vengeances economically and accurately began eliminating the supply dumps upon which the enemy had hoped to maintain his forces during the monsoon period.

#### R.I.A.F. Joins In

It was during this minor campaign that the Vengeance showed itself as an aircraft particularly suited to the type of warfare being fought in Burma. Not a war in which large numbers of troops rolled over the open plains in armoured vehicles, but one in which a great use of concealment was made. Targets were small—appearing especially so from the air—and our then small force of medium bombers were required elsewhere. Army commanders almost went on their knees for an increased number of Vengeance squadrons. The R.A.F. said "O.K." but we must let the Indian Air Force (now Royal) share the glory.

And so began an intensive training period in which the R.I.A.F. joined in. Much praise has been showered upon the Vengeance squadrons, and it has always seemed a pity to me that this has not been recognised in all quarters. The job of the Vengeance crews has been a particularly hazardous one.

As time wore on, more Vengeance squadrons lined the forward airfields up and down the 700 miles of Burma front. Their targets were varied, but always called for pin-point accuracy. They were constantly at the beck and call of the army, and never once did they refuse a target. It was they who inspired the phrase "bomb-happy Japs," so widely used in the eastern newspapers. And "bomb-happy" they became as formation after formation of

Vengeances came hurtling down upon them, spreading death and destruction in all directions. It is now well known that the enemy feared this form of attack more than the cannon and rocket projectiles of other aircraft.

Great use of these aircraft was made as "aerial artillery." The Japs had a habit of lodging themselves on top of hill features and then digging in at great depth. These precipitous slopes were difficult to assail, and always resulted in a disproportionate number of casualties. Some of them were held by the enemy for months, and proved a thorn in our sides.

I remember one such hill feature—1301—so called because that was the height of it in metres as marked on the flying map. The Japs were well tucked in, and it seemed that nothing would get them out. But the Vengeances were called in and subjected the target—merely 100 by 30ft. in area—to a sustained attack which sent the Jap into his deep dugouts and fox-holes. The last formation, however, came over, and, although making their routine dives, dropped no bombs. Meanwhile, the troops were storming the slopes, and upon reaching the top found the enemy well entrenched in their shelters.

After the feature had been captured, I climbed to the top. On the way up some of the men shouted, "Good old dive-bombers. They've blasted the top clean off hill 1301." Then, jokingly, "But they might have left us a bit of shade." Trees stood leaf and limbless, and the smell of rotting flesh and cordite assailed the nostrils.

It was whilst talking to the men over a cup of tea that I realised how closely knit the air support was to the ground forces. These fellows were high in their praise, and I was given many congratulatory messages to take back to the pilots who daily risked their lives in order that the ground casualties should be few in number.

During the subsequent campaigns, the Arakan No. 2, the Siege of Imphal and Kohima, the move down the Irrawaddy and a host of minor supporting excursions, the Vengeances of the R.A.F. and the R.I.A.F. always figured as an integral part of the planned operation. They put up a show which would have gladdened the hearts of the American aircraft workers at the Vultee plant.

## THE NEW AMERICAN WIND TUNNELS

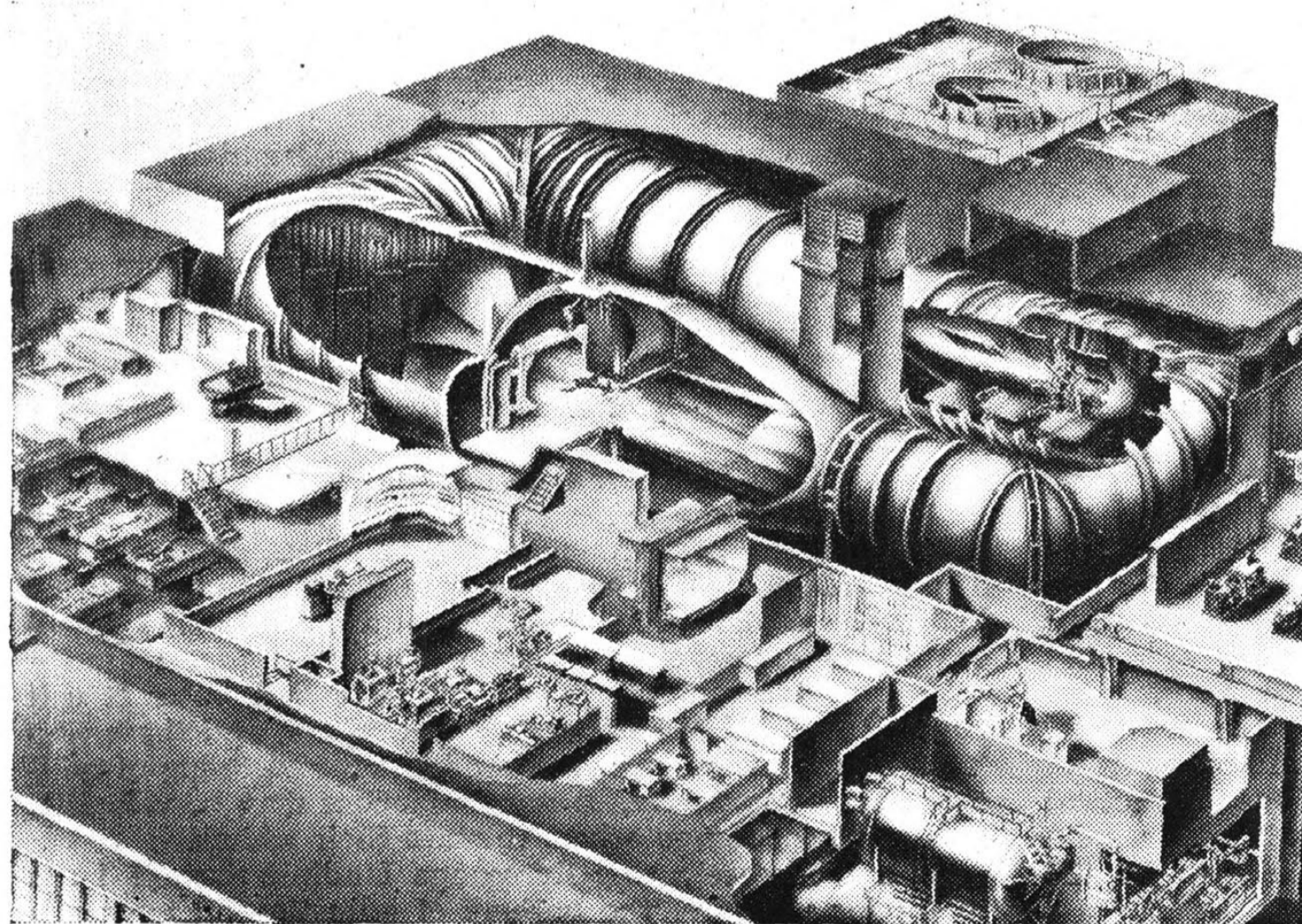
**T**WO new wind tunnels are being built in the United States for tests of models at velocities representing full-scale speeds in the neighbourhood of the speed of sound.

One is located at Pasadena, California, and is to be operated by the California Institute of Technology for four west-coast firms: Consolidated-Vultee, Douglas, Lockheed and North American. The other is being constructed by the Curtiss-Wright Corporation at Buffalo.

**28,000 h.p.**

The design of the two tunnels is identical, and the following information about the Curtiss-Wright tunnel may therefore be taken to apply to the Pasadena tunnel as well. The tunnel is of variable-density type, with steel walls three-quarters of an inch thick, in which pressures up to 60 lb./sq. in. can be built up by four special compressors, or the pressure can be reduced to 4 lb./sq. in., equivalent to the full-scale conditions at 35,000ft. The total volume of the tunnel is 210,000 cu. ft. and the two electric motors of 14,000 h.p., driving two 16-bladed, 22-ft. diameter fans in tandem, give tunnel speeds up to the equivalent of full-scale speeds in the region of 740 m.p.h.

As the test chamber measures 8ft. 6in. in height and 12ft. in width, models up to 1cft. span can be tested. The circuit length of the tunnel is 378ft. and the overall length 178ft. The overall width is 81ft.



Cutaway model of the new wind tunnel now being built at the Curtiss-Wright research laboratory at Buffalo.

"Indicator" Discusses Topics of the Day

# What Does the Private Owner Want ?

*Let the Amateur State His Requirements Now : The Importance of Overseas Markets : A Possible Specification : Some Personal Whims*

**I**F only because it may be some time before individuals, clubs and aircraft hire organisations are permitted to purchase and make use of small aircraft, now, it would seem, is the time for the amateur to state his wants. Whether or not official permission for the purchase and free use of aircraft is likely to be given later or sooner, the aircraft industry, in its major part, is going to be much too busy on the development of Far Eastern military types and in satisfying the needs of the airline operators during the next year or two for the fragile and indefinite light aircraft market to be seriously considered.

In due course, however, as the other more important needs are satisfied, manufacturers will begin to look to this market as a possible means, at least, of filling in the gaps in the production programme, and even of helping along overseas sales by keeping their name continually in the foreground. And I do not think that the prospective purchaser should leave it entirely to the manufacturer to decide what he ought to want. In fact, however well the manufacturer may be represented in different parts of the world, he will not be *able* to decide successfully where overseas sales are concerned—and these are likely to be by far the most important of any.

A variety of types will suffice for the purpose, so long as they are not too expensive to run and fulfil certain simple requirements. Shortness of take-off or ease of starting, for instance, cannot greatly matter where there is an ample number of airfields and ground crews who are prepared to swing on the end of an airscrew blade. Except where the annual maintenance bill is concerned, it will not even matter whether the outfit is reasonably accessible for adjustment and inspection. Endurance, within reason, can be short or long.

## Individual Requirements

I imagine that the sort of friendly little group of small aircraft firms, which we knew so well before the war, will be able to cope quite adequately with the internal market. These will be much better able to build to personal specification in the way that suits the average aircraft owner in this country and for special purposes in any comparatively well-organised community. I may be quite wrong, but I cannot see the "pleasure owner" being happy to own an aircraft which is standardised and to be seen by the hundred everywhere he flies. For some more years, light aircraft will be considered rather as cars were considered a quarter of a century ago—and as sailing craft are still considered.

But it is a very different matter when we come to the all-too-seldom-considered overseas and Dominion market—and that is probably the only one worth serious attention by the bigger firms. In general, the purchasers in this market, widely spaced as they are, will no more mind flying a standardised aircraft than they have ever minded driving a practical and standardised car with a useful ground-clearance, a big woolly engine, and soft springs. Just as this type of car is bought for continuous practical work in all kinds of conditions, so the aircraft with a solid performance and sturdy background is likely to be the one to be bought.

Certain obvious requirements can be mentioned, but the details of the specification must obviously come from the people who are going to make use of the machines.

A big engine, cruising at a low relative output, perhaps; roominess in a special way and arranged so that the c. of g. cannot be widely shifted by careless loading; ability to stand up to all-the-year-round "dispersal"; a short take-off run, with the help of "override" power and high-lift flaps; a steep and easy approach and a short landing run (with the help of the same flaps); a vice-proof stall, and an undercarriage that will take anything within reason. Of course, the thing will be heavier than the average pre-war light aircraft, so we shall have to think in terms of greater engine-power with, maybe, a separate high octane fuel supply for take-off and an interconnected fuel cock arranged on "no-high-octane-no-through-the-gate-throttle" principles. For the rest, the engine should take just "gasoline."

## Flaps Essential

Depending on weight and cost considerations, a two-pitch airscrew might suffice. But the main help in shortening the take-off run should be from the high-lift flaps. Such devices, above all, are worthy of continuous and vigorous research for use with all types of aircraft. It is long since designers (other than one or two) did anything much more than raise the wing-loading by a few more pounds when a better performance was required—and that will not do, either for our proposed "utility" private aircraft (using the word in its old-fashioned sense), or for the kind of feeder-line transport which will be bought for operation in similar conditions.

Not that I am suggesting that there will be nothing to buy in the meantime. Whether or not the "little firms" blossom again, there will be a plentiful supply of the practical light aircraft which have been doing such good work with the Army and elsewhere, and which were becoming popular enough in the States during the peace years. But that, I feel, is only one answer to the requirements. Something larger and more roomy, but with a comparable "airfield" performance, will be needed. We do not want to find ourselves trying to sell, as an alternative; smooth, well-equipped, over-efficient and rather temperamental cruisers into which the larger series of light aircraft were tending to be developed before the war, both here and, in a rather different form, in America. They may still be toys, and are merely more expensive to buy and to run; furthermore, their take-off characteristics were, in general, hardly good enough for casual day-to-day use in all conditions.

It is difficult for those who have been designing, making and flying military types for the last five years or so to judge the requirements of the civil pilots of five years hence. Most of us have developed biases of one kind or another, and for what they are worth as a guide I will confess to my own. For some time, the great majority of prospective purchasers and hirers of light aircraft will be ex-R.A.F., R.N.V.R. and A.T.A. pilots, and those who have been concerned in the production and flying of military aircraft generally, so my confessions may be valuable, if only to encourage others to state their whims.

At a moderately ripe flying age I admit that, if I am to fly for pleasure, the bothers of adjusting an approach should be reduced as far as possible. I disapprove of motoring approaches with single-engined aircraft, and think that as little motor as is expedient should be used

WHAT DOES THE PRIVATE OWNER WANT?

even with multis. Yet, suiting the airfield to the type, it is still quite an effort to adjust height and turn-in so that a safely short arrival can be guaranteed without either using the engine or indulging in swish-tail tactics over the fence. I should like to see high-lift flaps in some form on all aircraft, and these should be easily adjustable from barely perceptible to monumental drag positions. At no time must I suffer the horrid suspicions that I am either not going to make it or am hopelessly over-shooting after a misjudgment of wind-strength at a strange airfield. At any reasonable height over or near the boundary I should be able to slam on everything I've got and put the thing almost straight down on the ground. And, of course, it will be possible to raise the flaps in order to stretch the glide, a stop being arranged to prevent retraction through the "high-lift" angle.

The view, in all attitudes, should be as perfect as design can permit, with the screen flat, deep and as near my nose as possible. I like to see where I am going both on the ground and while approaching to land; I distrust curved screens and dislike screens that are, so to speak, at the end of a long corridor. Transparent roofs are all very well, but they are usually a mockery as far as all-round view is concerned, and make the aircraft insufferably hot when the sun is shining. Maybe, because of habit, I have convinced myself that the useful field of view is better with a low-wing than with a high-wing monoplane—and I also like to see where I'm going in turns. The ideal from all these points of view is a small twin with myself nearest to the accident—so I can see it coming and therefore avoid it. Or a pusher.

Ground directional stability is quite important—not only

when taxiing but during the few seconds when the aircraft (perhaps in a cross wind) is being properly organised neither by the flying controls nor the brakes. For that reason rather than for any easing of the landing technique I am inclined to favour the tricycle—which is rigidly stable when on or partly on the ground. A conventional aircraft which is comfortably stable on the ground is, *ipso facto*, too "tip-up-able." The Americans nowadays prefer the ground c.g. to be well aft and usually fit lockable tail-wheels to take care of the lost directional stability.

War conditions have taught us all the value of personal harnessing for safety even in minor accidents, but we all hate being tied like a baby in a pram. Something ingenious and instantly adjustable in the way of safety harnesses is required. Wheel brakes should be good and smooth—and applicable without contortionist efforts. The column trigger or the rocking pedals fulfil requirements here.

Finally, all engines should be capable of being started from the pilot's seat without assistance.

So much for a few of my own ideas.

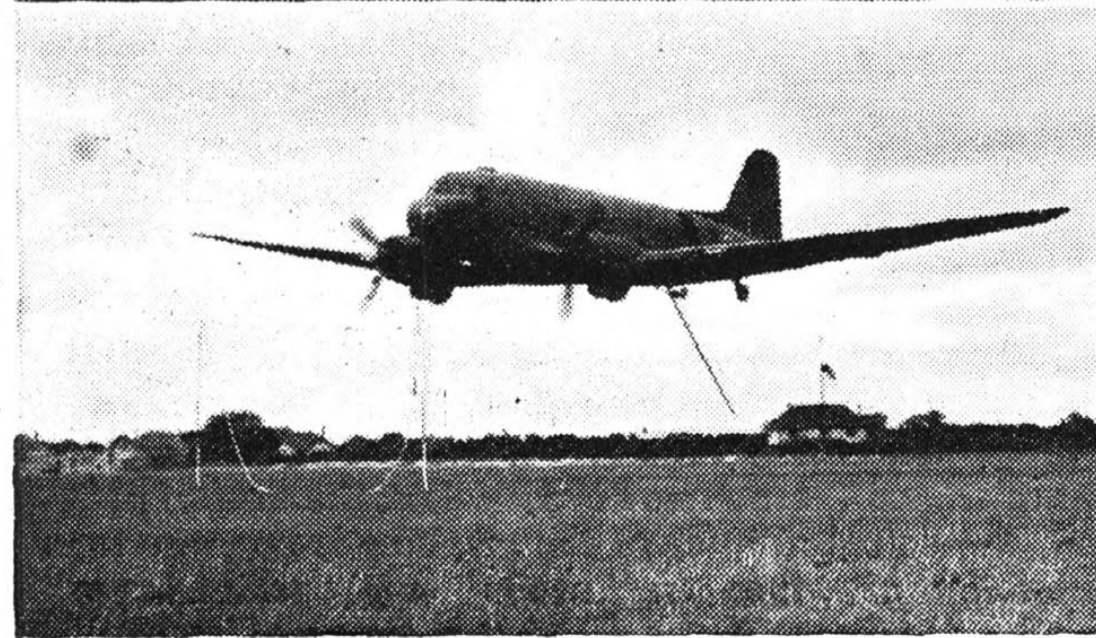
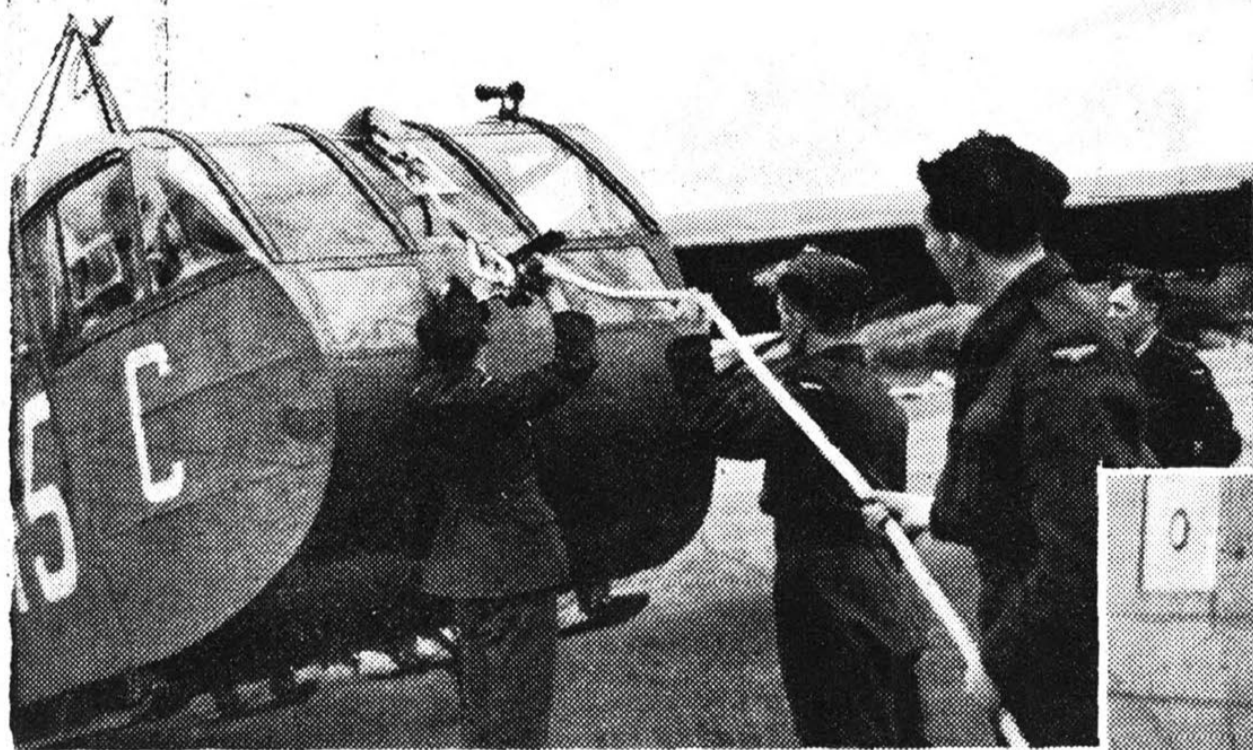
"INDICATOR."

MEASUREMENT BY MOVIE

CREDIT for developing an error-proof photographic method to measure take-offs and landings of aircraft goes to W. B. O'Neal, assistant chief power plant engineer, and William P. Zimmerman, chief photographer, of the Glenn Martin company. The invention is based on a "camera-enclosed grid" exposed on specially prepared movie film, and it has proved to be much more accurate, economical and safe than any method employed previously.

GLIDER PICK-UP

R.A.F. Transport Command  
Training to Pick-up Gliders  
Without Landing



By employing the hysteretic qualities of nylon rope it is possible to make snatch pick-ups of stationary gliders without the tug aircraft landing. This has proved very useful for reclaiming empty gliders after an airborne landing and for clearing casualties from country unsuitable for making airstrips. These training photographs show (top left) attaching the tow-rope to a Hadrian glider; (left) the method of pick-up by Dakota as it flies over; (right) the hook and pick-up apparatus being examined.

THE position held in the American aviation sphere by the Boeing Airplane Co. can well be likened to the position of A. V. Roe and Handley Page in this country. Each of these famous concerns have been responsible for producing outstanding heavy bomber aircraft for their respective nation's joint war effort.

History of the development of the B-29 Superfortress actually goes back to 1938 when requests were made to Boeing for ideas on major modifications to the Flying Fortress. At that time, the company had just built the B-15 for the Army, but that aircraft, although shining in some respects, was not up to requirements in others. Discussions on modifications continued, and in January, 1940, Boeing were given general specifications for an entirely new and enlarged four-engine bomber.

In point of fact the company had already been at work on such a design, and this resulted in the Model 341 of 73,000 lb. gross weight which could be increased to 85,672 lb. if necessary. In the meantime, however, the Army had revised its ideas and Boeings were instructed to enlarge the design. This was done—resulting in the Model 354—and, meeting with full approval, wind-tunnel models and a mock up were authorised. These evoked the XB-29, which was identical to the Model 345 with the exception that the gross weight had been further increased.

**Lengthy Flight Testing**

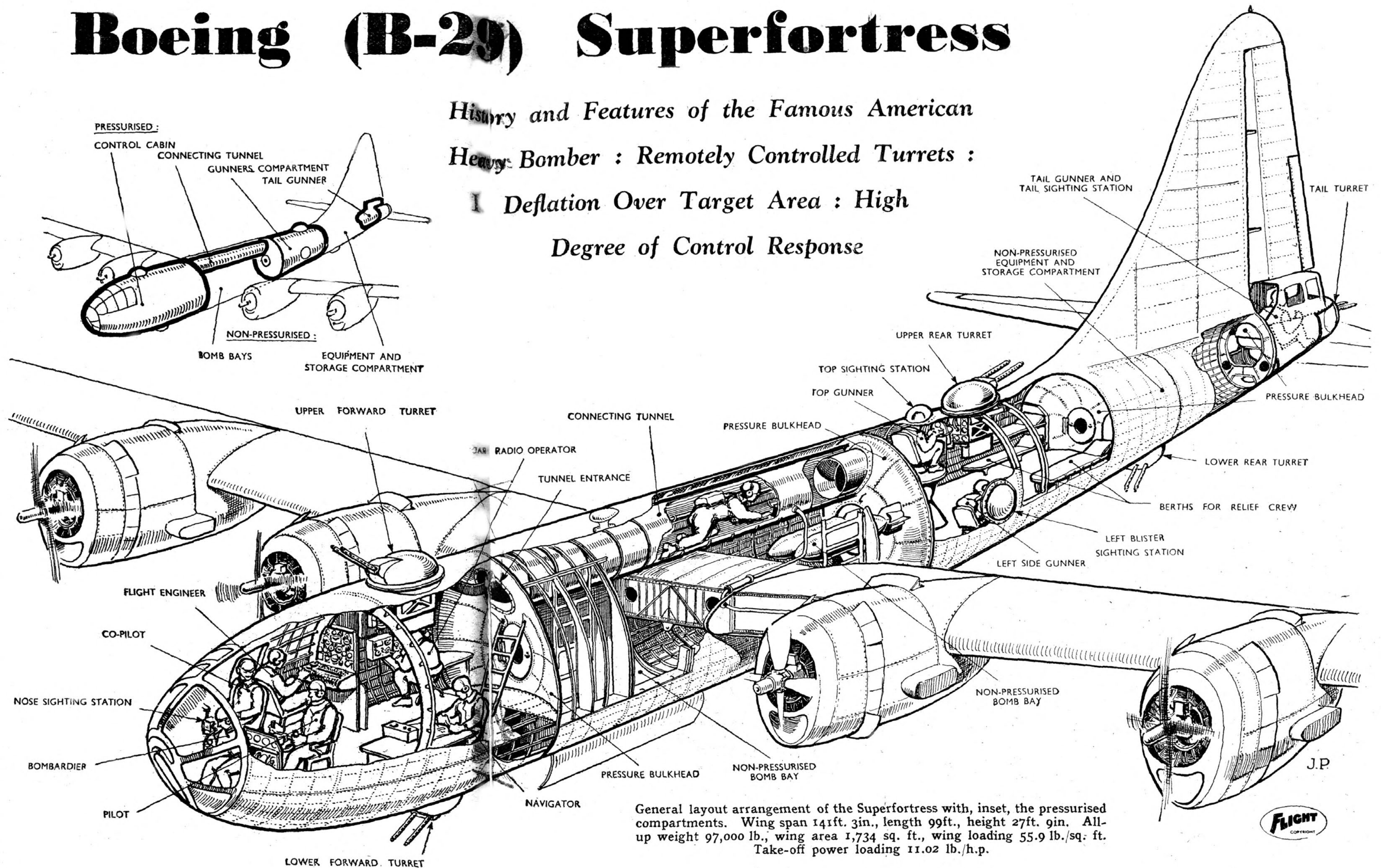
In August, 1940, the Army Air Forces authorised the construction of three XB-29s, but before they were completed, such confidence was felt in the merit of the aircraft that it was ordered in quantity production. The maiden flight of the B-29 was in September, 1942, and intensive flight testing of the machine continued throughout the rest of '42, through 1943 and into 1944.

As an aircraft the Superfortress is particularly interesting in view of the many novel features incorporated in the design. Most prominent of these is the pressurisation of the crew compartments. Although no value for the pressure differential used has been published, some idea can be gained from the fact that for operation at 35,000ft., with an internal pressure equivalent of 10,000ft., the differential will be 6.65 lb./sq. in. Another interesting feature of the pressurisation system is that the engine superchargers, which are of the centrifugal type driven by exhaust gas-turbines, are made to serve as cabin blowers in addition to their normal function.

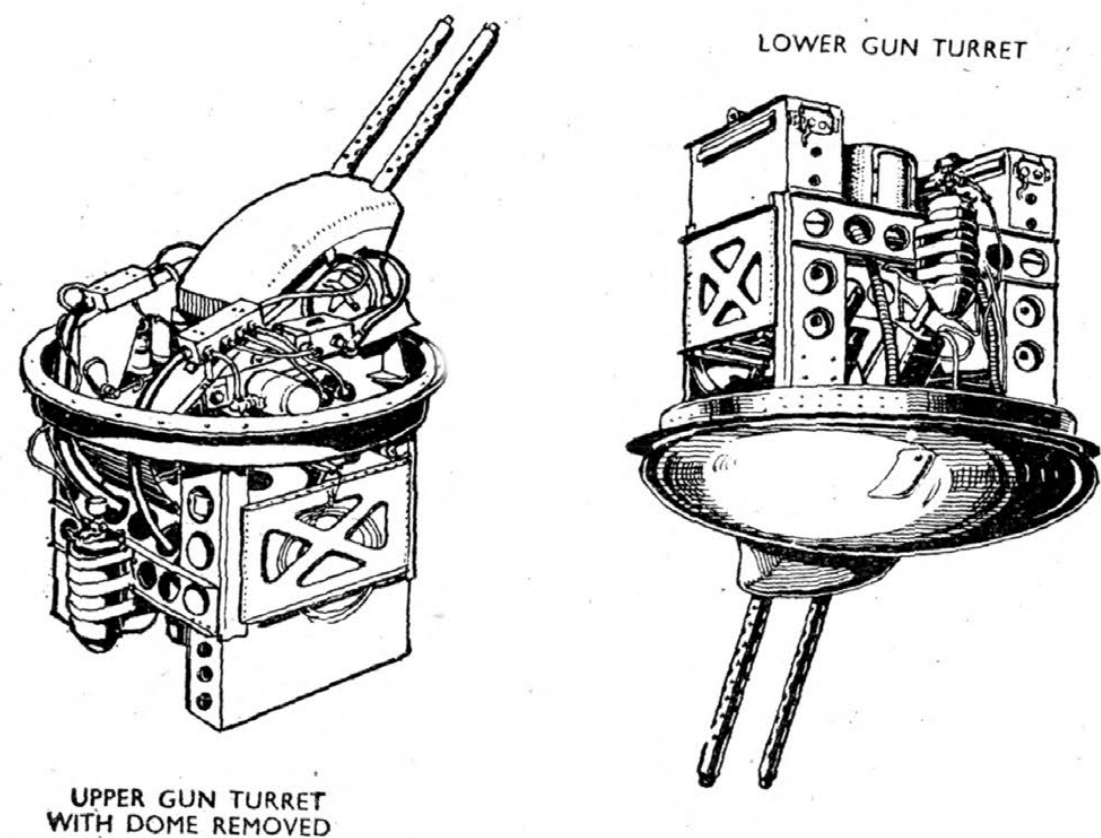
The operational drill is to employ pressurisation for

# Boeing (B-29) Superfortress

*History and Features of the Famous American Heavy Bomber : Remotely Controlled Turrets : Deflation Over Target Area : High Degree of Control Response*



General layout arrangement of the Superfortress with inset, the pressurised compartments. Wing span 141ft. 3in., length 99ft., height 27ft. 9in. All-up weight 97,000 lb., wing area 1,734 sq. ft., wing loading 55.9 lb./sq. ft. Take-off power loading 11.02 lb./h.p.



normal flight except over the target where, if the machine was badly shot up, the results of oxygen starvation and extreme cold, would materially affect the crew. Compartments are therefore deflated, and heated suits and oxygen masks worn until clear of the target area, when cabin pressurisation is resumed.

It is claimed that the crew do not suffer from the "bends" with the sudden deflation of the cabins, and all that one can offer in explanation of this anomaly is that if the cabins have been pressurised to an equivalent of 10,000ft. for some hours and, at the time of deflation, the actual altitude of the machine is no more than about 28,000ft., then the "bends" might not be experienced. However, if the aircraft is flying at 35,000ft., then the equivalent cabin altitude would have to be in the region of 18 to 20,000ft. in order that "bends" should not occur. There would appear to be little validity in the explanation that the cause of this phenomenon

is a result of the cabins being deflated suddenly, as has been suggested.

As may be seen from the accompanying drawings, the nose and midship compartments are joined by a spine tunnel, over the unpressurised twin bomb-bays, where intercommunication between the two emplacements is facilitated. The tail gunner is in a little pressurised compartment of his own which is isolated from the others. Originally, the tail gunner had a 20 mm. cannon in addition to his two 0.50in. machine guns, but the cannon has since been deleted. All guns are remotely controlled, electronically, from sighting stations, and a singular feature of fire control is that the government of individual turrets, or barbettes, can be undertaken from alternative sighting stations. Thus, the nose gunner (bombardier) controls both upper and lower forward turrets; the mid-upper gunner controls the upper and rear turret, and can also handle the upper front turret if the nose gunner is

not using it. The side gunners control the lower rear turret and can also control the lower front and tail turrets if the nose and tail gunners are otherwise engaged. Such a system affords great flexibility toward combating diversified attacks. Sighting motions and firing impulses of the gunner at his station are transmitted to a unit which compensates for relative speeds, range, bullet drop, windage and parallax, and operates the turret or turrets accordingly.

**Surface Characteristics**

The high aspect ratio (11.5) wing used on the Superfortress is something of a departure from Boeing's past practice, yet is claimed to have excellent characteristics among which are ample stall warning and a gentle stall. Modified Fowler type flaps are employed, and, when fully extended, increase the wing area by no less than 19 per cent. Tailplane and elevators are of the

same plan-form and size as on the B-17 Flying Fortress, although of different aerofoil section and construction. To prevent tailplane stall at certain altitudes, the leading edge of the tailplane is turned up, rather as though the aerofoil were upside down. Directional stability with the dorsal fin is such that it is claimed as preserved even with two engine failures on the same side at take-off.

It is said that the aircraft is easy to fly and that it has no undesirable ground or flight characteristics, the control response in particular being singled out for special note. In this connection, the control surfaces are claimed to require no more effort in movement than those of many smaller machines, due to the painstaking care lavished upon getting the servo and trimming tabs absolutely right. Because of this, a high degree of rolling

response is obtained, and, additionally, operation of the rudder is said to require less effort than in the case of the Fortress, which, incidentally, is not a bad thing, for the Fortress's rudder is not exactly light; in fact, comparably to similar size machines, it is rather heavy.

Four Wright Cyclone 18-cylinder air-cooled, radial engines of 2,200 T.O. h.p. are fitted, each engine being equipped with two turbo-blowers, one as reserve. Take-off r.p.m. and boost are 2,800 and 8.8 lb./sq. in. respectively, and fuel consumption is 99.7 (U.S.) gallons/hour/engine at 59 per cent. power. Bore and stroke are 6.125 in. and 6.3125 in. giving a swept volume of 3,347 cu. in. (54.8 litres). Compression ratio is 6.85:1, and the dry weight, without hub or starter, 2,670 lb., giving a sea level power/weight ratio of 1.21 lb./h.p.

# Speed-Range Indicator

## New and Valuable Instrument to Mitigate Inadvertent Stalling

**A**N instrument called the Baynes Speed Range Indicator has been evolved by L. E. Baynes, of Alan Muntz & Co., Ltd., Heston, and has been exhaustively tested both here and in America, Messrs. R. B. Pullin & Co. having manufactured the prototype instruments.

Mr. Baynes, in giving the reasons which prompted the design of the instrument, suggested that the causes of high-speed stalls were not always fully understood by pilots, especially novices, and even if they were understood, it seemed rather a tall order to expect the pilot to multiply the known steady flight stalling speed of his machine by the square root of the increase in  $g$  during any particular manoeuvre. Not that the pilot ordinarily has any indication of  $g$  increase anyway. The inventor also avers that the instrument is intended rather as an object lesson in what happens under conditions of increased  $g$ , rather than as a stall warning indicator, in that it gives an at-a-glance picture of the decrease in available speed range during turns or in pull-outs from dives.

As is well known, the stalling speed of an aircraft is proportional to the square root of the wing loading, and when in a small-radius turn or pulling out of a dive the wing loading is much increased and, therefore, the stalling speed is also increased.

If  $g$  represents the gravitational force per unit of mass, and  $a$  represents the acceleration force per unit of mass due to turning or pulling out of a dive, the total force per unit of mass to be supported by the wings is the resultant of  $g+a$  and may be called  $G$ . Since wing loading is proportional to  $G$  the stalling speed is proportional to  $\sqrt{G}$ .

Thus a high-speed aircraft in a small-radius turn, necessitating a steep angle of bank, may have a value for  $G$  as much as  $6 \times G$  during the turn. The stalling speed during the turn is in this case increased in the proportion of  $\sqrt{6} = 2.45$  times normal stalling speed, which is equivalent on a modern aircraft to about 200 m.p.h., and as the flying speed during the turn may have been reduced to a figure

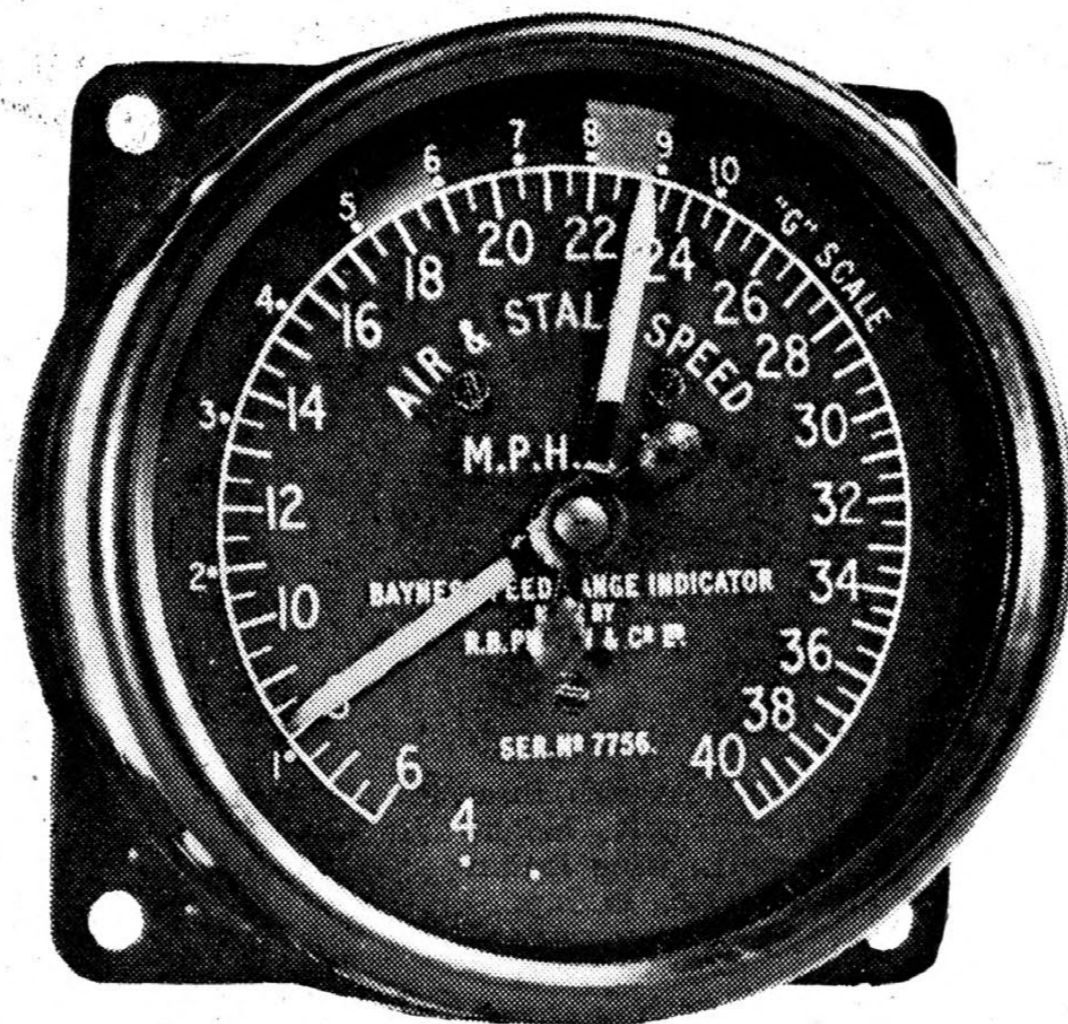
not much above this speed, there is the danger of a stall taking place without warning. The same thing may happen when pulling out of a dive; the stalling speed may increase to two or three times normal, due to the increase in the value of  $G$ , with the result that the machine stalls and fails to pull out of the dive.

Furthermore, at altitude the stalling speed has increased in the ratio of the square root of the relative density, and as the maximum speed also becomes less above the altitude to which the engine is supercharged, the speed range between stalling and flying speed is reduced for all values of  $G$ .

The Baynes Speed Range Indicator comprises a normal A.S.I. with an additional red pointer, concentric with the A.S.I. pointer, which is set at the known steady flight stalling speed (engine on, flaps up). This stalling speed pointer is operated by a mechanism inside the instrument which will turn the pointer to a degree proportional to  $\sqrt{G}$ , so that the correct stalling speed appropriate to the prevailing  $G$  will be shown on the dial, and the margin between the two pointers will thus represent the speed range available between the prevailing stalling and flying speeds. If the air-speed pointer moves back

to a position in which it overlies or underlies the stalling-speed pointer, stalling speed will have been reached and, by the approach of this superposition of the pointers, the pilot is given an easily visible indication of the approaching danger of stalling.

Since the indicated air speed given by a normal A.S.I. does not compensate for change in density at altitude, the indicated stalling speed is constant at all altitudes although the actual stalling speed increases as the square root of the relative density. No altitude compensation is therefore necessary for the stalling-speed pointer mechanism if the correct speed range available between prevailing stalling speed and flying speed is to be shown by the instrument. At altitudes above that to which the engine is supercharged,



Ordinary air speed is indicated by the "white" pointer, and stalling speed by the "red" pointer. The latter also indicates against the outer "G" scale.

## SPEED-RANGE INDICATOR

the indicated maximum speed becomes less, until, on reaching the absolute ceiling of the aircraft, the indicated flying speed and stalling speed of the machine are approximately the same, i.e., the available speed range has become nil. Therefore, although the actual stalling speed at altitude is increased and the actual flying speed is reduced until they are approximately equal at the absolute ceiling, the reduction in speed range on the indicator will be correctly shown by the movement of the flying-speed pointer towards the stalling-speed pointer.

In this way, the instrument will show the approach to the aircraft's ceiling and the reduction in speed range available for manoeuvring at an increased value of  $G$ ; the stalling-speed pointer turning towards the flying-speed needle with increase in  $G$ , and the flying-speed pointer turning towards the stalling-speed pointer as the ceiling is approached. The instrument will therefore give a better indication of the practical *service* ceiling as shown by the spacing between the two needles than will the usual 100 ft./min. indication on the rate of climb indicator.

The instrument may also be used as a " $G$ " metre; the value of  $G$  being  $\frac{\text{indicated stall speed}}{\text{basic stall speed}}^2$ . This may be of interest, for instance, in showing the pilot the  $G$  at which he "blacks out."

On the instrument illustrated the " $g$ " scale is marked on the dial with segments between 5 and 6  $g$  coloured red to represent the black-out region, and between 8 and 9

to represent the region where the wings are likely to come off.

The mechanism required to operate the stall-speed pointer (additional to the usual A.S.I. mechanism) consists of a small counter-weight on the end of an arm, mounted within the instrument body, which is free to move in a vertical direction and which is restrained against downward movement by a small coil spring. The weight moves down with increase in  $G$  and actuates a mechanism which causes the stall-speed pointer to turn to an extent proportional to the square root of the movement of the weight. The stalling-speed pointer is concentric with the A.S.I. pointer and makes use of the same speed scale on the dial as the A.S.I. pointer.

If required, an adjusting screw may be incorporated which will vary the setting of the stalling-speed pointer to suit the change in basic stalling speed caused by change in the loaded weight of the aircraft, but it would be necessary in this case to employ a logarithmic speed scale. This would permit adjustment of the stalling-speed pointer to various basic stalling speeds for conditions of aircraft loading and would also give wider spacings at the low-speed end of the scale.

The new instrument is intended to replace the conventional A.S.I., as it gives normally unavailable information to the pilot without the addition of a further instrument and without any additional installation complications. The diameter and mounting flange are as for the standard A.S.I., so that the instrument may be interchanged without modification to the orthodox panel. The only difference in dimensions compared with the standard A.S.I. is in the depth behind the mounting flange, which is  $\frac{3}{16}$  in. greater.

## CARGO SUPERCLIPPER

A TRANSPORT version of the Consolidated 204-seater "super clipper" on order for Pan-American Airways for post-war transatlantic service is being produced for the U.S.A.A.F. Air Transport Command.

This giant aircraft, briefly described in *Flight*, April 12th, has a span of 230ft. and a length of 182ft., and is powered by six engines mounted on the trailing edge of the wings and driving pusher propellers. It has a total pay-load of 50,000 lb., a cruising speed of about 340 m.p.h., and a range of well over 4,000 miles with full load. The fuselage is pressurised to permit operation at 30,000ft.

## "THE FEW" NUMBERED 414

ONLY 414 pilots and 300 fighters, totalling 18 squadrons, faced the *Luftwaffe* when the Battle of Britain opened almost five years ago, the British Information Service in New York disclosed last week.

That was the strength of No. 11 Group which was directed from a secret underground command post at Uxbridge, Middlesex, and which, as the famous "Few," bore the brunt of the battle.

Only three of these squadrons were equipped with Spitfires. Ten others flew Hurricanes, and the rest fought in obsolete aircraft.

Many of the squadrons were below the prescribed strength of eighteen aircraft each, although all were able to put at least twelve into the air when the call came to "scramble."

## ART AIDS "SSAFA"

IT has ever been a matter for debate whether a critic of art or entertainment should allow himself to be influenced by the fact that the subject of his review is in aid of charity. The purists hold that it is the moral duty of the critic to give his opinion on the presentation unbiased by any possible effects on a good cause, but the humanists believe he should put the cause first and say it's a good show whether he really thinks it is or not.

When *Flight* is invited to attend an exhibition of pictures because it has an R.A.F. angle, the above problem only arises in respect of those exhibits dealing directly with aircraft and life in the Service; we prefer not to air opinions on those depicting things outside this journal's normal terms of reference. Thus, in reviewing the one-man exhibition of drawings and paintings by A. C. David Smith opened by Group Capt. Douglas Bader in the Cooling Galleries, New Bond Street, London, W.1, recently, the proceeds of which are in aid of the Soldiers', Sailors' and Airmen's Families Association, we

are in the happy position of being able to say that this young R.A.F. artist's Halifaxes, Stirlings, etc., are immediately recognisable as such and that in the broader scenes of life in the Service the right atmosphere is admirably caught.

David Smith, a number of whose pictures have been purchased by the National Collection of War Records by the War Artists' Advisory Committee, told us that he is still experimenting, having entered the R.A.F. five years ago when still a student-teacher. Nearly 100 of his pictures (only 79 of which are actually catalogued) are gathered together in this exhibition, and they show a number of very different styles. "One experiments for quite a long time before settling down to one particular style," he said.

N. D. R.

## JET PROPULSION CONFERENCE

JET propulsion and gas turbine developments, which already are blazing a meteoric trail into a new era of military and civil air operations, were recently analysed at Swampscott, Mass. The occasion was a national three-day conference sponsored by the Air Technical Service Command of the U.S.A.A.F. and the General Electric Company, and was attended by 275 outstanding practical and research engineers of the major aircraft and engine companies in the United States, and a delegation from England.

The purpose of the Air Technical Service Command is to stimulate new advances in jet propulsion and gas turbines through the pooling of facts and ideas on the harnessing of this motive force for aircraft power plants.

Members of the official British delegation attending the conference included Air Vice Marshal L. M. Iles, Controller of Technical Services of the British Air Commission; Group Captain G. Watt, Deputy Director of Turbine Engines of the Ministry of Aircraft Production; W. G. Carter, chief designer of the Gloster Aircraft Company, and Major F. B. Halford, technical director of the de Havilland Engine Company.

## NEW R.R. PUBLICITY CHIEF

MR. M. PROCTER-GREGG, who has been appointed publicity manager for Rolls-Royce aircraft engines at Derby, had previously held a similar post with the Bristol Aeroplane Co. since the beginning of the war. He was responsible for (among other successful innovations) the first technical instruction advertisements on the Hercules engine and the Beau-fighter which appeared in colour in *Flight*, and thousands of which were sent out to the R.A.F. at home and abroad, and to the A.T.C. Mr. Procter-Gregg served in the R.F.C. in the 1914-18 war, and in recent months has been engaged on a study of the economics of Empire air transport as market research engineer.

# Over the Pole

## Photographs from the Navigational Trips by the Avro Lancaster "Aries"



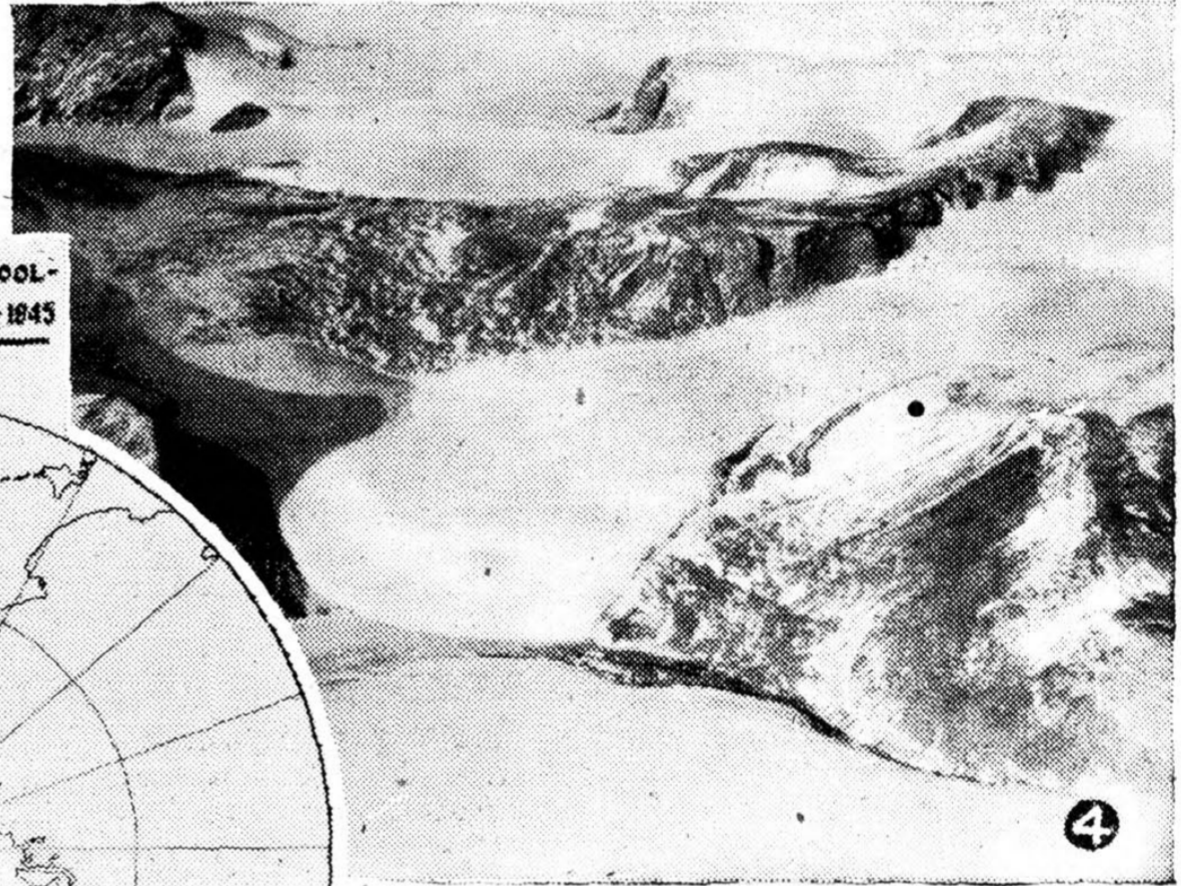
1. Wing-Cdr. D.C.M. McKinley, D.F.C., A.F.C. at the controls.



2. The *Aries* and her crew. The Lancaster was specially modified for the work.



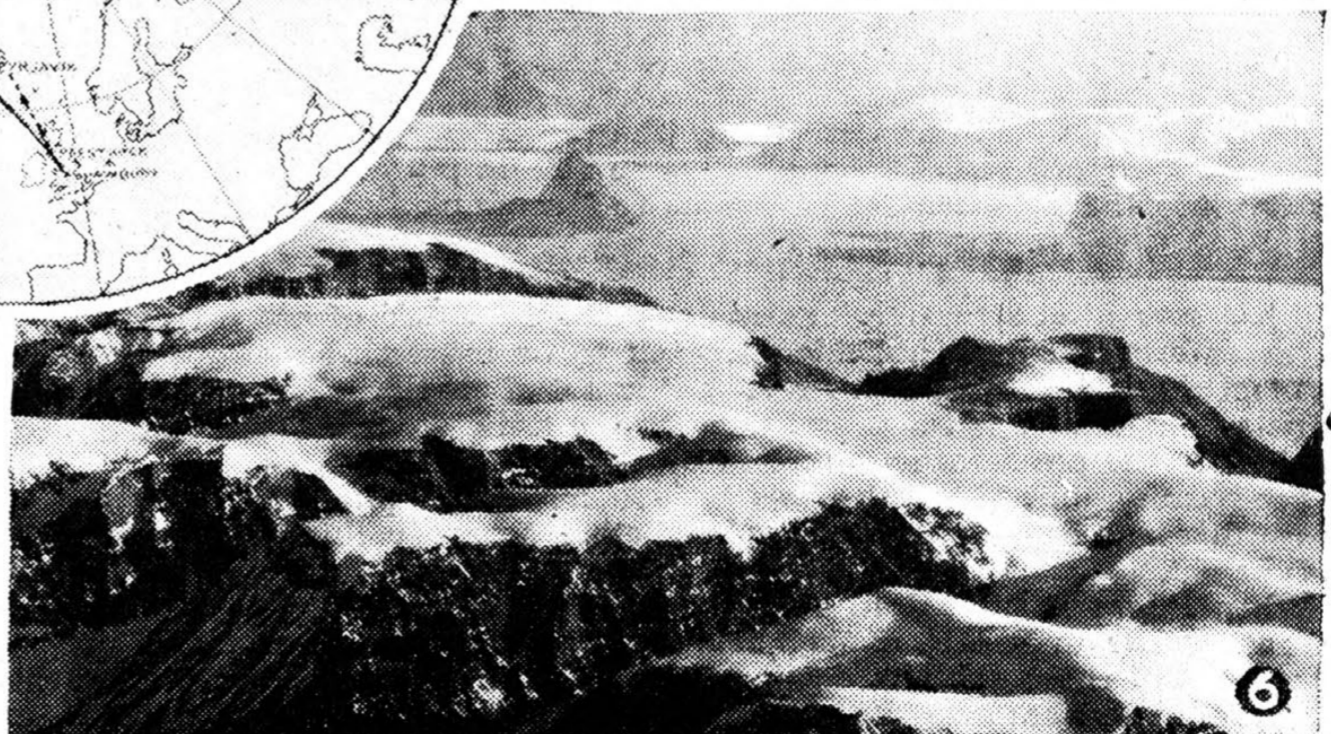
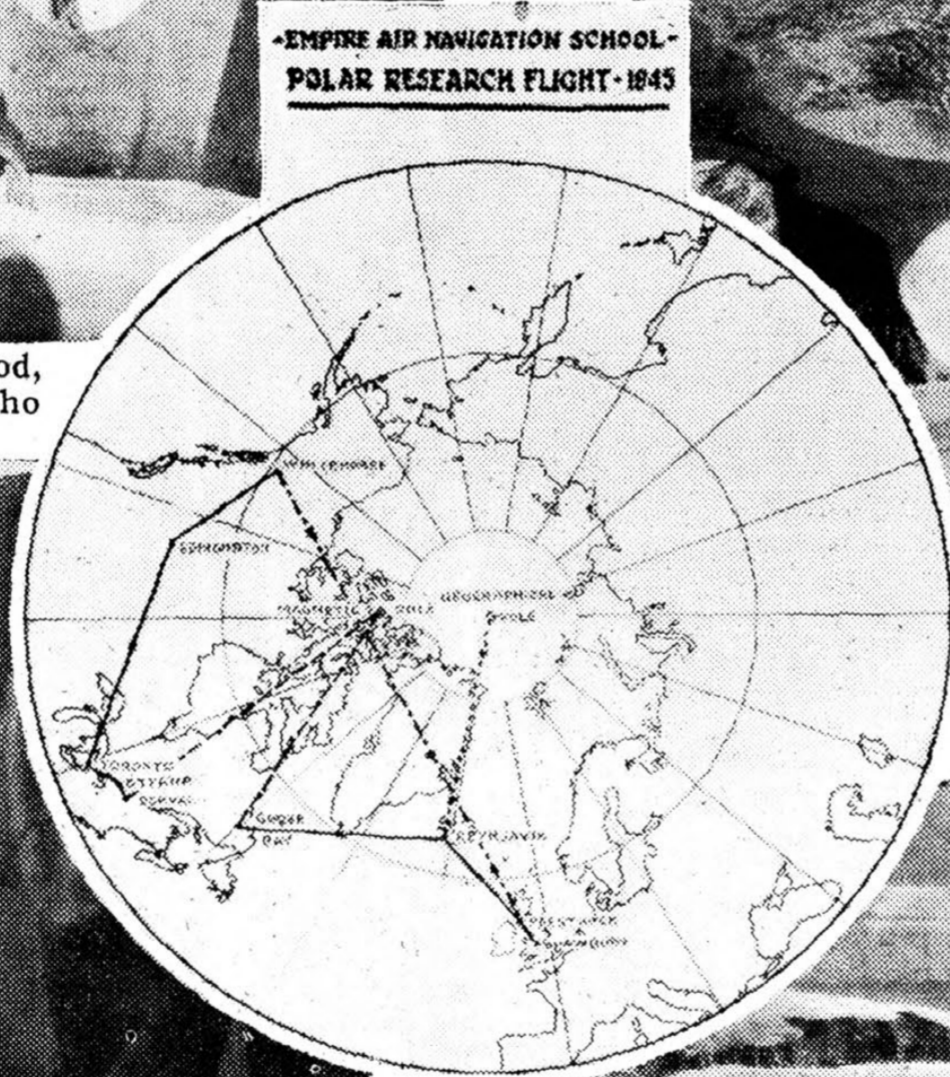
3. Flt. Lt. S. T. Underwood, navigator/plotter who checked the course.



4. A great ice-cap surface in the Arctic regions.



5. Wing-Cdr. H. H. Winfield, D.F.C., A.F.C., medical observer and assistant to the senior observer. He is from the staff of the physiological laboratory at the R.A.E.



6. Snow-covered mountains of the West Greenland coast.

# “Any Aircraft, Anywhere”



Over 300,000 Aircraft Delivered by A.T.A.: Handling Notes to Aid Pilots: Standard Cockpit Drill for 200 Types: Six Categories of Pilots

**T**HE Air Transport Auxiliary, formed in September, 1939, had delivered over 300,000 aircraft when it recently concluded its wartime duties. It started with 26 pilots ferrying only training aircraft. Finally it had a strength of over 600 pilots, 125 flight engineers, over 3,000 ground staff, and undertook delivery of all British and American types, from trainers to flying boats. Its activities extended from the United Kingdom to the Continent and included the transport of freight and important passengers.

The original band were mostly amateur pilots who flew pre-war only for pleasure. All were ineligible for service in the R.A.F. because of age or medical disability. Few of them had any technical knowledge or experience of military aircraft.

Considering the complexity of the modern aircraft, it would appear difficult enough to enable this kind of pilot to fly a powerful single-seater safely, let alone any one of the many heavier aircraft. Specialised training was therefore necessary and had to be devised. This training was continuously improved, and produced a new kind of pilot who did not exist pre-war. This was the man or woman who, given the essential information, could safely deliver any type of aircraft. It was the function of the A.T.A. Technical Department to provide this information.

Since it was manifestly impossible to give each pilot individual tuition on every type and mark of aircraft, he had to be provided with the facts in the simplest and handiest form. He had to absorb the facts without possibility of mistake, in not more than half an hour, and do this for an aircraft he had not previously seen.

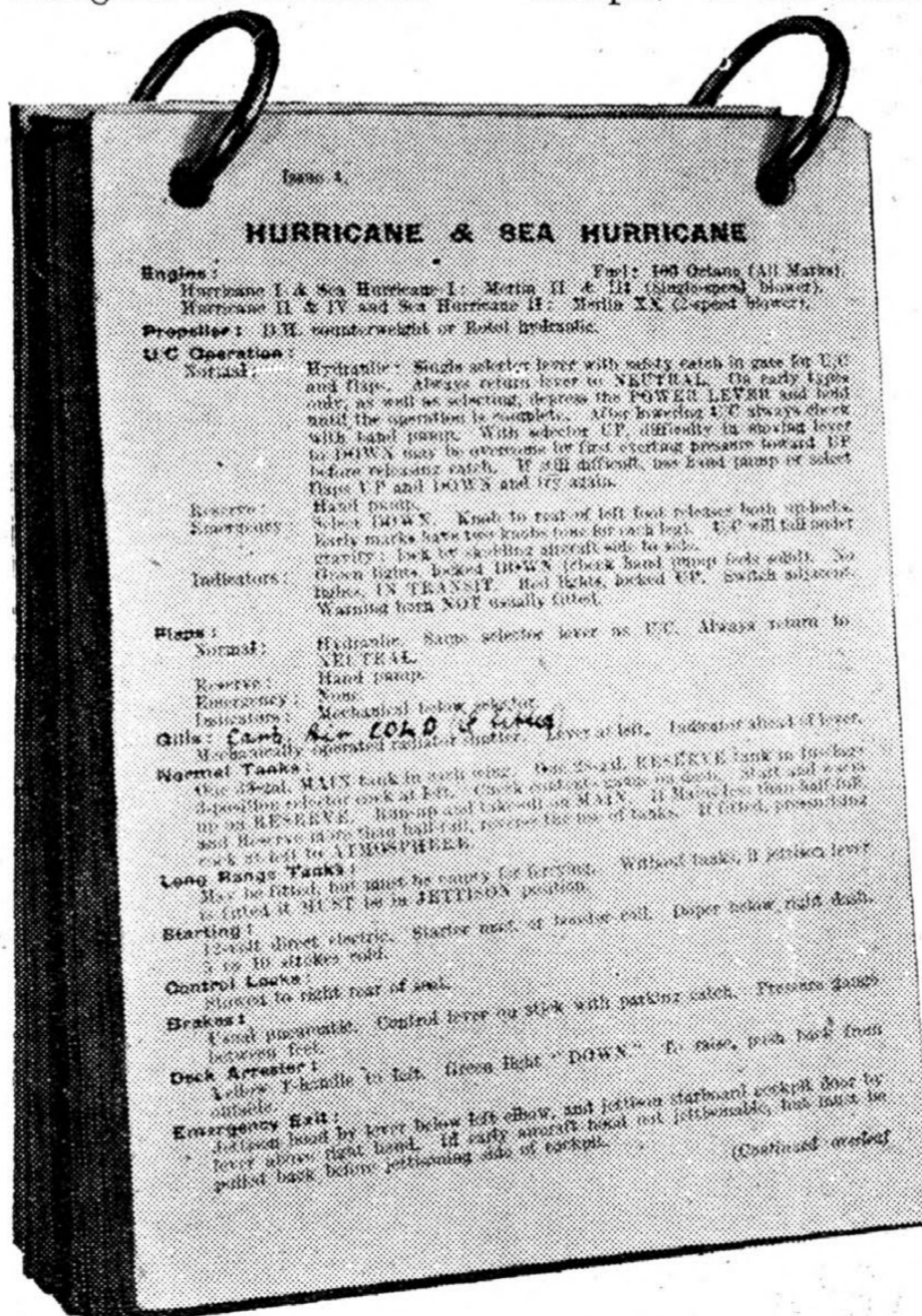
The Technical Department therefore wrote a "Handling Note" of about 30 short pages for each type of aircraft. The first part of this note gave the mechanical details which concerned the ferry pilot and omitted all details, such as armament, which did not concern him. The second part of the book told him how to fly the aircraft without the aid of a second pilot. In each of these books the material was always presented in the same standard sequence for quick reference. The simplest words were employed to describe complex mechanisms and functions.

Since all pilots are notoriously contemptuous of "bumph," it was essential to obtain their confidence in the written word simply expressed. In the building up of this confidence, much trouble was taken to ensure technical accuracy before the subject was put into pilots' language. The reader's difficulties were always in mind. He may or may not have had an extensive education, he may or may not be of British nationality.

Since the four-engined types were never flown by a junior pilot, the four-engine Handling Note did not give the same elementary advice as might be included in the case of a light aircraft. On the other hand, the four-engine Handling Note included a section for the flight engineer.

Having condensed a new aircraft into 30 short pages, it was again condensed into half a post-card which reminded the pilot of the bare facts and figures. A card for each aircraft was included in the "Ferry Pilot's Note Book," carried by every pilot.

Although these publications were amended every two months to keep them up to date, it was still necessary to



A typical sheet of the A.T.A. Ferry Pilot's Note Book.

## ANY AIRCRAFT, ANYWHERE"

convey "hot" news to the pilots daily. This was done by means of "Technical Instructions" exhibited on the notice board and filed in the pilots' rest rooms at each of the 14 A.T.A. Ferry Pools spread throughout the United Kingdom.

Obviously, the greatest dangers would be to publish too much information with consequent confusion, or to publish too little with consequent accidents. The technical department therefore employed a staff of specialists to examine the mass of information arriving hourly from all sources. This staff was directed by Commander R. C. Morgan, O.B.E., A.F.R.Ae.S., Chief Technical Officer, who was not only a qualified aeronautical engineer with experience in the design, construction and operation of military and civil aircraft, but also a pilot—with a consequent appreciation of the pilot's point of view. Previously he held appointments with the Gloster Aircraft Co., Ltd., Rolls Royce, Ltd., and British Overseas Airways Corporation.

A reference library of 10,000 volumes was maintained in the department and included all relative official publications and manufacturers' handbooks, drawings and technical bulletins. All R.A.F., Fleet Air Arm, and M.A.P. flying and technical instructions are examined, and an active liaison maintained with the Admiralty, Air Ministry, M.A.P. and the aircraft industry. News was also continuously collected from A.T.A. pilots and flight engineers, who were the first to come into contact with production and modified aircraft.

Since the ferry pilot was only concerned with the safe delivery of an aircraft and was not interested in aerobatics or combat performance, much official information was of no help to him and was not issued. On the other hand, he had to take more care than the operational pilot to avoid any possibility of hazarding the aircraft. He knew that any mishandling of the power plant, for example, might cause a subsequent engine failure to an R.A.F. pilot over enemy territory. To operate an aircraft safely requires the greatest prudence—the very opposite to the fighter pilot's outlook, which may be to sacrifice his machine in order to defeat the enemy.

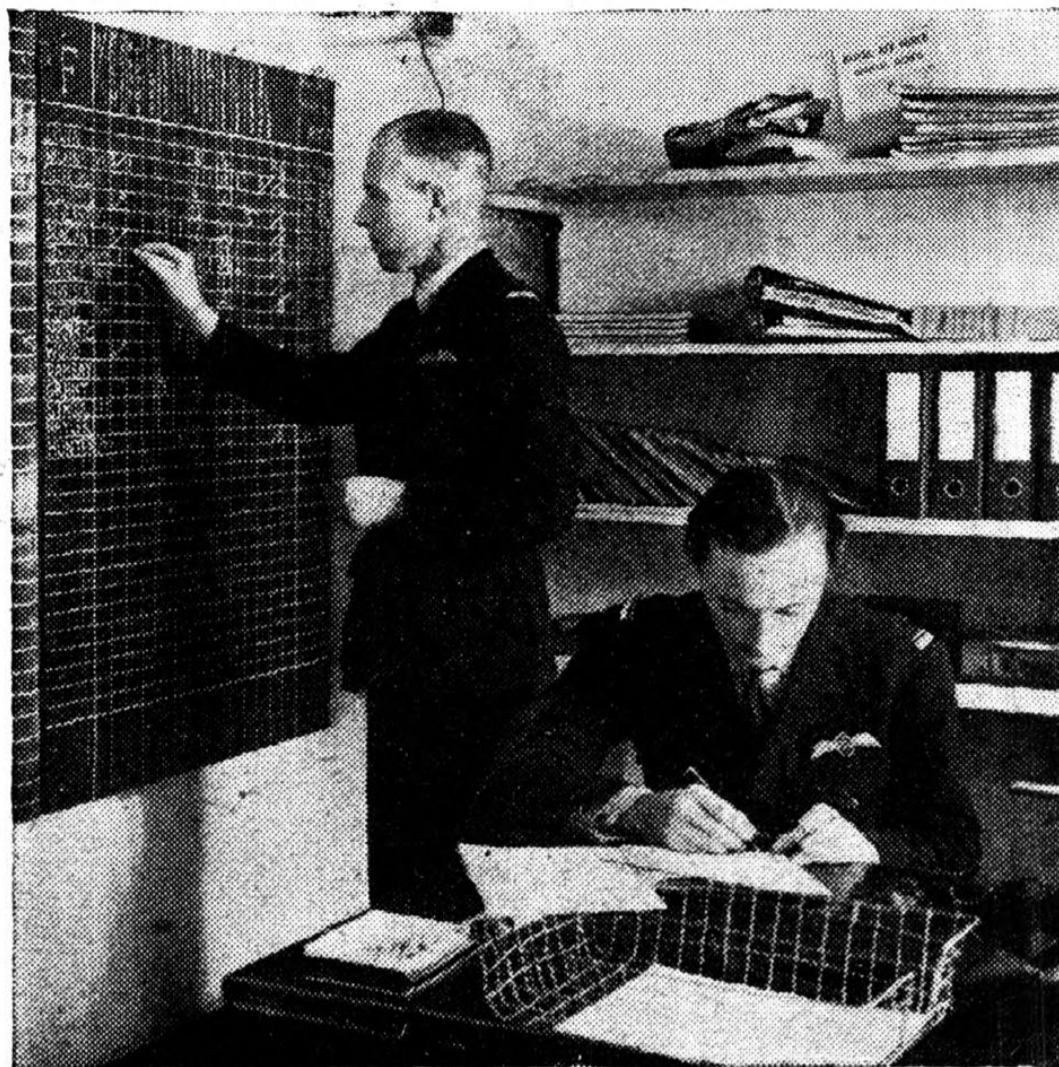
### Standardised Drills

To ferry some 200 different types of aircraft with equal safety, certain habits were essential. For example, a standard cockpit drill was used by A.T.A. on every flight on every type of aircraft before take-off and before landing. There was also an A.T.A. standard method of testing every engine before flight. Special emphasis was laid upon the reserve and emergency methods of operating the undercarriage, and flight with one or more engines dead. A standard feathering procedure was employed, applicable to all types of feathering propeller.

The same high quality of information had to be provided for obsolete types which were still ferried as for those types being produced in large numbers. A.T.A. was called upon to ferry aircraft long after they had been withdrawn from operational service, and when the machines themselves were by no means in the first flush of their youth.

New marks and types came on the ferrying programme at the rate of one every six or seven days. Each of these new aircraft had to be examined by the A.T.A. technical staff and flown by the A.T.A. chief test pilot, Captain J. A. V. Watson, O.B.E., who had flown every operational type in the last five years. Some advance information was usually available, but this had to be interpreted for ferrying purposes.

It was first necessary to decide what class of pilot would be required to ferry the new type—for A.T.A. pilots were divided into six categories according to their training, experience and competence. The handling trials were then conducted from the point of view of the class of pilot employed. The aircraft, also, was often found to have one



Chalking up the day's work on the operations board.

or more unusual characteristics, such as a pronounced trim change when the flaps were lowered, or a tendency to swing after landing. This may not embarrass a pilot who flies only that particular type, but might well inconvenience the ferry pilot making his first delivery of that particular type. Special attention was also paid to the handling characteristics in a cross wind on a small airfield, and to the ease or otherwise of dealing with a baulked landing. The A.T.A. was not interested in the top speed of any aircraft, but it was very much concerned with its behaviour when flown slowly in rain or mist along a river valley. Another thing the handling trials disclosed was whether it was possible to fly the machine solo, or whether the complexity of its controls and their arrangement demanded a flight engineer on board.

Flight engineers were specially trained for all four-engined types and were qualified to carry out a daily inspection. In the air the division of responsibility between the captain and flight engineer is roughly comparable to the custom of the Merchant Navy. The flight engineer is responsible for the operation of the engines and all hydraulic and electrical services, including the undercarriage and flap mechanisms, and their emergency operation.

But the provision of technical guidance to pilots and flight engineers was only one aspect of the work undertaken by the technical department. Among other allied responsibilities were examination of the causes and prevention of accidents, the division of duties between pilots, flight engineers and ground engineers, the arrangement of petrol loads with manufacturers and maintenance units, and the provision of ground facilities for ferry pilots, such as starting crews and equipment.

After each delivery flight, the ferry pilot was required to report in writing whether the aircraft had a clean "bill of health," or whether he had found any snags. His report was handed to the recipients of the aircraft, and a copy sent to the technical department, where it was analysed and any necessary point taken up with the responsible ministerial authorities, to enable them to take preventative action. Where the serviceability of any aircraft was in doubt, the chief technical officer was consulted.

A syllabus of technical training was designed to meet ferrying requirements and was continuously revised. Its aim was to teach the pilot his job without unnecessary detail. The pride of the A.T.A., and the explanation of its expansion and success, lay in the fact that only one-third of one per cent. of its flights resulted in any kind of mishap, however trivial.

# Ignition Testing Unit

*Unique Device for Immediate Detection of Faults : Probable Future as Permanent Equipment in Large Aircraft*

**T**HE detection of faults in ignition systems has, in the past, required someone with long experience of the effect produced on the engine by each particular fault. In such cases it has been usual to form a surmise as to the cause of trouble and then proceed by trial and error until finally cured. It was often impossible to tell whether a component were faulty or not unless it could be examined whilst the engine was running, and such was often out of the question.

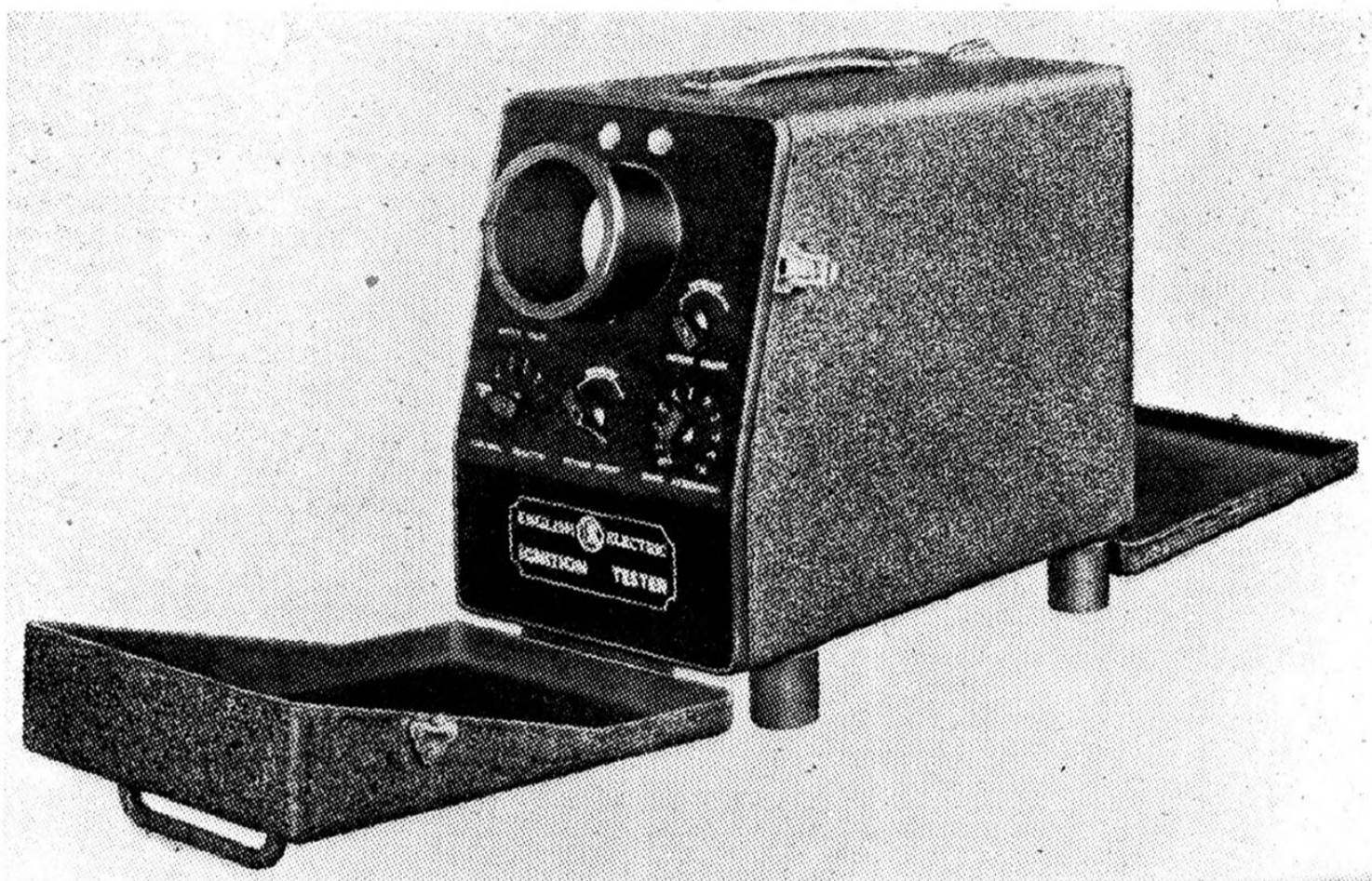
Unfortunately, the whole problem is rendered immensely more difficult when transferred from the realm of automobile engines to that of aircraft and armoured fighting vehicles by virtue of the use of fully screened ignition systems and, especially in the latter instance, inaccessible engine installations.

In an effort to overcome the difficulty, the Department of Tank Design approached D. Napier & Son, Ltd., whose ignition department were asked to tackle the problem of devising some means whereby faulty plugs in tank engines could be located without necessitating the removal of each plug from its usually inaccessible position. A device was built for this purpose in Napier's ignition laboratory, and their associate concern, the English Electric Co., designed and produced the final production model for the Army. This was adapted for both British and American tanks, and played a large part in keeping them in the front line. The device also received high commendation from the R.A.F., but, at the time, the prior requirements of the Army limited the number of instruments available for either R.A.F. or Fleet Air Arm, although this no longer applies.

The ignition tester performs the task of locating ignition

faults without direct access to the engine while the engine is running. Any fault in any particular plug, or plugs, in the cables, in the distributor, the magneto, the coil, or the battery can be located and diagnosed by plugging the instrument into a socket which may be placed in the tank or aircraft's instrument board or other convenient spot.

The required information is given pictorially as a row



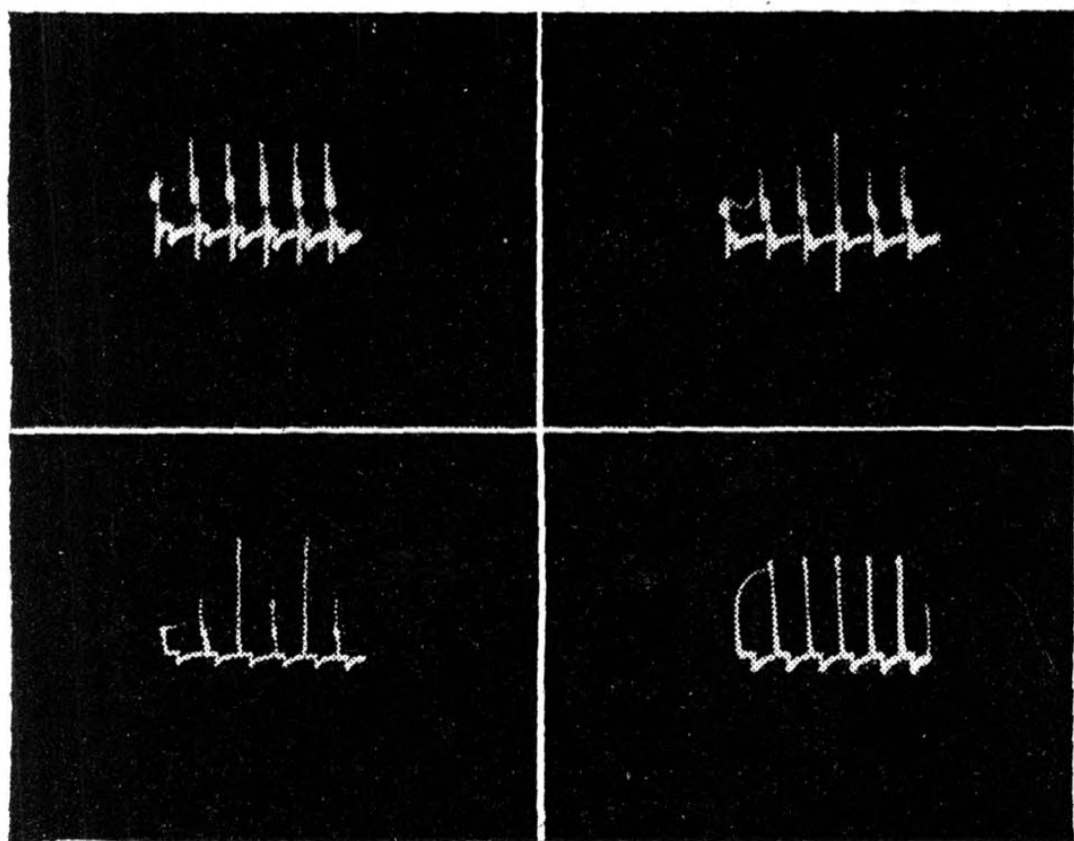
The ignition tester unit with front and rear covers opened and cathode screen visor partly extended.

of peaked figures on the screen of a cathode-ray oscillograph, as may be seen from the accompanying illustrations. There is one figure for each sparking plug, and they are arranged in the firing order of the cylinders, starting from a particular cylinder. Any fault in a plug causes a characteristic change in the corresponding figure, whilst faults in the magneto or the distributor alter the shape of the whole row of figures. With a little experience the operator can diagnose the nature of the fault from the shape of the figure, and its location is obvious from the position of the figure in the row.

### Visual Onomatopœia

No experience is necessary in order to locate a faulty plug, and the diagnosis of the nature of the defect is greatly aided by the fact that the shape of the figure is suggestive of the defect itself. For example, an excessive spark gap gives a high figure and a short-circuited gap gives a low figure. An occasional miss, which is a common trouble, gives a corresponding flickering up of the figure, which is instantly obvious. Among more complicated faults, a weak rocker spring, which causes the contacts to bounce above a certain speed, makes the row of figures dance as the engine is speeded up, in a way suggestive of the cause of the trouble. Maladjustments and weaknesses which may not be actually causing trouble at the moment are also shown up. In fact, it has been established that an experienced operator can gauge the condition of all parts of the ignition system better by applying the instrument than he would be able to by dismantling each part separately and examining it.

The electrical pulses which trace the figures on the cathode-ray tube are obtained from the primary or low-tension side



Typical indications as seen through the cathode screen. Top left : normal, no ignition defects. Top right : plug No. 4 misfiring or No. 4 distributor lead open circuited. Bottom left : plugs Nos. 3 and 5 misfiring. Bottom right : partly short-circuited condenser.

## IGNITION TESTING UNIT

of the magneto or coil, instead of from the secondary side which supplies the sparks. The primary and secondary windings of any magneto or coil constitute a transformer whose primary is open-circuited when the primary contact breaker opens to form the spark on the secondary. Under this condition any alteration in the secondary load, i.e., the sparking plug, alters the wave-form of the primary voltage peak. By observing this wave-form on a cathode-ray tube, the nature of the secondary load, i.e., the condition of the sparking plug, can be inferred. The primary voltage wave-form is available at the magneto switch, or, in the case of battery ignition, at the L.T. terminal of the coil. The instrument can either be connected to these points, or, since the connection does not affect the ignition, a permanent socket can be installed at a convenient point.

### Triggering

The fixing of the row of figures in firing order, starting from a selected cylinder, is attained by triggering the cathode ray with a tiny fraction of the voltage tapped from one of the plugs. The ray then traverses the screen tracing out the row of figures once for every two revolutions of the engine, always starting from the trigger plug, the remainder following automatically in the firing order of the cylinders. No connection or access to the rest of the plugs is necessary. The trigger connection does not affect the spark at the plug, consequently it can be made permanently to the L.T. socket. Alternatively it can be made by hooking a connector on to the plug selected, if no socket is provided.

This device also enables an estimate of the quality of the magneto and plugs to be made, and a possible breakdown forestalled, irrespective of whether the ignition is

performing correctly or not. For this purpose the instrument has an attenuator dial which consists of a stepped resistance which shunts the primary current in increasing amounts as the dial is operated. By operating the attenuator while watching the figure it can be seen that the plugs with the widest gaps, or the most fouling, missfire first as the spark weakens. Plugs with excessively small gaps can also be detected, and a weak magneto or coil is detected because general missing occurs on all the figures at a dial setting below normal.

An illustration of a fully tropicalised instrument for the Services, is shown. It is about the same size as a portable typewriter, and is arranged to take its power supply either from 220-volt A.C. mains, or from a six, twelve, or twenty-four-volt accumulator, as desired. It can, furthermore, be used on the vehicle or aircraft while in motion, if necessary. Alternatively, it can be easily adapted as a switch-board instrument for the routine supervision of a group of engines, as, for instance, in a multi-engined aircraft or boat, or in an engine test house.

With a single ignition tester fitted into the instrument board of a multi-engined aircraft, the ignition of each engine can be checked before take-off, and ample warning of any impending breakdown can also be obtained while in the air. The whole process only takes a few minutes, the time necessary to turn the selector switch on the instrument and glance at the line of figures presented by each magneto and its associated distributor, harness and sparking plugs.

All the minor ignition defects which lie dormant in the average engine, cutting down engine efficiency all the time, but receiving no attention until they cause a breakdown, would be laid bare at a glance. Being located and diagnosed at the same time, these defects could be rectified with the minimum loss of time, and the engine kept at maximum efficiency without laying up for expert attention.

## Commonwealth Air Transport Conference

LORD SWINTON, Minister of Civil Aviation, was elected President of the Commonwealth Air Transport Council when it met in London on Monday last to open its first formal conference at which representatives of Australia, Canada, India, Newfoundland, New Zealand, Southern Rhodesia and South Africa assembled with those of Great Britain. It was stated that the conference was expected to last at least a week, and the council has the services of a number of expert advisors headed by Lord Knollys and Major J. R. McCrindle, chairman and deputy director-general respectively of B.O.A.C.

In his opening remarks Lord Swinton welcomed "so many old friends from all parts of the Commonwealth," and said that all of them there had helped to make the Commonwealth air partnership which they would amplify and develop at this conference. They were proud that their first regular meeting should take place in London, but they would, he knew, all wish to pursue the policy they had laid down when the council was born at Montreal last winter, namely, that their future meetings should be spread over the whole Commonwealth.

"While formal meetings of the council will take place at intervals," said Lord Swinton, "the council is always in being, and its work is continuous. I think you will agree it has already proved its worth in the circulation of information and the exchange of views on matters of common concern. The secretariat has had a full measure of work in this respect. At Montreal you asked my Ministry to act temporarily as the secretariat to the council. I hope, with the valuable help of the liaison officers from all the High Commissioners' offices, we have given you satisfaction. It will be for this meeting to decide how they would wish the secretariat to be constituted and to function in the future.

"As you know, it was originally proposed that this meeting should take place earlier in the year. But we all agreed to postpone it for very good reasons. A great deal of ground had been covered and useful work done in our initial meeting in Montreal and in the subsequent conversations in London.

"Moreover, a meeting in the spring would have clashed with the South Africa Air Transport Conference which Field Marshal Smuts was anxious to convene as early as possible."

Lord Swinton briefly reviewed some of the work already done by the council and the policy it was pursuing, and said that the successful results achieved at the South African con-

ference had a direct bearing on their present work in London.

"We have a full programme in front of us," he concluded. "I think it shows how well justified the countries of the Commonwealth have been in establishing this Council, and the work will go on and grow. I am sure, too, that what we do here, the work of our Council the development of our partnership, will be of growing value, not only to the whole Commonwealth and Empire, but to the rest of the world as well. The same kind of agreements we make together we will make most gladly with other countries as well, and in so doing make the highways of the air the ways of peace for all nations."

The Rt. Hon. Vincent Massey, High Commissioner for Canada, said that he felt sure the present conference would be one more step towards international agreement in air matters; The Rt. Hon. S. M. Bruce, High Commissioner for Australia, who attended in the absence of Mr. D. McVey, stressed the fact that international agreement on civil aviation was only part of a much greater whole, and Air Comdre. A. de T. Neville, Vice-Chief of Air Staff, New Zealand, expressed the hope that the conference would stimulate civil aviation throughout the Empire. Others who spoke were Mr. G. Heaton Nicholls, High Commissioner for South Africa, Sir Gurunath Bewoor, Secretary, Posts and Air Department, India, Sir George London, Commissioner for Public Utilities, Newfoundland, and Mr. S. M. Lanigan O'Keeffe, High Commissioner for Southern Rhodesia.

### BRITISH WAR-PLANES ON CANVAS

PAINTINGS, by famous British war artists, of British combat and transport aircraft will be shown by the Society of British Aircraft Constructors in the first exhibition of its kind ever held in London, to be opened at Rootes' showrooms, Piccadilly, next Tuesday, July 17th.

These paintings of Great Britain's leading aircraft in action have been done by Frank Wootton, Roy Nockolds, Terence Cuneo and other well-known artists. Admission will be free, and the exhibition will be open from 10 a.m. to 5 p.m. daily (Sundays excepted) until Saturday, July 28th.

Mr. Arthur Gouge, president of the S.B.A.C., will officially open the exhibition at a private showing at noon on Tuesday.

It will be attended by many leading figures in British and foreign aviation now in this country.

# CIVIL AVIATION NEWS

## IN LONDON

THE Australian director general of civil aviation, Mr. McVey, and the widely known managing director of Qantas Empire Airways, Mr. Hudson Fysh, are among visitors to this country in connection with the Commonwealth Air Transport Council.

## CARIBBEAN CONTROL

IT is reported from Port of Spain, Trinidad, that the Government has agreed to the suggestion, made by the Comptroller of Development and Welfare, that a Director of Civil Aviation should be appointed for the entire Caribbean area, and has also agreed to pay 30 per cent. of the cost.

## S.A.B.E.N.A.

BRUSSELS radio recently announced the establishment of a direct air service between the Belgian capital and the Congo, with aircraft leaving Brussels and Leopoldville twice weekly. Sunday last was the day fixed for its inauguration by the first northbound flight.

## TRANSATLANTIC

A TRANSATLANTIC air service by T.C.A. is to be started on September 1st between Dorval (Quebec's airport) and Prestwick, according to a recent statement by Mr. C. D. Howe, Canada's Minister of Reconstruction.

"The fare," said Mr. Howe, "will not exceed Pan-American Airways' charge, and it is expected that the service will be daily, with modified priorities to enable Canadian businessmen to fly to Europe more easily.

Mr. Howe also revealed that Sweden has recently made a series of six experimental transatlantic flights on the converted Boeing Fortresses which are now known as Felixes.

## ZURICH-PARIS SERVICE

AS from Monday next, July 16th, the daily service between Zurich and Paris via Geneva is to be resumed with one aircraft flying in each direction. It will be operated jointly by Swissair and Air France, the two companies operating on alternate days.

Swissair is also reported to be considering the possibility of reopening traffic with London and Barcelona, but a Swissair official has stated that it will probably be several months before the London service can be resumed. In the meantime a B.O.A.C. representative has gone to Zurich and Swissair has sent a man to London so that actual negotiations can go ahead as soon as the Allied military authorities give permission to fly over the militarised territories between.

## STORM IN THE ANTIPODES

A BILL to provide for the establishment and operation of national airline services by the Commonwealth is shortly to be introduced in Australia by Mr. A. S. Drakeford, Minister for Civil Aviation in the Labour Government there.

Considerable agitation is rife in Australia about the Government's proposed policy to nationalise internal airways. While on foreign services the matter is settled, Qantas being the chosen instrument, airline operators of domestic services are lining up in an effort to forestall the realisation of the Government's policy and to build up as much public opinion in their favour as possible.

To this end the Airline Operators' Secretariat in Melbourne is putting out propaganda designed to convince the taxpayer that it would be out of his pocket that the cheques for nationalisation will have to be paid. It is claimed that the Commonwealth Government will lose about £2,000,000, representing the revenue on air mails carried by various Australian airline companies, different taxes, etc. It is obvious that these figures do not reflect exactly the actual state of affairs, but their appeal to the uninitiated may be quite considerable.

In fact, the airline operators threaten to take out an injunction against the Commonwealth Government should it attempt to put the policy into operation. Despite this opposition, which by no means reflects the general public opinion, there is no doubt that the Government will pursue its plan and nationalise the internal network system.

## FORECAST

IN a testimony before the U.S. Senate's Small Business Committee Mr. E. E. Wilson, President of the Aeronautical Chamber of Commerce of America and Vice-chairman of United Aircraft Corporation, quoted a recent forecast of post-war aviation markets by Mr. William A. M. Burden, Assistant Secretary of Commerce for Air, estimating the production of 50,000 aircraft a year for private flying.

On behalf of aircraft manufacturers he suggested that a "national air policy" be established which would "allow the industry to maintain leadership and design and preparedness to resume large-scale military production at any time if it should be necessary," and that aircraft plants which are not needed for aircraft or other production "be kept available for war production in the event of national emergency."

Mr. Wilson forecast widespread post-war use of the light metals, aluminium and magnesium, by the aviation industry, which, he pointed out, is more dependent upon light alloys than any other industry.

## CEYLON SEES POSSIBILITIES

THE Ceylon Government is reported to be giving consideration to the development of commercial air services after the war, says *Foreign Commerce Weekly*.

Weather and climatic conditions in Ceylon are favourable for flying, and her geographic location—off the tip of India, midway between Egypt and Australia, and between East Africa and Asia is another important factor which may make the island an important centre for future international air routes of the Middle East and Indian Ocean areas.

Previous to the outbreak of the war, Ceylon was not on any trunk air route, the only air service being an Indian air line connecting the island with the international services crossing northern India. In 1939, there were only two civil airports in Ceylon, but as a result of the war airports have been developed and enlarged, and adequate ground facilities, including radio and field lighting, for handling the post-war civil air traffic are being constructed.

Ceylon's pre-war air link with the mainland of India and the trunk routes to the north was established by the Tata concern which extended its Karachi-Bombay-Madras service southwards along the Coromandel coast to the island.

## AMERICAN CHALLENGE

THE Civil Aeronautics Board authorisation to three U.S. airlines to operate routes across the North Atlantic lifts the veil from what is to be expected from U.S. civil air strength after the war in the Pacific.

Pan-American Airways' existing route to London—hitherto the only American line with permanent authority for flying the North Atlantic service—is extended through Europe and the Near East to Calcutta by way of Brussels, Prague, Vienna, Budapest, Belgrade, Bucharest, Istanbul, Ankara, Beirut, Baghdad, Teheran and Karachi. Barcelona is also added to Pan-American's present route through Bermuda and the Azores to Portugal and thence to London and Marseilles.

American export lines, formerly only temporarily permitted to operate to Lisbon and Foynes, has now been authorised to provide services through Labrador, Greenland and Iceland to Stavanger, Stockholm, Helsinki, Leningrad and Moscow, and by way of Newfoundland and the Azores to Foynes, Glasgow, London, Amsterdam, Copenhagen, Berlin, Warsaw and Moscow.

The third airline, Transcontinental and Western Air Incorporated, will now be allowed to operate the northern route to Foynes, Paris, Berne, Rome, Athens, Cairo, Jerusalem, Basra and Bombay, and the southern route to Lisbon, Madrid, Algiers, Tunis, Tripoli, Benghazi and Cairo. A third service will be run by way of Lisbon to Rome, where it will connect with the northern route.

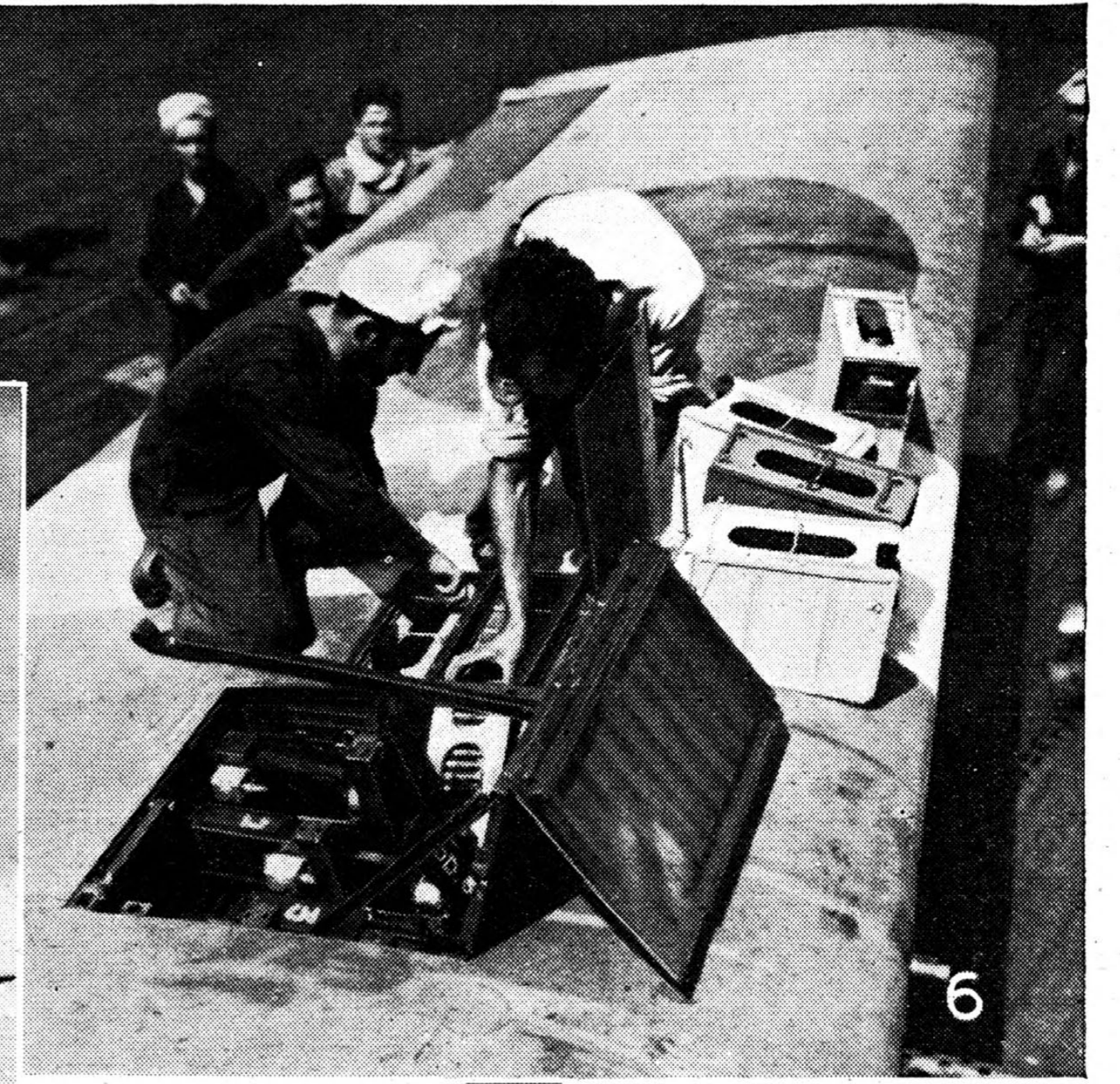
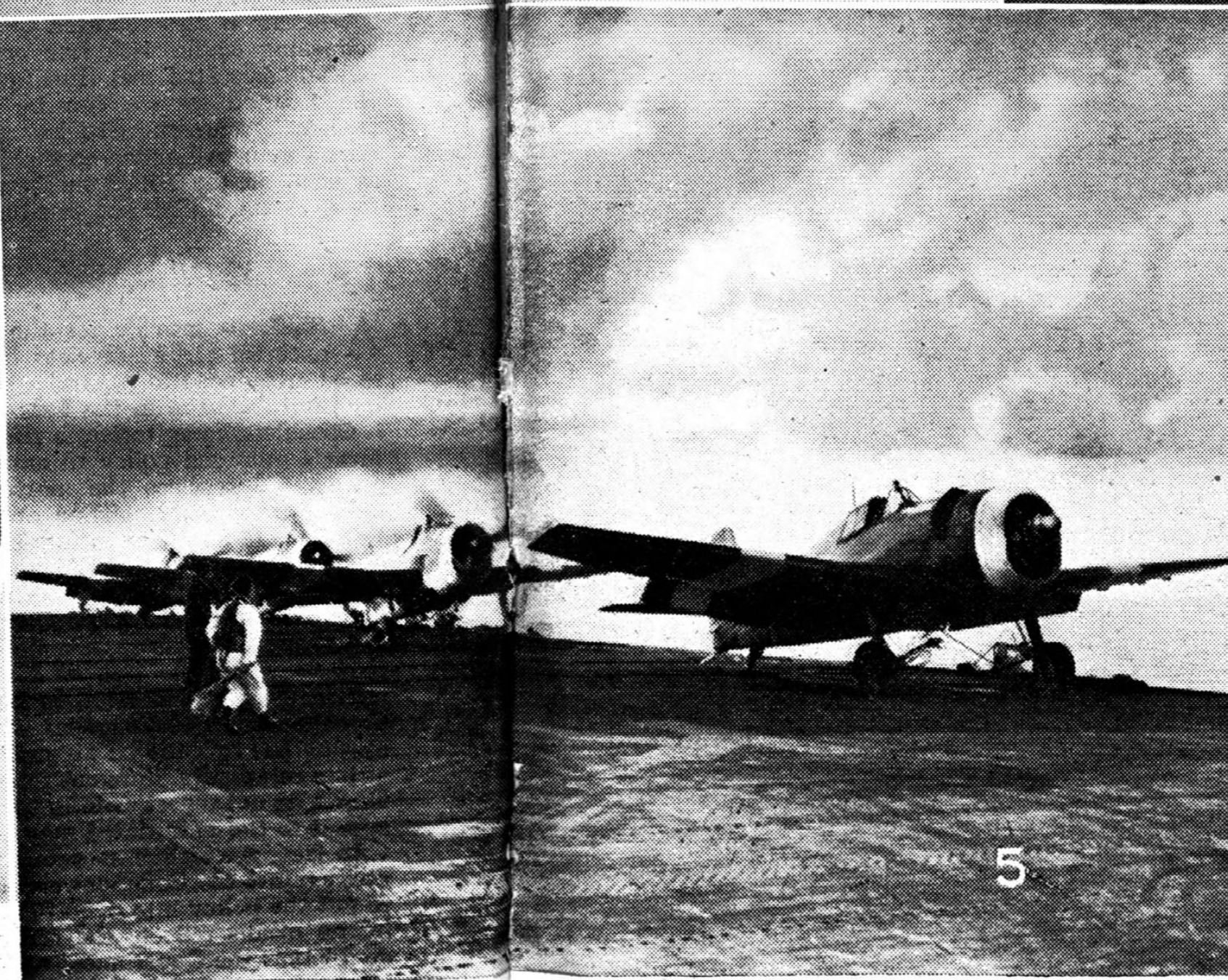
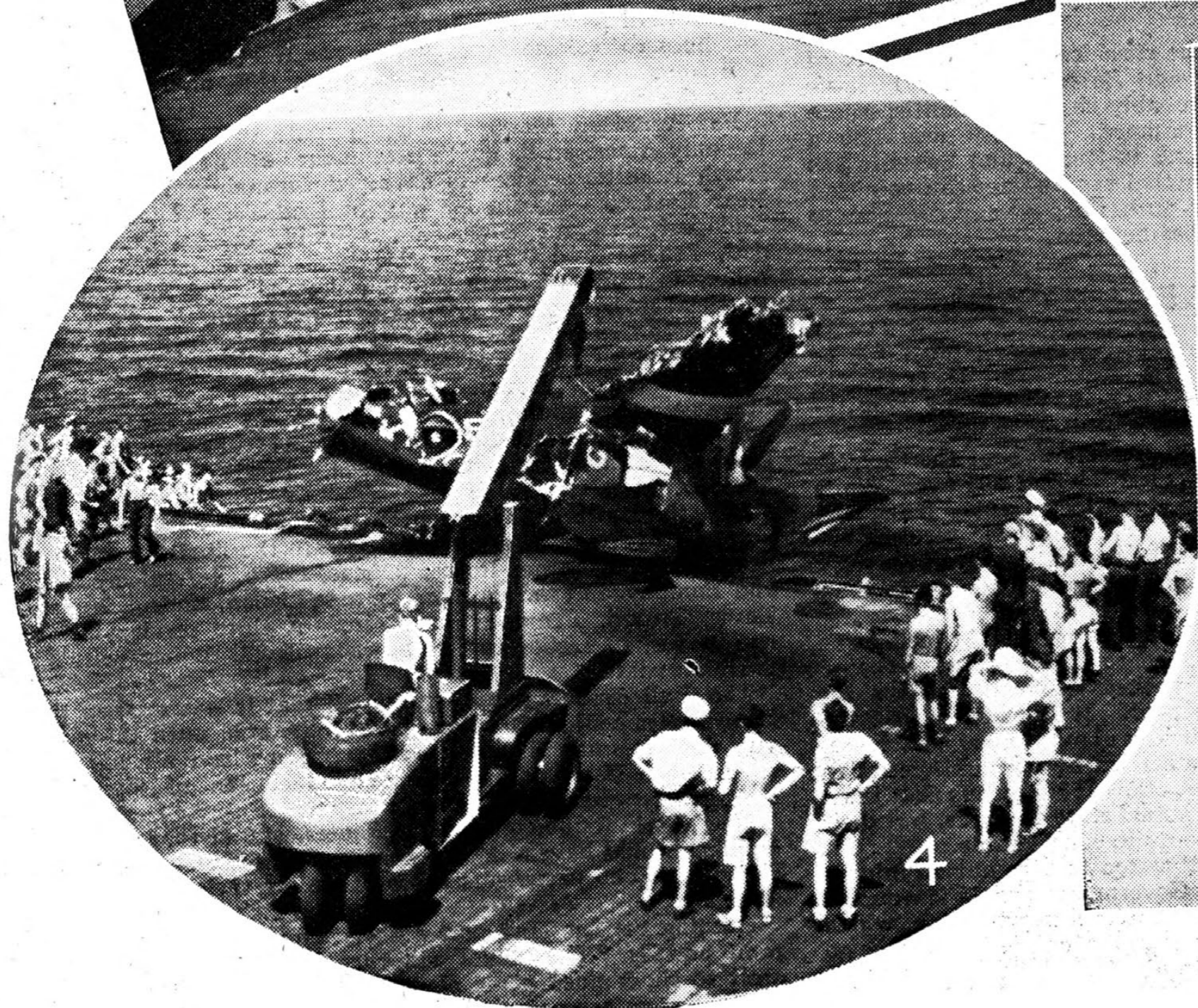
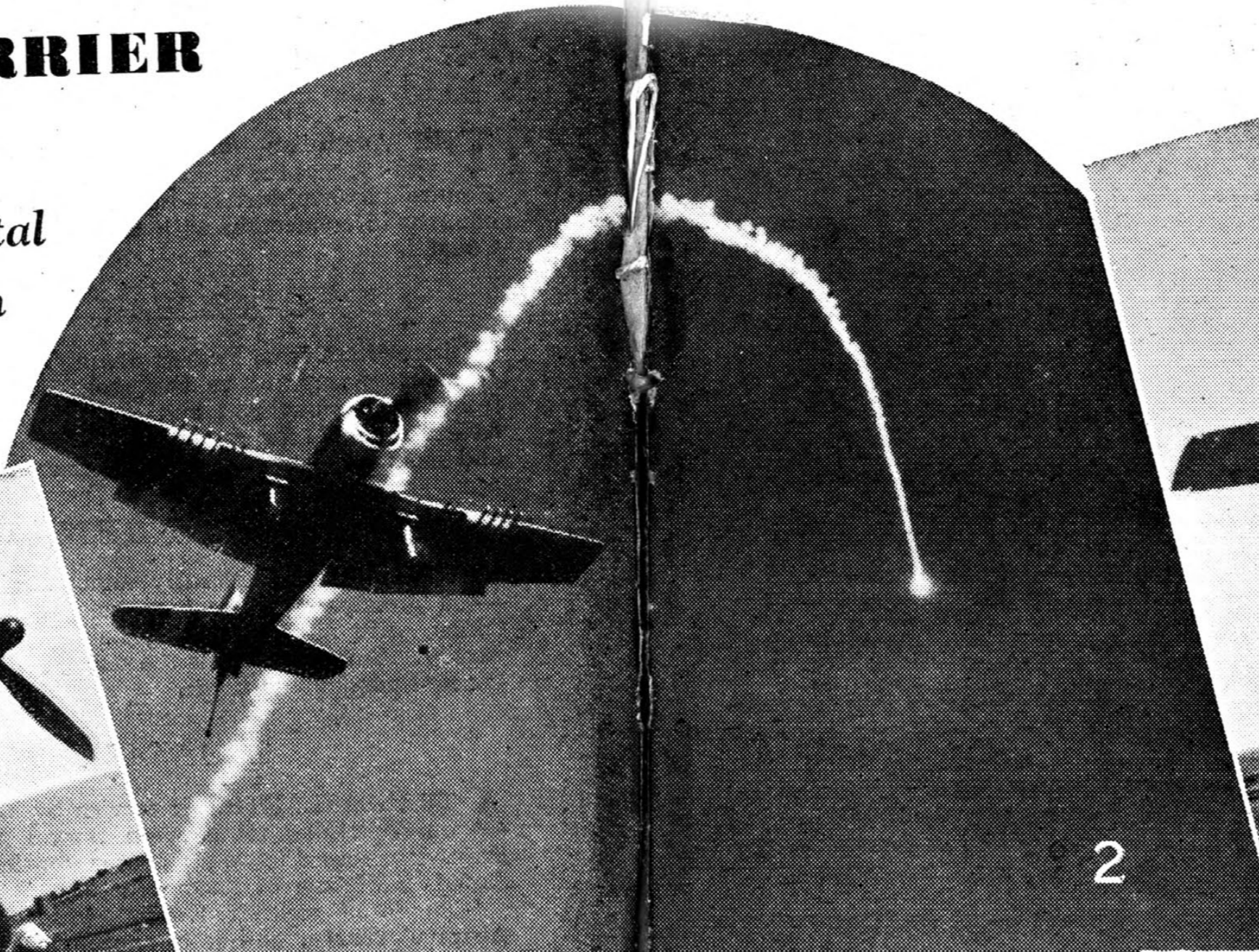
The Civil Aeronautics Board stated that it was realised that these routes could not be completely operated until the necessary countries had all given permits. Some have already done so, and the Board is awaiting the conclusion of diplomatic arrangements with all the countries.

New York Radio, quoted by Reuter, stated that American civilians would have a fleet of nearly 1,000 airliners, capable of carrying 36,000 passengers at one time, at their disposal after the war.

Quoting the Air Transport Association of North America the radio added: "The planes will vary from 15-passenger traffic craft to six-engined giant planes capable of carrying over 200 persons at an average speed of 330 m.p.h."

# ON A BRITISH ESCORT CARRIER IN THE FAR EAST

Units of the British Naval Air Arm Form a Vital Part of the East Indies Fleet Now in Action Against the Japs : Scenes from the Flight-deck of a "Flat-top" Equipped with Corsair and Hellcat Single-seater Fighters



1. To economise in the limited deck space of the escort carrier, the tail wheel of this Corsair is supported on an outrigger projecting beyond the flight-deck.  
4. Aircraft damaged beyond repair are dumped into the sea. This badly

"written-off" Hellcat is about to be bulldozed overboard by one of the carrier's mobile deck-cranes. With undercarriage, flaps and arrestor hook all ready for a landing, this Hellcat is ordered, by means of a signal flare fired from the bridge, to go round again because the deck is not clear.

3. A Hellcat, having come in too high, also has to go round again—in this case at the command of the "batsman" seen in the background. Landings must be "spot-on" owing to the limited deck length. Note the arrestor hook well clear of the wires and the tail well up, indicating plenty of flying speed.

5. The leader of a flight of Hellcats is flagged off by the flight-deck control officer (dressed in white and wearing a "Mae West"), and the next prepares to taxi into position on the "accelerator"—a catapult device, let into the deck, which assists the take-off.

6. Armourers reloading the port magazines of a Hellcat's 0.5in. wing guns. The three muzzles (one flush with the leading edge) can just be seen.

# CORRESPONDENCE

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.

## BOMB LOADS

### Wimpeys Carried "Cookies" in April, 1941

I WAS interested to notice, while reading *Flight*, May 31st, that Messrs. A. V. Roe and Co., Ltd., advertising the Lancaster, stated: "First aeroplane to carry the 4,000 lb. bomb."

I was at Waterbeach air station, Cambridge, in April, 1941, and two Wellington MKII (Rolls-Royce Merlins) were regularly carrying the 4,000 lb. bomb on raids to Germany.

The squadron was the 99th Squadron, letters LN, the aircraft letters V and Z. Did a Lancaster carry a 4,000 lb. before this, or are Messrs. A. V. Roe, Ltd., wrong? B. FOSTER.

## CO-OPERATIVE RESEARCH

### Let Us Push Instead of Lean!

I FEEL, as one who believes in the latest capabilities of British engineers, that I must challenge the statements made in the editorial of *Flight* on June 21st.

Too long have we in this country sat back content to regard America as "... that amazing country," where the obvious is done, and not merely discussed. We know we have very many difficult problems facing us at super-sonic speeds, and we also know that the obvious way to attack them is with the most modern tools which our ingenuity can devise.

Why, therefore, do we have to read "We do not, of course, suggest that the British aircraft industry could undertake a co-operative effort of a magnitude equal to the American, and in any case the Treasury would probably soon put a brake on any such 'extravagance'" in one of the most active and energetic publications of to-day? Let us expose and remove the higher administrators who can see no farther than the entries on their balance sheets, and let the far-sighted technicians do what is obviously in the best interests of the country and the world.

Too long have we relied on the occasional man of genius to pull us out of the rut; let "Intelligent, Active Research" be our watchwords, and let Englishmen generally stop leaning and start pushing before it is too late.

C. A. PICKERING.

## EXPENSIVE SPEED

### Cheaper, if Slower, Air Travel Wanted

IN all seriousness, and at the risk of being what might be called a spoilsport, might I suggest the formation of a "Society for the Direction of Aviation to a Useful Purpose"?

Some of the people in aviation seem to have become so absorbed in "gadgetry" of all kinds that one wonders where it will all end.

It is with dismay that I scrutinise the latest aircraft specifications when they are released. Bigger and faster, more complicated, every scientific device which can be thought of gets stowed away or stuck on the aircraft.

I find it really entertaining to speculate on how aircraft designers ever arrive at a specification. I say speculate because it seems to be a baffling mystery.

Is it speed they are after? It would appear so and yet why do they not then concentrate on "super speedsters" with thousands of h.p. and a solitary passenger reclining at his or her ease.

No, they are not quite so foolish, they compromise a little, but so little that one would think that unless aircraft flash through the sky at over 200 m.p.h. they would fall to the ground.

When will designers realise that as long as there is no variety in aircraft performance a mockery is being made of aviation?

The cost of air travel at present is ridiculous to say the least. Admittedly we must pay for speed, but there is a time and a place for everything. Where there are good surface transport facilities for short distances, air travel which is slow is useless. But what if the only surface transport is by sea; must aircraft always fly six or seven times faster than ships?

Obviously as far as Britain is concerned there is a need for slow (and therefore cheap) air transport on Continental routes and farther afield also where long distances are involved.

Too often, in the past, cheap flying has been associated with

all kinds of stunts. We can get cheap flying if we are willing to sacrifice some speed. The sooner that fact is appreciated the sooner will we be able to get the best out of aviation.

DOUGLAS DEANS.

## MANPOWER AND CIVIL AVIATION

### Another Enthusiastic Technician's Experience

THE experience of R. L. Hughes on "Manpower and Civil Aviation," in *Flight*, June 21st, prompted me to write to you as I am yet another who has experienced the very same; there are probably more who would like to air their opinion openly but are afraid to do so.

I have served 16 years in engineering, my experience covering overhauls, repairs and modifications to engines and airframes and test flights after major overhauls. Some of the positions held during my engineering career were charge-hand, foreman, licensed ground engineer and inspector. I have also spent many years of study and had seven years' technical training.

I have also been registered with the Ministry of Labour Appointments Board for U.K. or overseas posting, but find it a far better way to contact the companies concerned oneself, whether U.K. or overseas. Need I say more?

I also applied to the M.A.P. advertisement for technical officers as I have always made a practice of applying for such vacancies and have always received the usual form upon which is "we regret to inform you." It appears to me that all these vacancies are filled before advertising, probably some being filled by A.I.D. personnel, the majority of whom have been in anything but engineering and have very little or no applied mechanical or engineering knowledge whatever. Without A.P.1464, etc., and the excuse "it says so in the book," these men are lost.

In my opinion, to build an efficient civil aviation and do justice to passengers and crews, would be to fill supervisory and technical posts by men with practical experience in their particular branch (this would add to the safety factor) rather than have men without experience who pick the brains of the men under them.

The posts which should be filled by experienced men are usually filled by the "Yes, Sir," "Please, Sir," "No, Sir," type who, as R. L. Hughes stated, haven't a clue.

REG. H. SENIOR.

## TRIBUTE TO TEST PILOTS

### Michael Daunt's Valuable Work

IN the caption beneath Mr. Geoffery de Havilland's photograph in your issue of June 28th you refer to the fact that Mr. Michael Daunt was similarly honoured with the O.B.E. in the Birthday Honours List, and state that "Mr. Daunt did some of the test flying of the Gloster Meteor."

Although your statement is perfectly true, it does rather less than justice to one of the country's most expert test pilots who has now found congenial employment in agriculture after receiving his full quota of "near misses" in the profession of test flying.

When Jerry Sayer, whose name as a test pilot will never be forgotten, was killed so tragically in a collision, it fell to Michael Daunt to carry on the work which Jerry had begun in jet propulsion. Michael was the second man to fly the Gloster-Whittle Pioneer E28, and not only did he carry out all the early development flying on the prototype Meteor, but he made the very first flight on this aircraft.

Under present security restrictions I cannot risk incarceration in a dark and gloomy dungeon by writing more of the dangers and difficulties with which Michael Daunt had to contend. But when all the King's Enemies have been put to confusion, no doubt it will be permitted to disclose the full story behind the King's award of this distinction to Glosters' chief test pilot.

JOHN GRIERSON.

[We should be sorry to think that *Flight* has omitted to give credit to a brave man, but in the small space under a photograph it is impossible to go into detail. Even our correspondent has omitted to mention that a colleague of his and Michael Daunt's, the ever-popular John Crosby Warren, lost his life whilst test-flying a Gloster jet-propelled aircraft.—ED.]

P/O. W. ANDERSON, R.A.F.V.R., No. 156 Sqn. (since deceased).  
 P/O. N. S. F. PALMER, R.A.F.V.R., No. 35 Sqn.  
 P/O. A. V. SABOURIN, R.A.F.V.R., No. 250 Sqn.  
 P/O. W. G. SUGAR, R.A.F.V.R., No. 34 (S.A.A.F.) Sqn.  
 P/O. T. J. P. WALSH, R.A.F.V.R., No. 7 Sqn. (since deceased).  
 P/O. A. McC. WATSON, R.A.F.V.R., No. 50 Sqn. (since deceased).  
 W/O. J. PETTEY, R.A.F.V.R., No. 500 Sqn.  
 P/O. R. M. HAYS, R.C.A.F., No. 544 Sqn.  
 P/O. M. J. KELLY, R.C.A.F., No. 166 Sqn.  
 2nd Lt. R. TURNER, S.A.A.F., No. 5 (S.A.A.F.) Sqn.

**Bar to Distinguished Flying Medal**

Flt. Sgt. S. E. EMMETT, D.F.M., R.A.F.V.R., No. 571 Sqn.

**Distinguished Flying Medal**

Flt. Sgt. W. R. BROWNJOHN, R.A.F.V.R., No. 467 (R.A.A.F.) Sqn.  
 Flt. Sgt. R. P. HAYWOOD, R.A.F.V.R., No. 617 Sqn.  
 Flt. Sgt. D. J. MYERS, R.A.F.V.R., No. 49 Sqn.  
 Flt. Sgt. G. C. SHEPHERD, R.A.F.V.R., No. 7 Sqn.  
 Flt. Sgt. J. T. SMITH, R.A.F.V.R., No. 582 Sqn.  
 Flt. Sgt. V. G. SMITH, R.A.F.V.R., No. 7 Sqn.  
 Flt. Sgt. J. M. STEPHENSON, R.A.F.V.R., No. 158 Sqn.  
 Flt. Sgt. J. G. STEWART, R.A.F.V.R., No. 156 Sqn.  
 Flt. Sgt. W. C. TELFORD, R.A.F.V.R., No. 635 Sqn.  
 Flt. Sgt. P. VARTY, R.A.F.V.R., No. 35 Sqn.  
 Flt. Sgt. A. R. WILSON, R.A.F.V.R., No. 83 Sqn.  
 Flt. Sgt. C. H. A. YOUNGER, R.A.F.V.R., No. 635 Sqn.

Act. Flt. Sgt. J. C. BENNETT, R.A.F.V.R., No. 156 Sqn.  
 Act. Flt. Sgt. G. LINDSLEY, R.A.F.V.R., No. 35 Sqn.  
 Act. Flt. Sgt. A. ROWBOTHAM, R.A.F.V.R., No. 635 Sqn.  
 Sgt. H. J. B. EDWARDS, R.A.F.V.R., No. 7 Sqn.  
 Sgt. (now P/O.) D. HARPER, R.A.F.V.R., No. 128 Sqn.  
 Sgt. W. A. KING, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.  
 Sgt. A. E. MARKLAND, R.A.F.V.R., No. 571 Sqn.  
 Sgt. (now P/O.) J. A. OTTEWELL, R.A.F.V.R., No. 7 Sqn.  
 Sgt. W. C. PARKER, R.A.F.V.R., No. 128 Sqn.  
 Sgt. R. B. WESTON, R.A.F.V.R., No. 77 Sqn.  
 Flt. Sgt. H. G. E. SCOTT, R.A.F.V.R., No. 83 Sqn.  
 Flt. Sgt. A. SHERRIFF, R.A.F.V.R., No. 61 Sqn. (since deceased).  
 Flt. Sgt. H. E. WICKENDEN, R.A.F.V.R., No. 10 Sqn.  
 Sgt. R. J. COGBILL, R.A.F.V.R., No. 166 Sqn.  
 Sgt. R. K. O'BRIEN, R.A.F.V.R., No. 101 Sqn.  
 Sgt. R. PEARSON, R.A.F.V.R., No. 576 Sqn.  
 Sgt. K. SOUTHWOOD, R.A.F.V.R., No. 625 Sqn.  
 Flt. Sgt. R. O. SAYER, R.A.A.F., No. 467 (R.A.A.F.) Sqn.  
 Flt. Sgt. (now F/O.) R. C. FORRESTER, R.A.F.V.R., No. 50 Sqn.  
 Sgt. J. V. BRIGGS (now F/O), R.A.F.V.R., No. 89 Sqn.  
 Sgt. D. HEAP, R.A.F.V.R., No. 156 Sqn.  
 Flt. Sgt. (now W/O.), C. E. JONES, R.C.A.F., No. 12 Sqn.  
 Flt. Sgt. B. E. JARMEY, R.A.F.V.R., No. 250 Sqn.  
 Flt. Sgt. J. STOCKLEY, R.A.F.V.R. No. 85 Sqn.  
 Flt. Sgt. (now P/O.) R. W. J. ALLEN, R.A.F.V.R., No. 98 Sqn.  
 Sgt. S. GRIMSDITCH, R.A.F.V.R., No. 524 Sqn.  
 Flt. Sgt. R. F. PERRY, R.A.F.V.R., No. 7 Sqn.  
 Flt. Sgt. P. H. PEXTON, R.A.F.V.R., No. 102 Sqn.  
 Flt. Sgt. A. PURVIS, R.A.F.V.R., No. 635 Sqn.  
 Flt. Sgt. M. RICHARDSON, R.A.F.V.R., No. 166 Sqn.  
 Flt. Sgt. R. E. SALTER, R.A.F.V.R., No. 617 Sqn.  
 Flt. Sgt. C. J. SARGEANT, R.A.F.V.R., No. 7 Sqn.  
 Flt. Sgt. F. R. RICHES, R.A.F.V.R., No. 9 Sqn.

**Roll of Honour**

Casualty Communiqué No. 524.

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, 151 are second entries giving later information of casualties published in earlier lists.

**Royal Air Force**

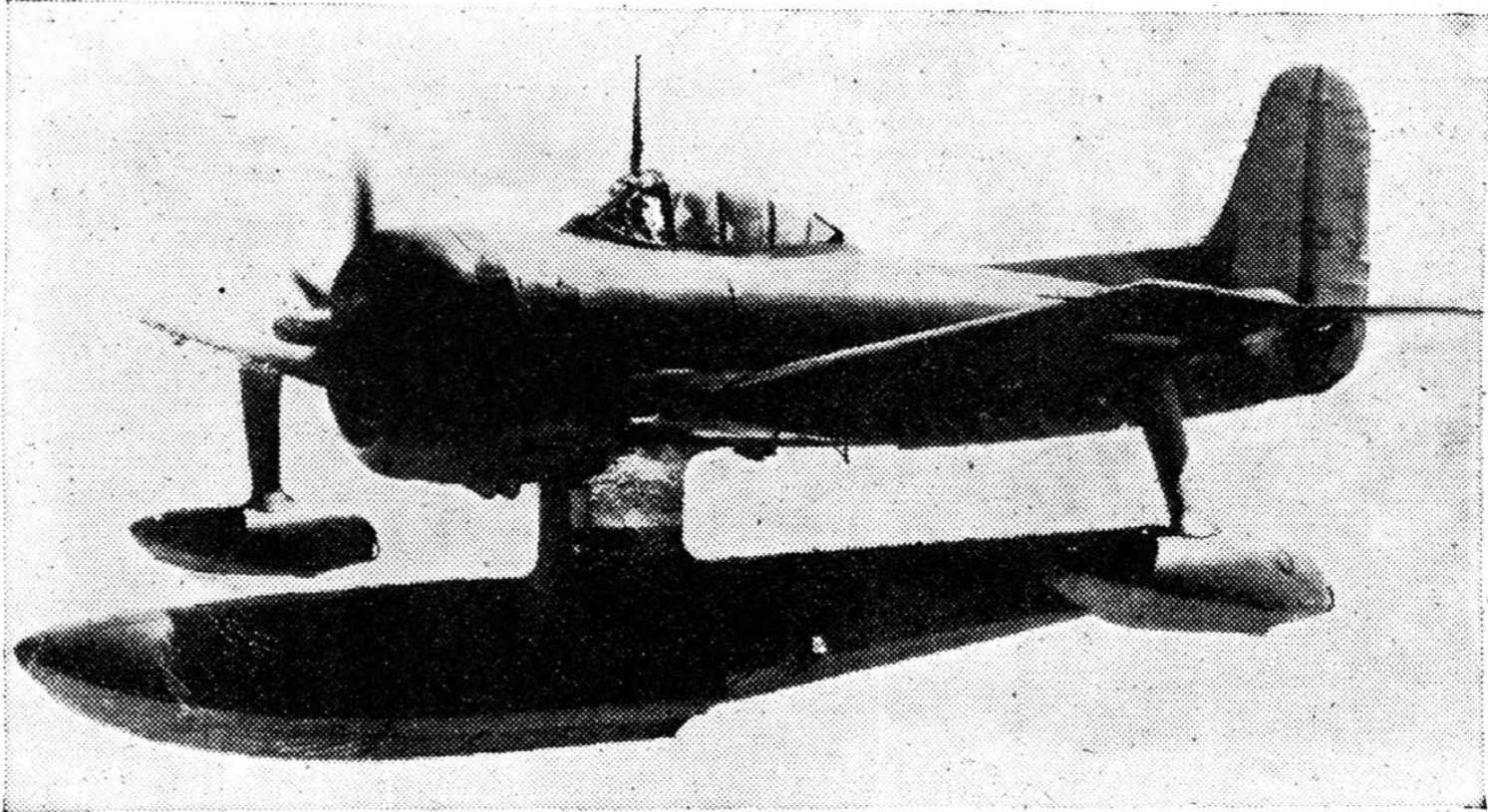
KILLED IN ACTION.—Wing Cdr. M. W. L.I. La V. Baker; Sgt. E. J. Denton; W/O. A. Y. P. Dickson; Flt. Sgt. J. R. Gordon; Sgt. A. Graham; Sgt. L. Hull; P/O. C. E. J. Ousley; P/O. F. S. Stone; Flt. Sgt. H. W. Vine.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. F. E. Baker; Flt. Sgt. G. W. Evans; Flt. Sgt. F. Glover; Sgt. E. H. Mills; F/O. J. B. Reynolds; Sgt. R. Russell; Sgt. J. W. Shaw.

PREVIOUSLY REPORTED MISSING, NOW PRE-



Badge of No. 644 Squadron, R.A.F. "Dentes Draconis Serimus" (We Sow Dragons' Teeth).



**FOR FASTER RECONNAISSANCE ;** The new Curtiss-Wright SC-1 Seahawk which is to replace the Kingfisher in the U.S. Navy. Horsepower has been stepped up to 1,200 and twice the speed of the Kingfisher is claimed.

SUMED KILLED IN ACTION.—Flt. Sgt. V. E. Aspin; P/O. J. L. Atkinson; Flt. Sgt. A. Banham; Flt. Sgt. A. Barber; Sgt. R. S. Barratt; Sgt. D. E. Barton; Flt. Sgt. J. E. Beaman; W/O. R. W. G. Bryant; F/O. J. W. Campbell; Sgt. H. Carmichael; Sgt. L. A. Chappell; F/O. S. R. Cooke; F/O. M. F. Culling; Flt. Sgt. H. Davison; Sgt. S. W. Fox; Sgt. A. E. J. Goddard; Flt. Lt. W. G. Grove; Sgt. J. C. Guthrie; Sgt. R. D. Hales; Sgt. R. F. E. Haly; Flt. Sgt. T. C. Hardwick; Sgt. K. A. Harper; Flt. Sgt. E. P. Hawkes; Flt. Sgt. E. Hill; Sgt. W. J. Hill; Flt. Sgt. H. J. Hiscox; Flt. Sgt. F. C. Holland; Flt. Sgt. H. G. Howes; Flt. Lt. L. V. Hyde; Sgt. A. R. Jackson; Sgt. E. J. Jewell; Sgt. J. A. Johnson; Sgt. G. E. King; Flt. Sgt. R. Lawley; Sgt. A. F. J. Lilley; Flt. Lt. C. A. Lyon; Sgt. W. A. McDougall; Flt. Lt. J. Nicholls; Sgt. H. P. Page; Flt. Lt. E. H. Palmer; Sgt. R. B. Priestley; P/O. M. E. Putt; Sgt. L. Ratcliff; Sgt. A. McL. Reid; Flt. Sgt. J. Shaw; P/O. J. A. Sills; Sgt. A. R. Skelton; P/O. J. Smith; Flt. Lt. W. A. Stratis, D.F.C.; Flt. Sgt. G. H. Stromberg; P/O. R. Taylor; Sgt. R. G. Thompson; P/O. G. S. Waddell; Flt. Lt. A. Whitten-Brown.

WOUNDED OR INJURED IN ACTION.—F/O. H. W. Ashley; Sgt. L. C. Charteris; Sgt. C. A. H. Dixon; F/O. R. B. Jackson.

MISSING, BELIEVED KILLED IN ACTION.—W/O. J. F. Kelman; Flt. Lt. J. R. Muir.

MISSING.—P/O. A. C. Adams; Sgt. E. A. Amzalak; Flt. Sgt. G. H. Ashworth; Sgt. G. Askey; Flt. Lt. A. Baker; Wing Cdr. E. A. Benjamin, D.F.C.; F/O. R. A. A. Cannon; Sgt. J. Cartmell; Sgt. A. G. Chapman; Sgt. F. K. Clough; Flt. Lt. T. J. D. Cook; W/O. J. H. P. W. Crowther; Flt. Lt. R. S. Cumming; Flt. Lt. R. Cunliffe; W/O. F. W. Cuthbertson; P/O. P. De Metz; F/O. S. Denmark; P/O. T. Dillon; Flt. Lt. R. F. Dobson; Flt. Sgt. D. W. Eastcott; Sgt. R. F. Edwards; F/O. E. L. Ellis; Sgt. D. Evans; Sgt. R. C. Finlayson; Sgt. F. G. Fox; Sgt. T. W. Gascoigne; Sgt. R. Girling; Flt. Sgt. B. S. Hall; Sgt. E. Harrison; Sgt. T. H. Hatton; Sgt. D. W. Hayes; Sgt. J. J. O'B. Heady; F/O. J. E. Heath; F/O. G. Holmes; Sgt. W. J. Hosking; Flt. Lt. G. B. Howson; Sgt. D. W. Hughes; Sgt. P. E. Humphries; Flt. Lt. R. F. Humphries; Flt. Sgt. E. E. Jenkins; Sgt. J. K. Jones; Sgt. J. T. Jones; Flt. Sgt. J. F. Jordan; Flt. Sgt. J. W. Knight; Flt. Sgt. R. L. Lewis; Flt. Lt. C. W. R. Lord; F/O. E. J. Lowther; F/O. H. L. Lucas; F/O. J. V. Malloch; Sgt. F. L. C. Mewis; Sgt. A. D. Morgan; Flt. Sgt. L. L. Nicholas; Sgt. R. Nolan; Sgt. H. J. Ockerby; Sgt. A. K. Parker; Sgt. W. Pass;

F/O. C. L. Philpott; W/O. R. L. C. C. Pinkerton; Sgt. S. J. Price; F/O. J. W. Rae; Sgt. D. J. Reeves; Sgt. R. Richards; P/O. J. S. Rice; Sgt. G. F. Rudge; P/O. J. MacF. Scott; P/O. D. Shepherd; Sgt. C. W. Sibley; P/O. G. L. Sorrell; W/O. E. E. Standing; Flt. Sgt. G. D. Stean; Flt. Sgt. W. S. H. Strong, D.F.M.; Flt. Sgt. D. Taylor; Flt. Lt. J. H. Taylor; Sgt. W. C. Thacker; P/O. M. J. Thain; P/O. J. S. Thompson; P/O. S. A. W. Tressider; Sgt. F. W. Underhill; Sgt. A. M. Watson; Flt. Sgt. J. Webber; P/O. K. F. White; Sgt. W. H. Wicks; Flt. Sgt. A. C. Widdowson; Sgt. D. Williams; Flt. Sgt. I. Williams; Flt. Sgt. E. P. Yates.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Lt. M. A. Berkeley; Flt. Lt. J. G. Brown; Sgt. S. T. Norfolk; Sgt. W. H. Parkin. KILLED ON ACTIVE SERVICE.—Flt. Lt. J. S. An-

draws, A.F.C.; Flt. Lt. G. Atkinson; Flt. Sgt. K. A. Bore; Sgt. P. Carter; F/O. A. T. R. Cleeve; Wing Cdr. W. P. Green, D.S.O., D.F.C.; A/C.2 E. A. Hines; Sgt. S. H. Holmes; L.A./C. F. G. A. Sapsed; F/O. J. H. Wilde; F/O. R. J. Worby.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—L.A./C. A. J. Baines.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. H. H. Dixon; Flt. Sgt. E. Johnson; Sgt. K. v. Mant; P/O. J. Parkinson; Sgt. A. F. Raymond; Sgt. G. W. Wilson.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Lt. P. A. Barker; Flt. Sgt. A. E. Davies; A/C.1 W. Harland; A/C.1 B. J. Marriott; L.A./C. R. J. White; L.A./C. V. H. Yates.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. S. G. Hodges.

DIED ON ACTIVE SERVICE.—A/C.1 D. G. Douglas; Sgt. D. Greig; Sgt. V. O'Neill; L.A./C. P. C. Quartermain; Cpl. R. Salter.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. W. Marshall; Sgt. A. J. MacPherson; F/O. C. D. Shaw, D.F.M.

**Women's Auxiliary Air Force**

DIED ON ACTIVE SERVICE.—Cpl. A. M. Evans; L.A./CW. R. E. Irving; L.A./CW. D. M. Mockford.

**Royal Australian Air Force**

KILLED IN ACTION.—Flt. Lt. J. J. Dunne, D.F.C.; Flt. Sgt. E. A. Barsby; Flt. Sgt. B. Bradock; F/O. H. T. Campbell; F/O. B. M. Clegg; P/O. P. M. Oleinikoff; Flt. Sgt. C. B. Robinson; F/O. S. C. Swift.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. E. F. Champness; Flt. Sgt. P. J. Conway; P/O. W. D. Croft; P/O. T. W. Henderson; Flt. Sgt. J. G. Lane; Flt. Sgt. G. E. Nash; P/O. K. B. Smith.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. J. Burns; F/O. K. H. Freeman; Flt. Sgt. G. H. Knight; Flt. Sgt. P. S. May; F/O. A. F. Paton; Flt. Sgt. G. H. Rose; Flt. Sgt. C. J. Schmidt; Flt. Sgt. R. B. Spencer; Flt. Sgt. P. E. T. Tiernan.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—F/O. J. R. Frees.

MISSING, BELIEVED KILLED IN ACTION.—W/O. I. Rensson.

MISSING.—P/O. W. J. M. Baillie; Flt. Sgt. C. G. Cooper; P/O. L. P. Curtin; W/O. A. N. Fletcher; F/O. A. Flynn; W/O. R. D. Gill; F/O. B. Heffer; F/O. K. G. Hollaway; P/O. M. E. Jordan; Flt. Sgt. R. H. Lock; Flt. Sgt. A. R. Main; Flt. Sgt. F. J. Sheridan; Flt. Sgt. R. C. Styles; F/O. K. Weber.

**Royal Canadian Air Force**

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. J. R. Alexander; P/O. H. Blaydes; Flt. Lt. S. W. Little; F/O. R. S. McGill; W/O. H. F. Murphy; W/O. M. Sherman; Flt. Lt. G. J. Smith.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. C. H. M. Beaudoin; P/O. C. T. Beech; W/O. P. A. J. Besico; F/O. A. J. Black; P/O. N. W. E. Burdett; P/O. H. E. Colman; P/O. S. H. Cullen; P/O. C. O. Draper; P/O. A. V. Everest; P/O. A. G. Fairless; Flt. Lt. J. P. Flynn; F/O. R. D. Ford; P/O. M. Habiluk; Flt. Lt. W. M. Hale; F/O. J. G. Hillman; F/O. J. H. Irwin; F/O. J. I. Johnston; P/O. P. A. Kingston; P/O. E. C. Lehman; P/O. T. B. Lowe; P/O. D. F. McAllister;

## SERVICE AVIATION

P/O. J. D. McCreary; P/O. W. J. McMeekan; P/O. J. M. McPherson; P/O. W. M. McQueen; P/O. W. M. Manser; P/O. G. O. Massicotte; P/O. F. H. Moxon; P/O. R. E. Niles; P/O. C. L. Panton; P/O. G. Parker; P/O. K. L. Patience; P/O. A. A. Patton; P/O. T. J. Preece; P/O. F. L. Rey; W/O. E. A. Rhoades; P/O. H. G. Robinson; Flt. Lt. G. R. B. Roe; P/O. H. T. Rogers; P/O. W. H. Scott; P/O. J. J. Scully; P/O. D. Sebestyen; P/O. A. H. Siemens; P/O. W. E. P. Soeder; P/O. C. V. Soderstrom; Flt. Sgt. A. J. Stainton; P/O. E. G. Surridge; P/O. R. J. Walton; P/O. N. H. Wettlauffer.

MISSING—F/O. G. M. B. Barlow; F/O. T. G. Burton; Sgt. C. J. A. Cary; W/O. W. D. Coulson; Sgt. A. J. Cybulskie; F/O. R. V. Dallin; F/O. C. J. Driscoll; Flt. Sgt. S. M. Duncan; F/O. W. A. Eden; P/O. E. M. Ford; Flt. Sgt. H. Gallagher; Sgt. B. Granka; W/O. R. H. Holtan; P/O. N. R. Lamphear; F/O. L. A. MacDonald; F/O. J. J. McElhone; F/O. D. A. Magrath; F/O. H. McKay; Sgt. G. A. McLarty; Sgt. H. L. G. Mayer; F/O. L. Medynski; Flt. Lt. C. R. Mills; Sgt. A. L. Morrison; P/O. J. F. Peak; Flt. Sgt. G. E. Robertson; P/O. J. T. Rose; F/O. V. S. Roy; P/O. M. Schwartz; Flt. Sgt. A. N. Scoria; F/O. A. G. Slocum; F/O. R. S. Stanzel; Flt. Sgt. A. R. Williams; W/O. J. H. Wilson.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. C. N. Durdin.

## Royal New Zealand Air Force

KILLED IN ACTION.—Cpl. W. G. Blair.  
PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. M. W. Cosgrove; F/O. G. H. Hart; F/O. D. W. Lindsey; F/O. A. W. Wilson; F/O. C. M. Wilson.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—P/O. W. H. Russell.

KILLED ON ACTIVE SERVICE.—P/O. G. P. Carr.  
PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—W/O. T. D. De Renzy.

## South African Air Force

KILLED IN ACTION.—Lt. J. F. L. Burnard.  
DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—2nd Lt. B. M. Lindley.

MISSING, BELIEVED KILLED IN ACTION.—Major T. P. L. Murray, D.F.C.

MISSING.—Lt. Aberdeen; Lt. J. B. Miller; Major G. Hilton-Barber; Capt. H. T. Snyman.

KILLED ON ACTIVE SERVICE.—2nd Lt. T. M. Jenkins; 2nd Lt. E. C. Richards.

## Casualty Communique No. 525

Of the names in this list 137 are second entries giving later information of casualties published in earlier lists.

## Royal Air Force

KILLED IN ACTION.—F/O. N. A. Ansdell; Flt. Sgt. H. Barnfield; F/O. H. Bennett; Sgt. L. E. Billington; Sgt. H. Birch; Flt. Sgt. W. Briddon; Sgt. D. J. Browne; Flt. Sgt. C. Butler; Sgt. W. T. G. Cobden; Flt. Sgt. H. F. Cox; Flt. Sgt. D. L. Dickenson; W/O. W. F. Flatt; Sgt. H. Frost; Flt. Sgt. L. A. Hadder; Flt. Sgt. F. Hares; F/O. A. G. Heath; Sgt. P. J. Healy; F/O. A. Hunter; Sgt. T. H. Jarman; P/O. D. Kinnell; W/O. H. A. Lambert; Flt. Lt. G. J. Lane; Sgt. W. Mellor; F/O. W. H. Palmer; Sgt. R. O. Parry; F/O. J. A. Patterson; Sgt. H. Payne; Sgt. W. H. Rogan; Flt. Sgt. D. R. Russell; Sgt. R. F. D. Schafer; Flt. Sgt. H. J. Terry; F/O. A. H. Wakeling; Sgt. A. H. Walker; Sgt. W. H. Walklate; Sgt. A. F. Warbey; Sgt. W. E. Welsh.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. S. J. Abbott; Flt. Sgt. N. W. Brown; Flt. Sgt. L. C. Clutterbuck; Flt. Sgt. E. A. Davies; Sgt. D. A. Davison; F/O. J. F. Judd; Sgt. T. J. Meehan; Sqn. Ldr. The Hon. F. H. L. Scarlett; Sgt. R. Thompson; Sgt. D. A. Wilson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. H. Abbott; Flt. Lt. L. H. Ackland; P/O. C. L. E. Allen; Sgt. D. A. Anderson; Sgt. W. E. Astley; Sgt. C. Beech; Flt. Sgt. P. Bissett; F/O. N. E. Blight; P/O. K. A. Boyce; Sgt. D. Brown; Sgt. E. G. Brown; Sgt. K. W. Brown; Sgt. R. W. Burgess; P/O. J. C. Cairns; Flt. Sgt. J. G. Campbell; F/O. F. Carr; Flt. Lt. R. H. Clark; Flt. Sgt. T. R. Clegg; Sgt. L. E. Crick; Sgt. R. M. Cringle; Flt. Sgt. A. C. Croft; F/O. J. G. Dallen; Flt. Sgt. W. A. Davies; Sgt. L. W. Denning; Sgt. D. Dickson; Sgt. D. J. Dowe; Flt. Lt. J. Downey, D.F.M.; F/O. J. C. P. Doyle; Sgt. P. C. Emms; Sgt. P. A. Esson; Sgt. J. Fear; Flt. Sgt. C. M. Firth; Sgt. E. J. Foddering; Flt. Sgt. A. J. Foster; Flt. Sgt. E. C. Fox; Flt. Sgt. A. Frith; Flt. Sgt. J. E. Frith; Sgt. S. P. Frith; Sgt. P. Furlong; Flt. Sgt. A. J. Gasser; Sgt. P. Gilmore; Sgt. B. F. Gratwicke; Sgt. J. H. Greenslade; Flt. Sgt. H. Gregg; Flt. Sgt. F. Gregory; Sgt. W. J. Gwynne; Flt. Sgt. S. J. Hall; P/O. R. S. Hanson; Flt. Sgt. R. S. Hartley; F/O. F. C. Hentsch; P/O. J. W. Humble; P/O. J. G. Johnston; Sgt. J. R. Honey; Flt. Sgt. J. A. Jones; Flt. Sgt. A. Jory; Flt. Sgt. H. S. Langley; P/O. D. A. Long, D.F.M.; Sgt. R. C. McArthur; Sgt. J. C. McCartney, D.F.M.; Flt. Sgt. A. McCormick; Flt. Sgt. R. McIntosh; F/O. W. B. Mathias; W/O. W. A. Molyneux; Flt. Sgt. R. Nelson; Sgt. D. E. Nutter; Flt. Sgt. C. J. Oliver; Sgt. E. H. Orchard; Sgt. A. F. Patmore; P/O. K. Peacock; Sgt. J. D. Pedley; Sgt. J. Pender; Sgt. C. F. Penn; Sgt. J. D. Pepper; Sgt. W. G. S. Pettis; Sgt. R. Plant; Sgt. G. E. Polden; Sgt. E. R. W. Pond; Flt. Sgt. R. E. Priest; Flt. Sgt. C. G. Rhodes; Sgt. A. D. Roper; P/O. J. A. McL. Ross;

Sgt. R. D. Samuels; Sgt. K. W. Sansom; Sgt. A. L. Sayers; Sgt. R. J. Service; Sgt. J. I. Scott; Flt. Sgt. H. A. Shaw; Sgt. J. Shaw; Sgt. W. Shaw; Sgt. F. B. Smith; Flt. Sgt. P. N. Smith; Flt. Sgt. A. W. Snowden; Sgt. C. Southworth; Sgt. L. Staffor; Flt. Sgt. S. Swift; Flt. Lt. R. N. Tapley; Flt. Sgt. W. M. Thomas; Sgt. G. Thomson; Sgt. E. B. Tones; F/O. F. D. Topping; Sgt. H. J. Tucker; Flt. Lt. H. A. Turner; Flt. Sgt. J. R. Velzian; Sgt. E. G. Waller; Sgt. G. E. Ward; Sgt. E. W. Wash; Sgt. F. D. Wells; Sgt. D. Wensley; Flt. Sgt. L. W. C. Wheeler; Sgt. D. R. R. L. Whitfield; Sgt. A. T. Williams; P/O. J. H. Wilson; Flt. Lt. E. W. Wiseman; W/O. H. H. Wright; Flt. Sgt. R. M. Woods; Sgt. B. Woodward; F/O. J. C. Yorke.

WOUNDED OR INJURED IN ACTION.—Flt. Lt. T. R. Burne, A.F.C.; Sqn. Ldr. R. Burrell; W/O. R. W. Church, D.F.M.; Sgt. A. J. P. Clark; W/O. K. Holdaway, D.F.M.; Sgt. A. McDermid; F/O. A. D. Stephens; F/O. E. V. Stephenson.

MISSING, BELIEVED KILLED IN ACTION.—F/O. K. W. Bailey; Sgt. W. A. Bailey; Sgt. A. F. W. Taylor.

MISSING.—Flt. Lt. A. E. Arnold; P/O. A. J. Backshell; Flt. Sgt. L. G. Baldock; Flt. Sgt. D. G. Baxter; Flt. Lt. T. A. Brown; Sgt. D. H. Burton; F/O. V. M. Collins; Sgt. W. L. Colquhoun; F/O. E. J. Cooper; F/O. T. B. Cooper, D.F.M.; Flt. Lt. N. C. Cowley; Flt. Sgt. D. J. Critchley; Flt. Sgt. L. B. Crook; W/O. S. B. Currie; Sgt. T. F. Darragh; Sgt. T. E. David; Flt. Sgt. R. E. Davies; Flt. Lt. H. M. Dean; Sgt. T. H. Deere; F/O. R. A. A. Doherty, D.F.C.; Flt. Sgt. S. A. F. Duplock; Flt. Lt. J. G. Enticott; P/O. L. P. Etheridge; P/O. N. P. Etheridge; Flt. Lt. H. H. Fielding-Johnson, D.F.C.; Sgt. D. J. G. Gibb; F/O. R. V. Goldsmith; F/O. J. G. Graham; Flt. Sgt. T. J. A. Grant; Sgt. J. Halsall; Sqn. Ldr. G. Hampton, D.F.C.; F/O. L. G. Harbord; Flt. Sgt. G. Harrison-Broadley; Flt. Sgt. J. Hawridge; Sgt. L. W. Hazelwood; Sgt. R. Hetherington; F/O. A. W. Higginson; Flt. Sgt. F. C. Hinton; Sgt. G. Hogg; Flt. Sgt. D. Hollinrake; F/O. R. W. Horrocks; Flt. Sgt. G. A. Humphrey; F/O. R. J. Ingham; F/O. H. J. A. Johnson; Flt. Sgt. A. J. Joyce; Sgt. K. G. Kemp; Flt. Sgt. D. J. Long; F/O. D. R. McLean; F/O. P. Millhouse; F/O. L. Moore; Flt. Sgt. H. Morgan; F/O. W. J. D. Muir; F/O. J. E. G. Munschamp; Flt. Sgt. K. F. Newman; Sgt. M. Ogilvie; F/O. R. J. Owen; F/O. P. P. Parker; P/O. J. E. Peach; Sgt. W. Porter; Sgt. G. M. Pumphrey; Sgt. S. Richardson; Flt. Sgt. A. M. Robertson; Flt. Sgt. G. Robinson; Flt. Sgt. J. G. Rudman; W/O. P. S. Rundle; Sgt. G. A. E. Sanday; Flt. Sgt. G. P. R. Seagrave; Flt. Sgt. R. W. Sheen; Sgt. J. Simpson; F/O. J. B. Smart; W/O. E. Smith; Sgt. W. W. Smith; Sgt. J. Sneddon; Flt. Lt. D. W. T. Stealey; F/O. G. Thirlwell; Flt. Lt. J. S. Tootal; Flt. Sgt. N. Watson; Sgt. D. G. Weaver; Sgt. G. A. Wellstead; Flt. Sgt. R. Westgarth; Flt. Sgt. T. D. Whateley; Sgt. D. R. White; Sgt. W. L. Whitehead; F/O. J. E. M. Wilson; Sgt. J. R. Wise; Flt. Sgt. W. W. Woakes; W/O. M. Woodthorpe.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. C. Abbs; Sgt. E. G. Andrews; F/O. R. J. Anson; A/C.2 H. M. Aitken; Flt. Lt. G. J. Barnes; Sgt. S. A. Bragg; Sgt. G. E. Dandy; Flt. Sgt. G. J. D'Assonville; Sgt. E. Davis; Sgt. C. B. Douglas; Sgt. A. Fraser; Flt. Lt. R. Harpin, D.F.C.; Flt. Lt. R. J. H. Hussey, D.F.C., D.F.M.; L.A./C. A. Kessack; Sgt. F. D. Leahy; P/O. K. R. H. Lindley; F/O. R. J. G. Manning; F/O. F. R. Noxon; Wing Cdr. G. A. L. Sinclair-Hill; P/O. R. I. Smith; Flt. Sgt. E. J. D. Stone; Sgt. C. J. Waters; Sgt. C. W. Watts; Sgt. D. Whitefoot; Wing Cdr. P. H. Woodruff, D.F.C.; Sgt. T. Yarker.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.2 H. G. Bandy; Sgt. J. C. Davis.  
DIED ON ACTIVE SERVICE.—L.A./C. J. Blades; A/C.1 D. Curtis; Sgt. C. Danks; A/C.2 F. Davies; L.A./C. J. Hadler; A/C.1 F. A. Norman; Cpl. D. Sharp; L.A./C. H. Smith; A/C.2 L. W. Warren.

## Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. G. W. Dixon; Flt. Sgt. F. E. Gould; Flt. Sgt. R. R. Johnson; P/O. A. E. Lutz; W/O. L. J. Odgers; F/O. L. R. Pederson; F/O. J. J. F. Ryan; F/O. A. F. W. Shelton; Flt. Sgt. E. T. Sumner; F/O. E. A. Thynne.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. E. Jasper; W/O. C. H. Whyte.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—W/O. R. A. Brewington; Sqn. Ldr. R. T. Fitzgerald, D.F.C.; Flt. Sgt. G. F. Geraghty; Flt. Sgt. L. K. Robson.

MISSING, BELIEVED KILLED IN ACTION.—P/O. J. C. Saisell.

MISSING.—F/O. H. J. Brock; F/O. J. H. Caldwell; Flt. Sgt. P. J. P. Carlon; Flt. Sgt. W. F. Duncan; F/O. V. C. Ely; W/O. N. J. Hall; F/O. J. H. Hering; W/O. R. W. Mann; W/O. E. R. W. Oliver; P/O. E. S. Quirk; P/O. J. R. Shepley; Flt. Sgt. M. A. Smith; W/O. J. D. Stevenson; F/O. R. G. Tickner.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. O. Allen.

## Royal Canadian Air Force

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. F. G. Wilkinson.

## Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. G. Fisher; F/O. H. W. Henderson; Flt. Sgt. R. J. I. Melville; Flt. Sgt. J. A. Mullally.

MISSING.—Wing Cdr. R. W. Baker, D.F.C.; Flt. Lt. A. J. Fowler.

KILLED ON ACTIVE SERVICE.—Flt. Lt. H. B. Cooper.

## South African Air Force

KILLED IN ACTION.—Capt. E. Swales, D.F.C.  
MISSING.—Major O. A. Hunt; Lt. L. M. Jacobs, D.F.C.; Major A. C. Johnson; 2nd Lt. J. W. Potgieter; Capt. F. G. Pratt.

## Official Corrections

## Casualty Communique No. 511.

Alter introduction to read 191 are second entries.

Under "MISSING, BELIEVED KILLED IN ACTION," delete Flt. Sgt. J. G. Aspinwall and Sgt. G. Baker, Sgt. W. C. Burrows, Flt. Sgt. C. Candlish, Flt. Sgt. R. H. Dixon, Flt. Sgt. M. V. Ireton, 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 and Flt. Sgt. W. T. Watson and transfer to "KILLED IN ACTION."

Under "MISSING," delete Sgt. R. C. Fergie, Sgt. A. Kay, Sgt. O. J. Pulford and F/O. R. T. Salvoni, D.F.C., and transfer to "KILLED IN ACTION."

Delete Sgt. W. J. Harrison, Flt. Sgt. J. E. Hughes, Flt. Lt. T. A. Smith, Flt. Lt. D. M. Mansel-Pleydell, D.F.C.

Under "KILLED ON ACTIVE SERVICE," alter Sgt. K. L. Sutton to read P/O. Under "DIED ON ACTIVE SERVICE," for L.A./C. R. S. Packman read Packham.

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

Under R.A.A.F., delete "MISSING, BELIEVED KILLED IN ACTION." Transfer P/O. N. T. Bickard to "KILLED IN ACTION."

Under R.C.A.F., delete "MISSING, BELIEVED KILLED IN ACTION." Transfer Flt. Sgt. J. C. Daze to "KILLED IN ACTION." Under "KILLED ON ACTIVE SERVICE," W/O. J. Firth P/O.

Under "S.A.A.F.," insert heading "KILLED IN ACTION," Lt. A. L. Spafford.

## Casualty Communique No. 512.

Alter introduction to read 155 are second entries.

Under "KILLED IN ACTION," insert P/O. D. Hauber, P/O. T. S. H. Whitehouse.

Under "MISSING," alter Sgt. E. Baxter to read Flt. Sgt. Delete Sgt. J. A. Fallon, P/O. D. Hauber, Sgt. T. Myatt, F/O. W. G. Thorby, P/O. T. S. H. Whitehouse and Sgt. R. Wilson. Alter Sgt. R. Redmond to read Flt. Sgt. Alter Flt. Sgt. K. F. Tilston to read W/O. Insert Sgt. R. Wilson.

Under "DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE," alter Sgt. L. M. Lewis to read Flt. Sgt.

Under "DIED ON ACTIVE SERVICE," alter Sgt. F. I. Foreman to read Flt. Sgt.

Delete heading "PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR," and all names.

Under R.A.A.F. delete heading "PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR," and all names.

Under "R.C.A.F., MISSING," delete F/O. D. W. Ritchie.

Under "R.N.Z.A.F., MISSING," delete F/O. P. J. McVerry.

Under "S.A.A.F., MISSING," delete Capt. C. F. Marais.

Delete heading "PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR" and all names.

## Casualty Communique No. 518.

Alter number of second entries to 202.

Under "PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION," Sgt. P. W. Leach should read Flt. Sgt.

Under "MISSING," delete Flt. Lt. J. D. Callaghan, Sqn. Ldr. J. Garden, Flt. Lt. R. P. Harding, P/O. E. S. Leach, Flt. Lt. J. D. Ross and F/O. W. F. Younger.

Under "MISSING, BELIEVED KILLED ON ACTIVE SERVICE," delete P/O. C. D. Callum and place him under "KILLED ON ACTIVE SERVICE."

Under "DIED ON ACTIVE SERVICE," delete L.A./C. T. J. Suffield.

Delete the heading "PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR" and the name beneath it.

Under "R.A.A.F., KILLED IN ACTION," Flt. Sgt. P. M. Hore should be described as F/O.

Under "MISSING, BELIEVED KILLED ON ACTIVE SERVICE," Conolan's initials should read B. L. R.

Delete the heading "PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR," and the name beneath it.

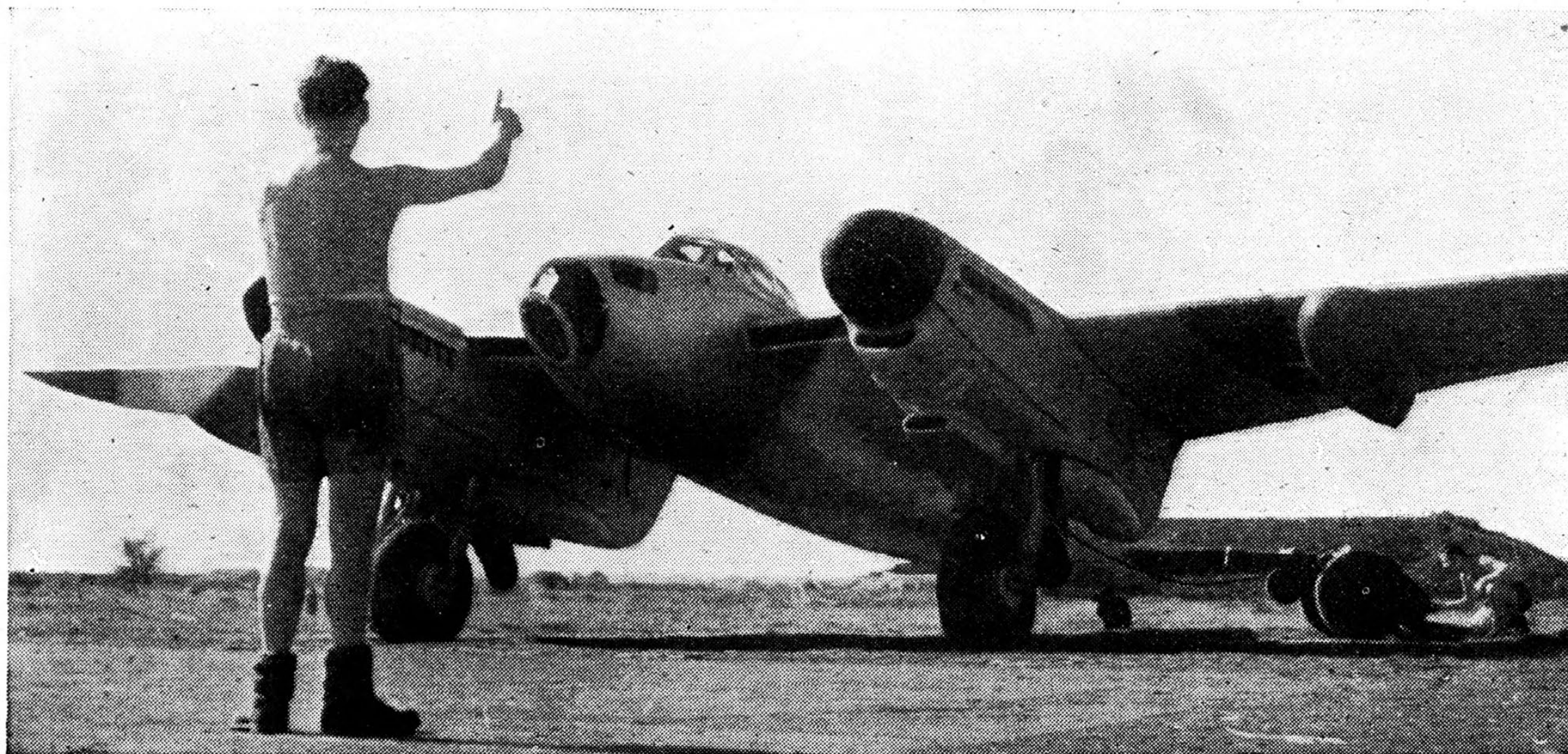
Under "R.C.A.F., MISSING," delete Flt. Lt. G. J. Bruce.

Under "MISSING," P/O. C. L. Johnston should read F/O.

Under "KILLED ON ACTIVE SERVICE," P/O. N. L. Gordon should read F/O. and Sgt. J. W. Ross as Flt. Sgt.

Delete the heading "PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR," and the name beneath it.

Under South African Air Force, delete the heading "MISSING" and the name beneath it.



**HIGH UP TO GET LOW-DOWN:** A pressurised Mosquito XVI taxiing out to take-off for a photo-reconnaissance flight over Burma.



# SERVICE AVIATION



Royal Air Force and Fleet Air Arm News and Announcements

## Appointments

**THE** Air Ministry announces the following appointments:—

Air Vice-Marshal Lawrence DARVALL, M.C., to be Air Officer Commanding a Transport Command Group, Middle East.

Air Vice-Marshal Cecil Arthur BOUCHIER, C.B.E., D.F.C., to be Air Officer Commanding No. 221 Group in Air Command, South-East Asia.

Air Vice-Marshal Dermot Alexander BOYLE, C.B.E., A.F.C., to be Air Officer Commanding, No. 11 Group, Fighter Command.

Air Commodore Philip Herbert MACKWORTH, C.B.E., D.F.C., to be Senior Air Staff Officer, Headquarters, Coastal Command, and to be Acting Air Vice-Marshal.

Air Vice-Marshal Darvall has been Air Officer Commanding No. 46 Group, R.A.F. Transport Command, since September, 1944. He was previously Director of Air Transport Policy and Operations at the Air Ministry, and has carried out various flying training and staff duties at home and abroad. He was Deputy Senior Air Staff Officer, Air Headquarters, India, from March, 1942, until the following year.

Air Vice-Marshal Bouchier was recently appointed Air Officer Commanding a group in Air Command, South-East Asia. He had previously been Senior Air Staff Officer at Headquarters, Fighter Command. He has also served as Deputy Director of Fighter Operations at the Air Ministry.

Air Vice-Marshal Boyle has been Air Officer Commanding No. 85 Group, 2nd Tactical Air Force, since April this year, and before that he was Senior Air Staff Officer, No. 83 Group.

At the beginning of the war he was at Headquarters, Advanced Air Striking Force, in France, and in 1940 went to Headquarters, Bomber Command on Air Staff Operations Duties. He was awarded the C.B.E. in January this year and the A.F.C. in June, 1939.

Air Vice-Marshal Mackworth has been Commandant of the Empire Central Flying School since September, 1944. He had previously been Air Officer Commanding a Group in India from June, 1942. In 1940 he was on air staff training duties in Canada. Commissioned in 1916 in the Royal Naval Air Service, he became a flying officer in the R.A.F. in 1919.

He was for three years engaged on air staff duties at the Directorate of Training, Air Ministry, and in 1932 served in the Middle East in Command of No. 216 Squadron. He was awarded the D.F.C. in January, 1919.

## 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:—

### Distinguished Service Order

Act. Sqn. Ldr. P. A. H. MCKEAND, D.F.C., R.A.F.V.R., No. 240 Sqn.—This officer has a fine operational record. He has completed a large number of sorties, many of them, within recent months, of a most hazardous nature. The successes he has achieved, sometimes in the face of almost impossible conditions, are a magnificent tribute to his brilliant skill, great courage and devotion to duty.

Act. Group Capt. G. H. POWELL-SHEDDEN, D.F.C., R.A.F.—Group Capt. Powell-Shedden has a long period of operational flying. He served during the Battle of Britain, when he destroyed at least four enemy aircraft. This officer then served for a period in Malta before assuming command of a squadron engaged on low-level intruder operations. The success achieved was largely owing to his enthusiasm, administrative ability and patient training. Group Capt. Powell-Shedden is now in command of a station with two intruder squadrons, and under his brilliant leadership they have attained a high degree of operational efficiency.

Act. Sqn. Ldr. E. D. MACKIE, D.F.C., R.N.Z.A.F., No. 80 Sqn.—This officer has led the squadron on numerous sorties within recent months. During these operations more than 70 locomotives have been put out of action. A good number of barges, trucks and mechanical vehicles have also been most effectively attacked. Ten enemy aircraft have been destroyed. The successes obtained are a fine testimony to this officer's exceptional leadership, great skill and courage. Among his achievements is the destruction of 18 enemy aircraft.

Act. Sqn. Ldr. J. G. PATTISON, D.F.C., R.N.Z.A.F., No. 485 (N.Z.) Sqn.—This officer has the highest standard of skill and courage, and throughout his devotion to duty has been unflinching. He has shown the finest qualities of leadership, both in the air and on the ground, and his sterling work has contributed in good measure to the success of the squadron he commands. Within recent months Sqn. Ldr. Pattison has destroyed very many enemy mechanical vehicles and shot down two enemy aircraft.

Act. Sqn. Ldr. J. T. HALL, D.F.C., R.C.A.F., No. 35 Sqn.—This officer has completed a large number of operational missions. He has displayed exceptional skill and throughout has set a magnificent example of determination and devotion to duty. His record is worthy of the highest praise.

### Bar to Distinguished Flying Cross

F/O. W. T. MAYSON, D.F.C., R.A.F.V.R., No. 128 Sqn.—F/O. Mayson has participated in many further operational sorties since the award of the D.F.C. including nine attacks against Berlin. He has proved himself to be a consistently efficient navigator. His keenness, courage and devotion to duty have always been most praiseworthy.

Act. Sqn. Ldr. R. FROWDE, D.F.C., R.A.F.V.R., No. 170 Sqn.—Since the award of the D.F.C., Sqn. Ldr. Frowde has completed many operational sorties. He has participated in attacks against such heavily defended targets as Cologne, Dusseldorf and Gelsenkirchen, in addition to more distant targets in Stuttgart and Ludwigshafen. He has shown himself to be a gallant and determined flight commander and captain of aircraft and has always set a magnificent example of skilful airmanship, cool courage and devotion to duty.

Act. Sqn. Ldr. P. D. HALLAM, D.F.C., R.A.F.V.R., No. 582 Sqn.—Now on his second tour of duty, Sqn. Ldr. Hallam has had over three years of operational experience, during which time he has attacked many of the most heavily defended targets in enemy territory. He has proved himself to be a skilful and determined member of aircraft crew, and his coolness and reliability in action have contributed materially to the success of many sorties.

Act. Sqn. Ldr. P. R. MELLOR, D.F.C., R.A.F.V.R., No. 635 Sqn.—As pilot and captain of aircraft this officer has completed many attacks against such heavily defended targets as Kiel, Bremen, Stettin and Hamburg. He has always pressed home his attacks with the utmost coolness and determination in the face of all enemy opposition. Sqn. Ldr. Mellor's tenacity, fortitude and fine fighting spirit have set an outstanding example to all members of his squadron.

Act. Sqn. Ldr. D. I. BENHAM, D.F.C., R.A.F.V.R., No. 41 Sqn.—In air fighting this officer has destroyed ten enemy aircraft. Since being awarded the D.F.C. he has participated in many sorties, involving harassing attacks on various targets, during which much loss has been inflicted on the enemy. Sqn. Ldr. Benham has invariably displayed a high degree of skill and courage, and has set an example worthy of the greatest praise.

Flt. Lt. J. A. HALL, D.F.C., R.A.F.V.R., No. 488 (N.Z.) Sqn.—This officer continues to show the greatest keenness and, in various sorties, has inflicted much loss on the enemy. Among his achievements is the destruction of eight enemy aircraft at night. On the last occasion, in March, 1945, Flt. Lt. Hall pressed home his successful attack from such close range that his own aircraft was badly damaged by flying debris. Nevertheless he flew back to base and landed safely. This officer has displayed high qualities of skill and courage.

## SERVICE AVIATION

Act. Sqn. Ldr. J. M. GARLICK, D.F.C., R.A.F., No. 97 Sqn. (since deceased).—Since the award of the D.F.C. Sqn. Ldr. Garlick took part in most of the recent operations against important German targets. He was a flight commander and the captain of a reliable crew, who contributed many effective sorties to the squadron's operational effort. This officer at all times displayed determination and resolution on operations.

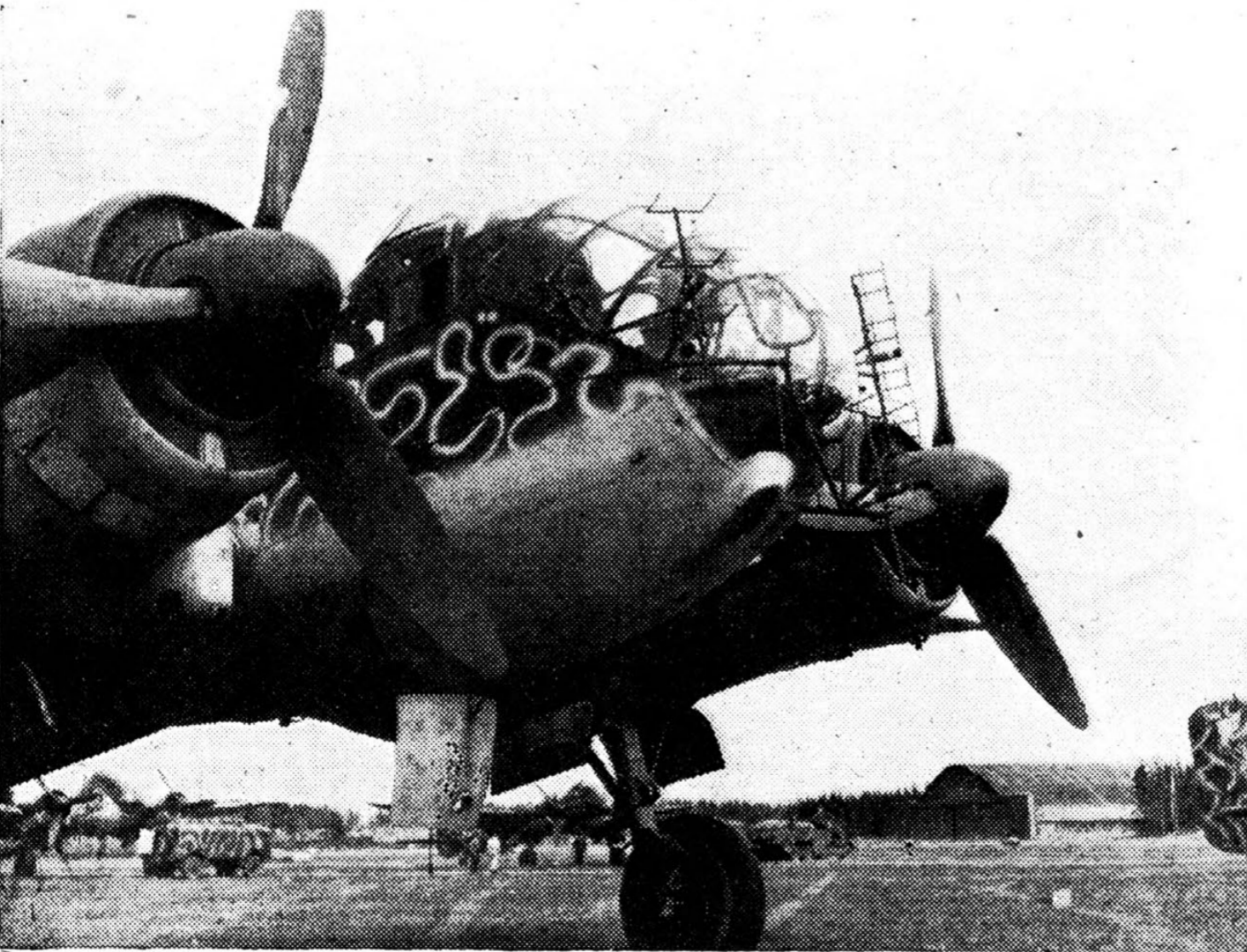
Act. Sqn. Ldr. W. C. RICHES, D.F.C., R.A.F.V.R., No. 635 Sqn. (since deceased).—Since the award of the D.F.C. this officer completed many operational sorties against some of the most heavily defended targets in Germany. An outstanding pilot, his consistent determination, fortitude and devotion to duty won the admiration of all members of his squadron.

Act. Wing Cdr. R. G. N. PRYOR, D.F.C., R.A.F.V.R., No. 148 Sqn.—Since the award of the D.F.C. Sqn. Ldr. Pryor has completed numerous operational sorties. The majority of these operations have involved long flights over heavily defended areas. On one occasion the starboard engine of his aircraft caught fire while over Southern Germany. The fire was eventually brought under control, and this officer flew safely back to base with only three engines serviceable. At all times he has displayed outstanding keenness, determination and devotion to duty.

Act. Sqn. Ldr. T. C. McNAMARA, D.F.C., R.A.F.V.R., No. 178 Sqn.—Since the award of the D.F.C. this officer has taken part in numerous attacks on heavily defended targets. As a flight commander, his courage and determination in the face of the enemy have set an inspiring example to the other members of his flight. Two of the missions on which he achieved particular success were in November, 1944, when he completed a telling daylight attack on the heavily defended railway sidings at Sarajevo, and in February, 1945, when he attacked the ammunition dump at Pola. On this later occasion Sqn. Ldr. McNamara's aircraft was damaged by fire from the enemy's defences.

Flt. Lt. G. S. JOHNSON (since deceased), D.F.C., R.A.F., No. 97 Sqn.—During his second tour of operational duty, this officer completed many outstanding sorties. In September, 1944, he took part in a very successful attack on Bremerhaven. On another occasion, this officer completed two hazardous sorties, requiring a very high standard of map reading over difficult country within a very short period. On both missions, excellent photographic results were obtained. Throughout his operational career Flt. Lt. Johnson showed exceptional ability and courage.

Act. F/O. P. H. MARTIN, D.F.C., R.A.A.F., No. 61 Sqn.—F/O. Martin has taken part in a large number of operational sorties. He has attacked such heavily defended targets as Brunswick, Stuttgart, Stettin and Gelsenkirchen and has flown in support of our ground forces in France. He is a most skilful and determined pilot who has never let either adverse weather or enemy opposition deter him from completing his mission. At all times this officer has displayed fine leadership, courage and unflinching devotion to duty.



**GERMAN RADAR:** The array of radar aerials on the nose of this Ju 188 is interesting in light of the continued requests we received from the censor asking us not to mention radar on aircraft in case the enemy had not thought of it.

F/O. C. E. WILKIN, D.F.C., R.A.F.V.R., No. 7 Sqn.—Since the award of the D.F.C. this officer has completed many more operational sorties. He has at all times displayed exceptional courage in the face of danger, a fine fighting spirit and unselfish devotion to duty.

Sqn. Ldr. C. J. W. TAYLOR, D.F.C., R.C.A.F., No. 407 (R.C.A.F.) Sqn.—Sqn. Ldr. Taylor is an outstanding flight commander who has participated in a large number of operational sorties. He is an excellent leader and the high standard of operational efficiency attained by his squadron is largely owing to his enthusiasm and untiring efforts. Towards the end of July, this officer was captain of an aircraft when a U-boat was sighted. As the result of his determined and well-executed attack the enemy submarine was probably sunk.

Flt. Lt. A. G. MILES, D.F.C., R.A.F.V.R., No. 608 Sqn.—Throughout a long operational career, Flt. Lt. Miles has proved himself to be a skilful and determined navigator. He has participated in many operational sorties since the award of the D.F.C. with excellent results. As squadron bombing leader, his efficiency and cheerful confidence have won the admiration of all crews in his squadron. Flt. Lt. Miles has always displayed courage and devotion to duty of the highest order.

Flt. Lt. J. D. B. V. REFFITT, D.F.C., R.A.F., No. 105 Sqn.—This officer is now engaged on his third tour of operational duty. He has completed a very large number of sorties against a wide range of important targets, including numerous attacks against vital and difficult targets in France in support of the invasion forces. At all times he has set an excellent example of navigational skill, courage and determination.

## Distinguished Flying Cross

Flt. Lt. F. G. BARLOGIE, R.A.A.F., No. 357 Sqn.  
Sqn. Ldr. R. G. KNIGHT, R.A.A.F., No. 458 Sqn.  
P/O. M. M. PATRICK, R.A.A.F., No. 156 Sqn.  
Flt. Lt. E. W. BATESON, R.A.A.F., No. 180 Sqn.  
Flt. Lt. F. R. FOGARTY, R.A.A.F., No. 180 Sqn.  
Act. Flt. Lt. M. S. FLETCHER, R.A.A.F., No. 156 Sqn.

Act. Flt. Lt. R. H. WEDD, R.A.A.F., No. 156 Sqn.  
F/O. C. C. BETTS, R.A.A.F., No. 258 Sqn.  
F/O. R. S. SMITH, R.A.A.F., No. 156 Sqn.  
P/O. W. J. ARMOUR, R.A.A.F., No. 428 (R.C.A.F.) Sqn.  
W/O. L. A. KENT, R.A.A.F., No. 460 (R.A.A.F.) Sqn.

P/O. F. W. PEARCE, R.A.F.V.R., No. 357 Sqn.  
Act. W/O. M. J. COYLE (later P/O.), R.A.F.V.R., No. 156 Sqn. (since deceased).  
Act. W/O. R. B. WARNER, R.A.F.V.R., No. 635 Sqn.

Act. Sqn. Ldr. F. S. GILBERTSON, R.C.A.F., No. 414 (R.C.A.F.) Sqn.

F/O. M. A. JONES, R.N.Z.A.F., No. 218 Sqn.  
F/O. W. L. WILSON, R.N.Z.A.F., No. 75 (N.Z.) Sqn.

P/O. W. R. MORRIS, R.N.Z.A.F., No. 75 (N.Z.) Sqn.

Flt. Lt. C. K. ARNOLD, R.C.A.F., No. 541 Sqn.  
Flt. Lt. W. G. DINSDALE, R.C.A.F., No. 410 (R.C.A.F.) Sqn.

Flt. Lt. J. H. DONOVAN, R.C.A.F., No. 414 (R.C.A.F.) Sqn.

Flt. Lt. E. G. IRELAND, R.C.A.F., No. 411 (R.C.A.F.) Sqn.

Flt. Lt. A. McK. LOTT, R.C.A.F., No. 541 Sqn.

Flt. Lt. J. R. MACELWAIN, R.C.A.F., No. 2 Sqn.

Flt. Lt. C. D. MYERS, R.C.A.F., No. 407 (R.C.A.F.) Sqn.

Flt. Lt. L. H. PARKER, R.C.A.F., No. 175 Sqn.

Flt. Lt. J. D. TAYLOR, R.C.A.F., No. 404 (R.C.A.F.) Sqn.

Flt. Lt. J. J. WINSHIP, R.C.A.F., No. 684 Sqn.

Act. Flt. Lt. R. J. DUNPHY, R.C.A.F., No. 426 (R.C.A.F.) Sqn.

F/O. J. W. BRADFORD, R.C.A.F., No. 681 Sqn.

F/O. J. E. DUNN, R.C.A.F., No. 410 (R.C.A.F.) Sqn.

F/O. W. INVERARITY, R.C.A.F., No. 35 Sqn.

F/O. W. E. SUDDICK, R.C.A.F., No. 101 Sqn.

F/O. J. E. TAYLOR, R.C.A.F., No. 226 Sqn.

P/O. C. N. MOE, R.C.A.F., No. 404 (R.C.A.F.) Sqn.

Act. Flt. Lt. H. J. HAUS, R.C.A.F., No. 601 Sqn.

Act. Flt. Lt. H. K. LEFROY, R.C.A.F., No. 405 (R.C.A.F.) Sqn.

Flt. Lt. W. R. RINGROSE, R.A.F.V.R., No. 459 (R.A.A.F.) Sqn.

Act. Flt. Lt. J. G. IRWIN, R.A.F.V.R., No. 635 Sqn. (since deceased).

F/O. A. H. BYWATER, R.A.F., No. 7 Sqn. (since deceased).

F/O. H. LOWE, R.A.F.V.R., No. 75 (N.Z.) Sqn. (since deceased).

F/O. J. WILLIAMS, R.A.F.V.R., No. 15 Sqn. (since deceased).

Act. F/O. C. ERRITT, R.A.F.V.R., No. 83 Sqn. (since deceased).

P/O. P. A. GLEESON, R.A.F.V.R., No. 83 Sqn. (since deceased).

Act. Sqn. Ldr. W. F. CLAYTON-GRAHAM, R.A.F.V.R., No. 235 Sqn.

Flt. Lt. E. M. ALLIES, R.A.F.V.R., No. 547 Sqn.

Flt. Lt. A. E. BROWN, R.A.F.V.R., No. 547 Sqn.

Flt. Lt. C. A. FOX, R.A.F.V.R., No. 143 Sqn.

Flt. Lt. G. B. C. KEY, R.A.F.V.R., No. 547 Sqn.

Flt. Lt. F. L. PROCTOR, R.A.A.F., No. 455 (R.A.A.F.) Sqn.

Flt. Lt. R. S. TURNER, R.A.F.V.R., No. 235 Sqn.

F/O. H. H. BLAMPY, R.N.Z.A.F., No. 489 (N.Z.) Sqn.

F/O. J. McC. COYNE, R.C.A.F., No. 404 (R.C.A.F.) Sqn.

F/O. H. P. FLYNN, R.C.A.F., No. 404 (R.C.A.F.) Sqn.

F/O. H. W. PEARSON, R.A.A.F., No. 455 (R.A.A.F.) Sqn.

F/O. R. W. RIDLER, R.A.F.V.R., No. 547 Sqn.

P/O. A. R. MANSFIELD, R.A.F.V.R., No. 143 Sqn.

F/O. M. FREEMAN, R.A.F.V.R., No. 241 Sqn.

F/O. A. T. C. WILMOT-DEAR, R.A.F.V.R., No. 58 Sqn.

F/O. V. G. WATLING, R.A.F.V.R., No. 58 Sqn.

Lt. D. G. DENT, S.A.A.F., No. 12 (S.A.A.F.) Sqn.

Act. F/O. F. F. WRIGHT, R.C.A.F., No. 100 Sqn.

Act. Sqn. Ldr. B. W. TAYLOR, R.A.F.V.R., No. 37 Sqn.

Flt. Lt. J. A. GRAY, R.A.F.V.R.

Act. Flt. Lt. I. D. BOLTON, R.A.F.V.R., No. 50 Sqn.

Act. Flt. Lt. J. PERFECT, R.A.F.V.R., No. 7 Sqn. (since deceased).

Act. Flt. Lt. A. V. RIPPENGAL, D.F.M., R.A.F.V.R., No. 40 Sqn.

Act. Flt. Lt. R. M. SMALLLEY, R.A.F., No. 83 Sqn.

Act. Flt. Lt. R. F. SOMERVILLE, D.F.M., R.A.F., No. 18 Sqn.

F/O. G. F. COLLIER, R.A.F.V.R., No. 55 Sqn.

F/O. E. DOUGLAS, R.A.F.V.R., No. 500 Sqn.

F/O. A. E. W. GARDNER, R.A.F.V.R., No. 57 Sqn. (since deceased).

F/O. K. HERMISTON, R.A.F.V.R., No. 682 Sqn.

F/O. W. F. JOHN, R.A.F.V.R. (since deceased).

F/O. D. E. A. LANDER, R.A.F.V.R., No. 35 Sqn.

F/O. E. WILSON, R.A.F.V.R., No. 70 Sqn.

Flt. Lt. W. T. G. GABRIEL, R.A.F.V.R., No. 9 Sqn.

Act. Flt. Lt. L. E. COULTER, R.C.A.F., No. 434 (R.C.A.F.) Sqn.

Act. Flt. Lt. F. L. HOWELLS, R.A.A.F., No. 463 (R.A.A.F.) Sqn.

Act. Flt. Lt. L. E. MARSH, R.A.F.V.R., No. 9 Sqn.

Act. Sqn. Ldr. K. G. HUBBARD, R.A.F.V.R., No. 70 Sqn.

Act. Sqn. Ldr. T. B. MARSHALL, R.A.F.V.R., No. 39 Sqn.

Act. Sqn. Ldr. R. L. J. FITCH, R.A.F.O., No. 143 Sqn.

F/O. E. L. PARKER, R.A.F.V.R., No. 143 Sqn.

Flt. Lt. W. S. BIGGAR, R.A.F.V.R., No. 502 Sqn.

Flt. Lt. J. R. HUTCHISON, R.A.F.V.R., No. 502 Sqn.

F/O. J. A. O'REILLY, R.A.F.V.R., No. 502 Sqn.

Flt. Lt. J. MACFADYEN, R.A.F.V.R., No. 58 Sqn.

Flt. Lt. W. LEACH, R.A.A.F., No. 502 Sqn.

F/O. J. A. WHITE, R.C.A.F., No. 159 Sqn.

W/O. C. R. LAWRENCE, R.A.F.V.R., No. 62 Sqn.

W/O. E. J. WOODIWISS, R.A.F., No. 194 Sqn.

Sqn. Ldr. E. F. PUBLICOVER, R.C.A.F., No. 547 Sqn.

W/O. B. J. BARLOW, R.A.F.V.R., No. 143 Sqn.

Flt. Lt. H. E. DUNFORD, R.A.F.V.R., No. 608 Sqn.

Flt. Lt. O. H. E. JONES, R.A.F.V.R., No. 601 Sqn.

Flt. Lt. F. A. HADEN, A.F.C., R.A.F.V.R., No. 162 Sqn.

Flt. Lt. H. G. PATTISON, R.A.F.V.R., No. 182 Sqn.

F/O. F. H. EDWARDS, R.A.F.V.R., No. 150 Sqn.