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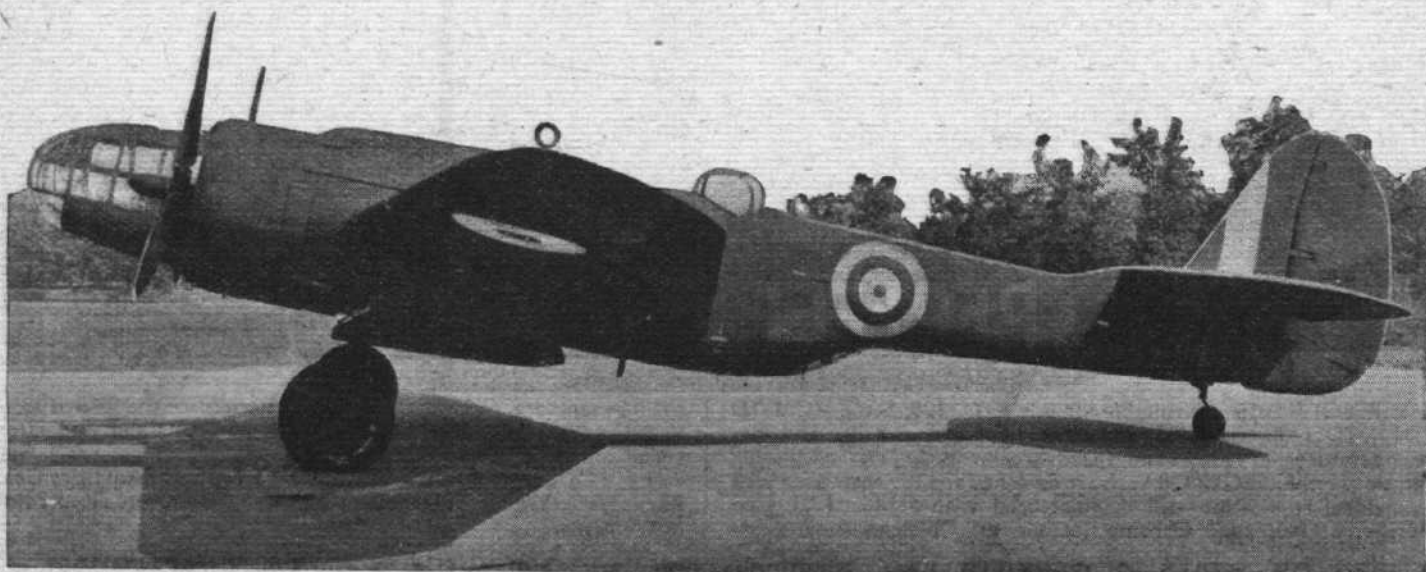
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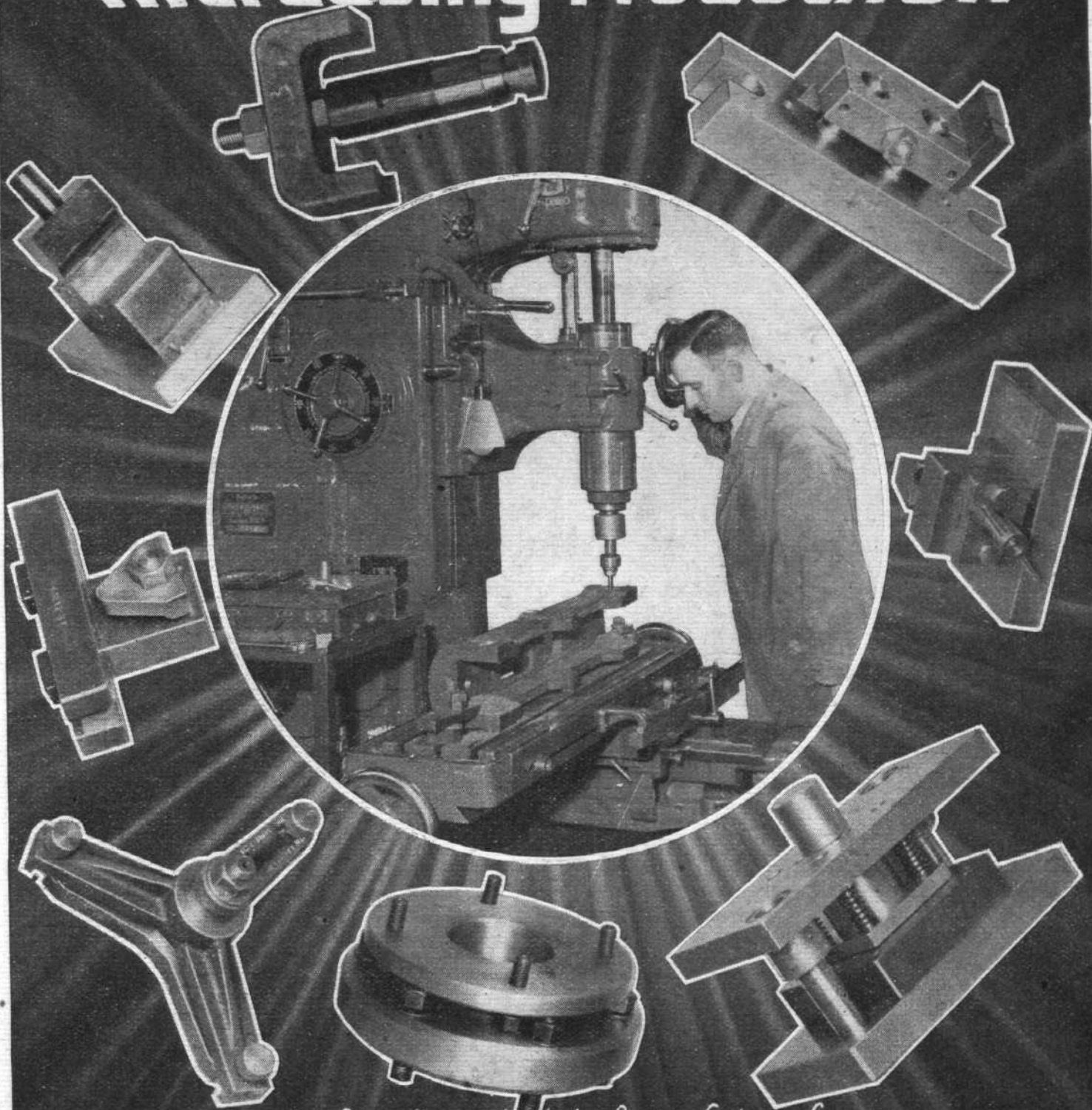


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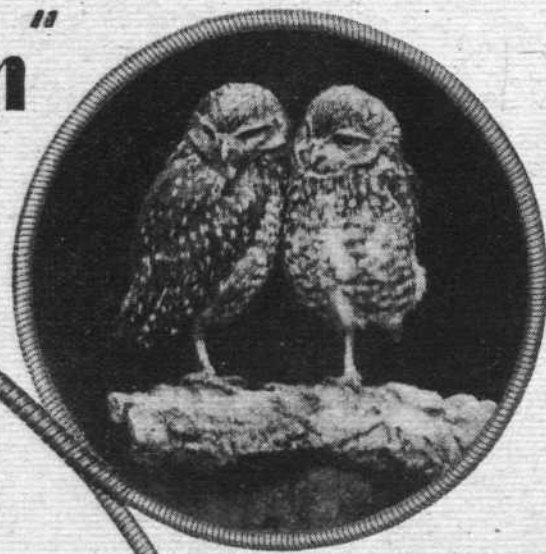
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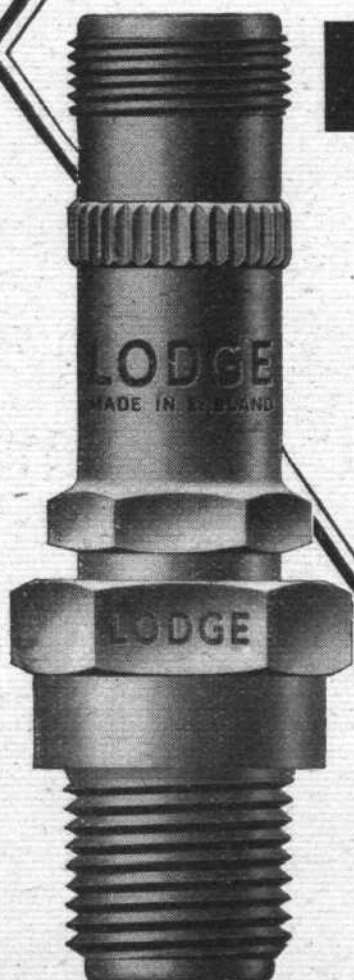
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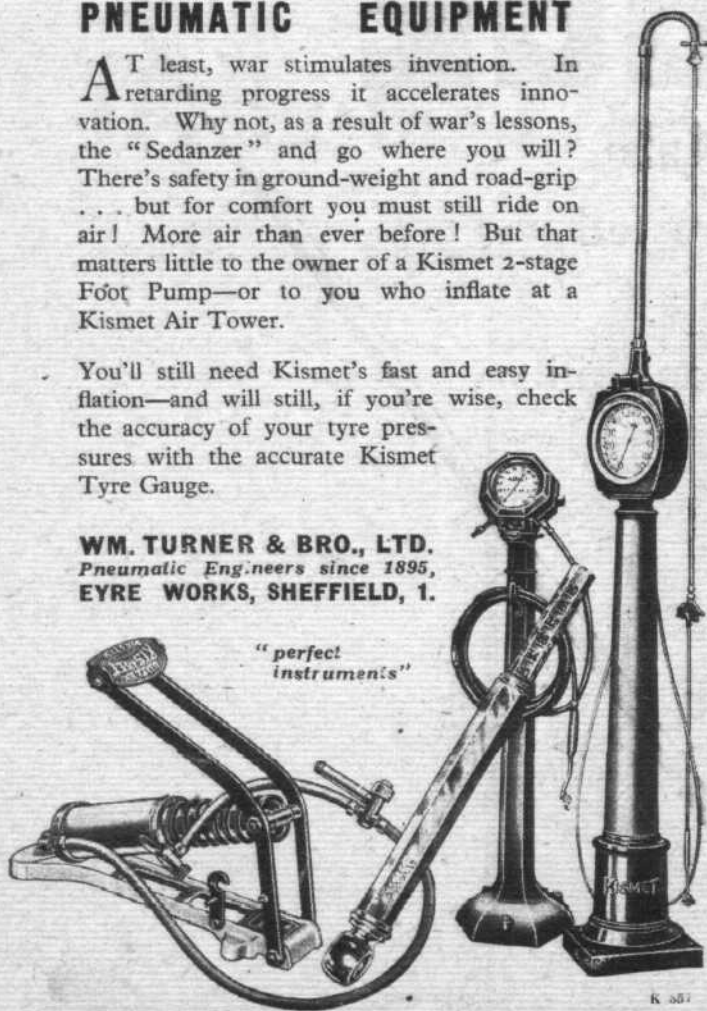
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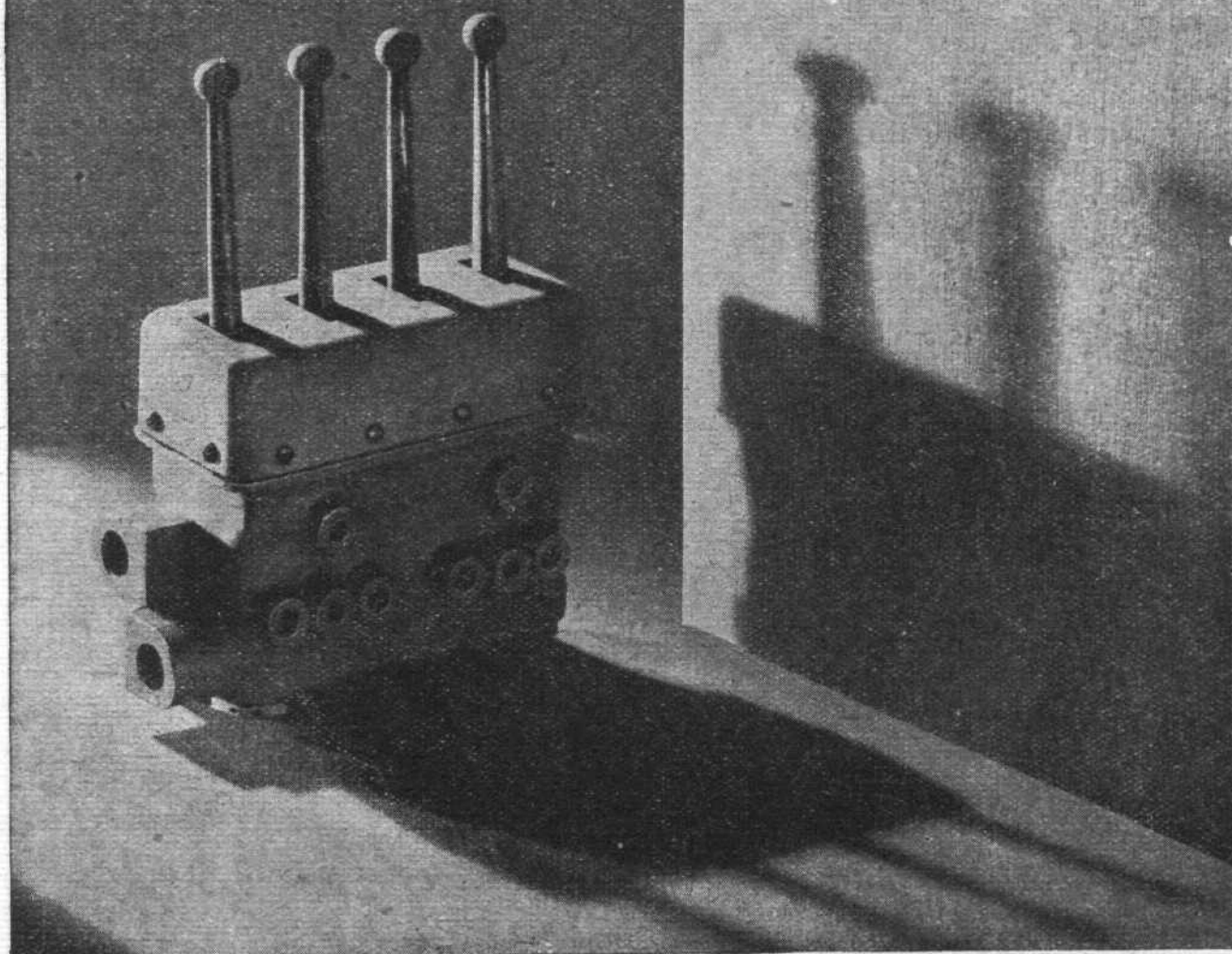
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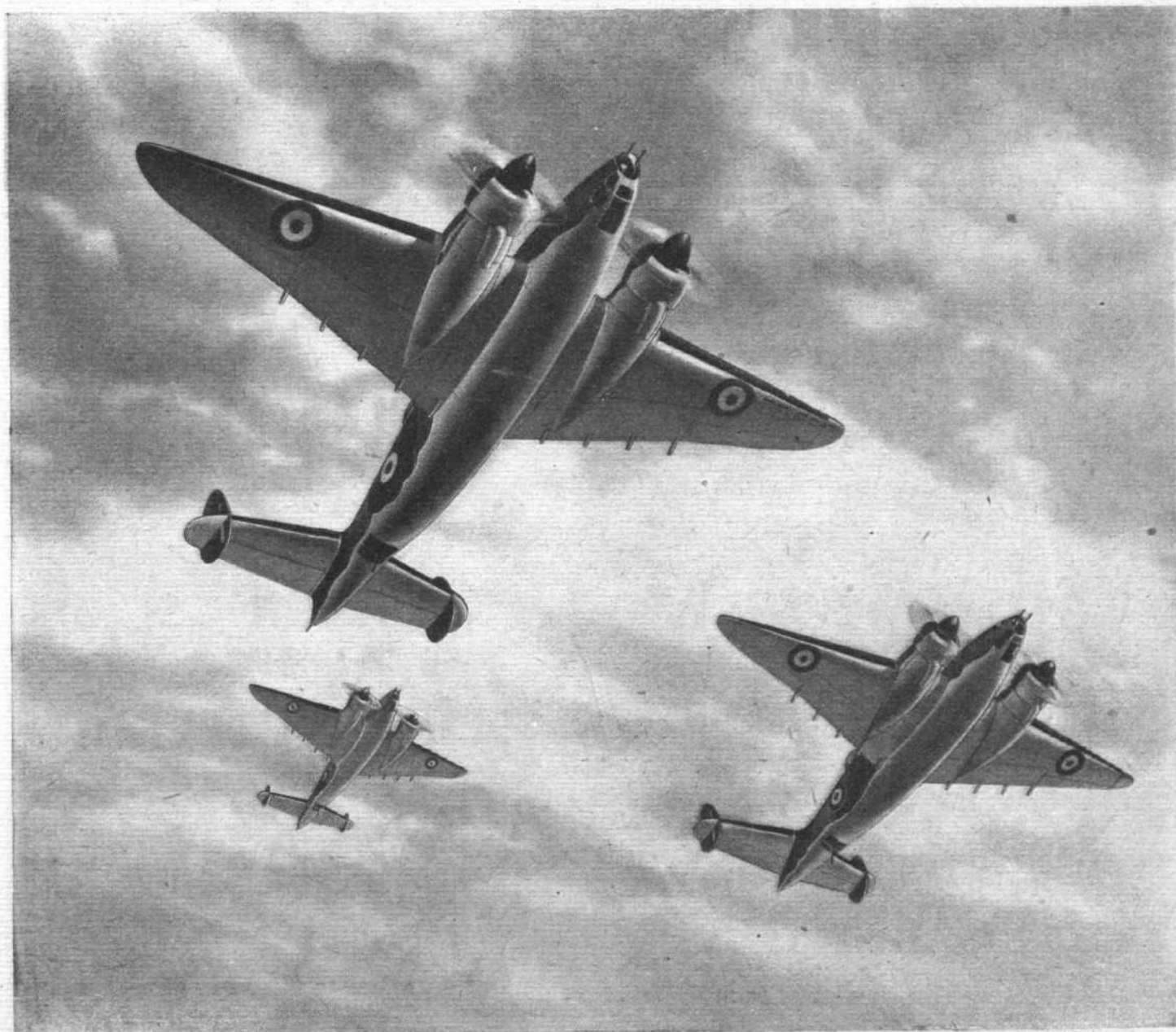
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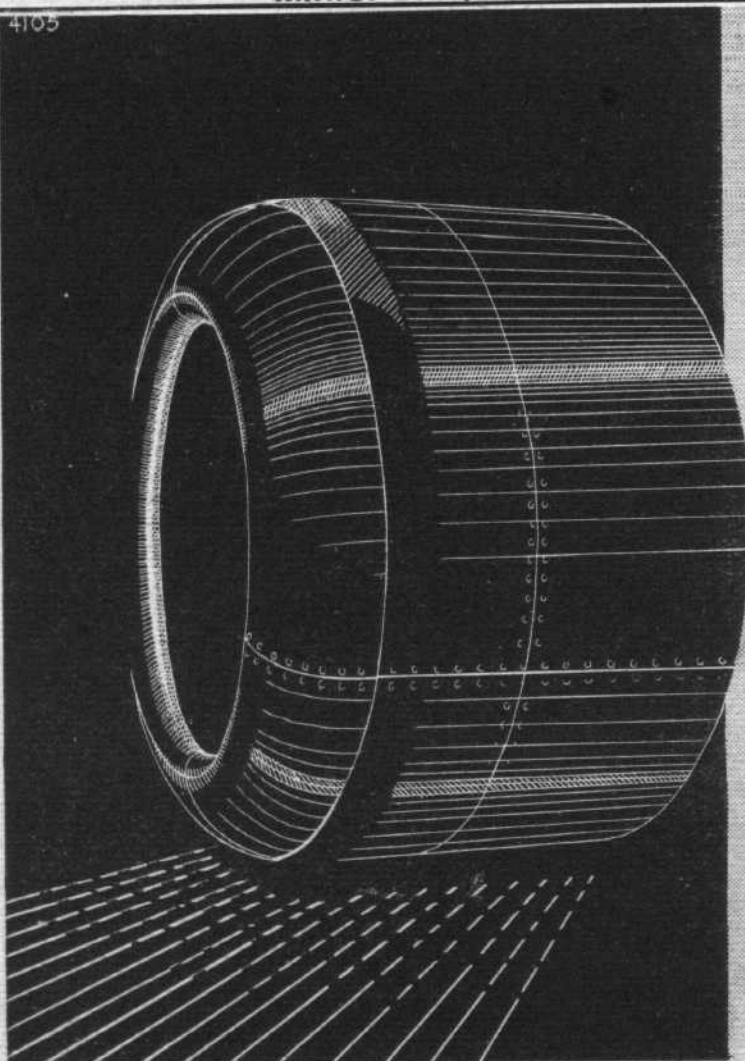
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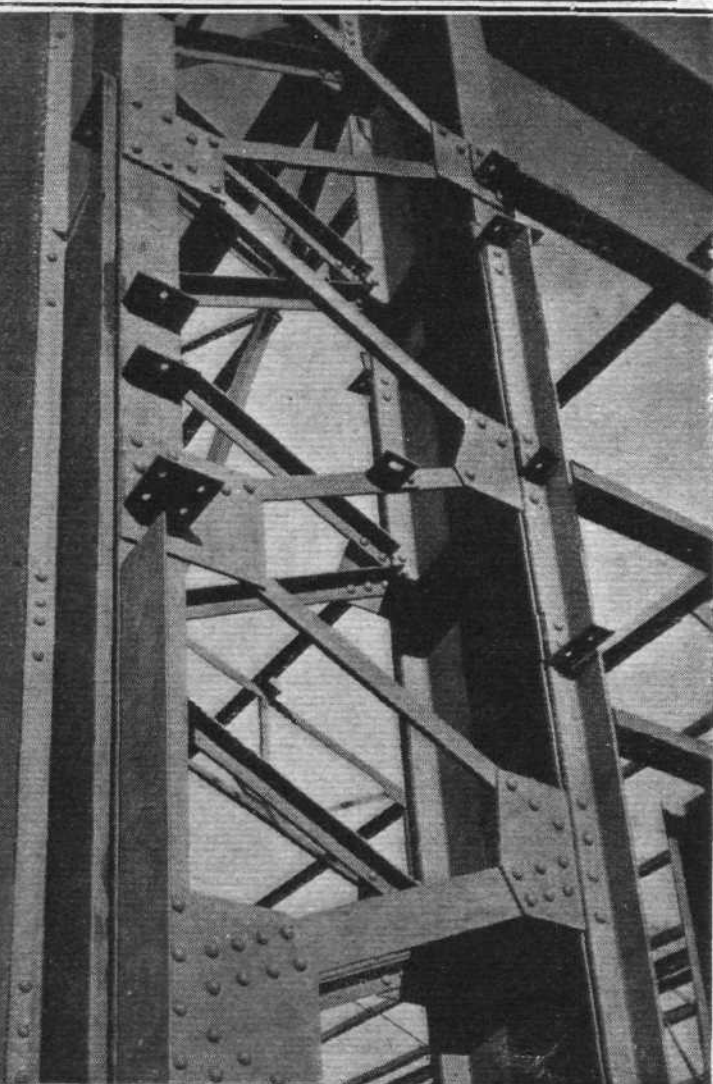
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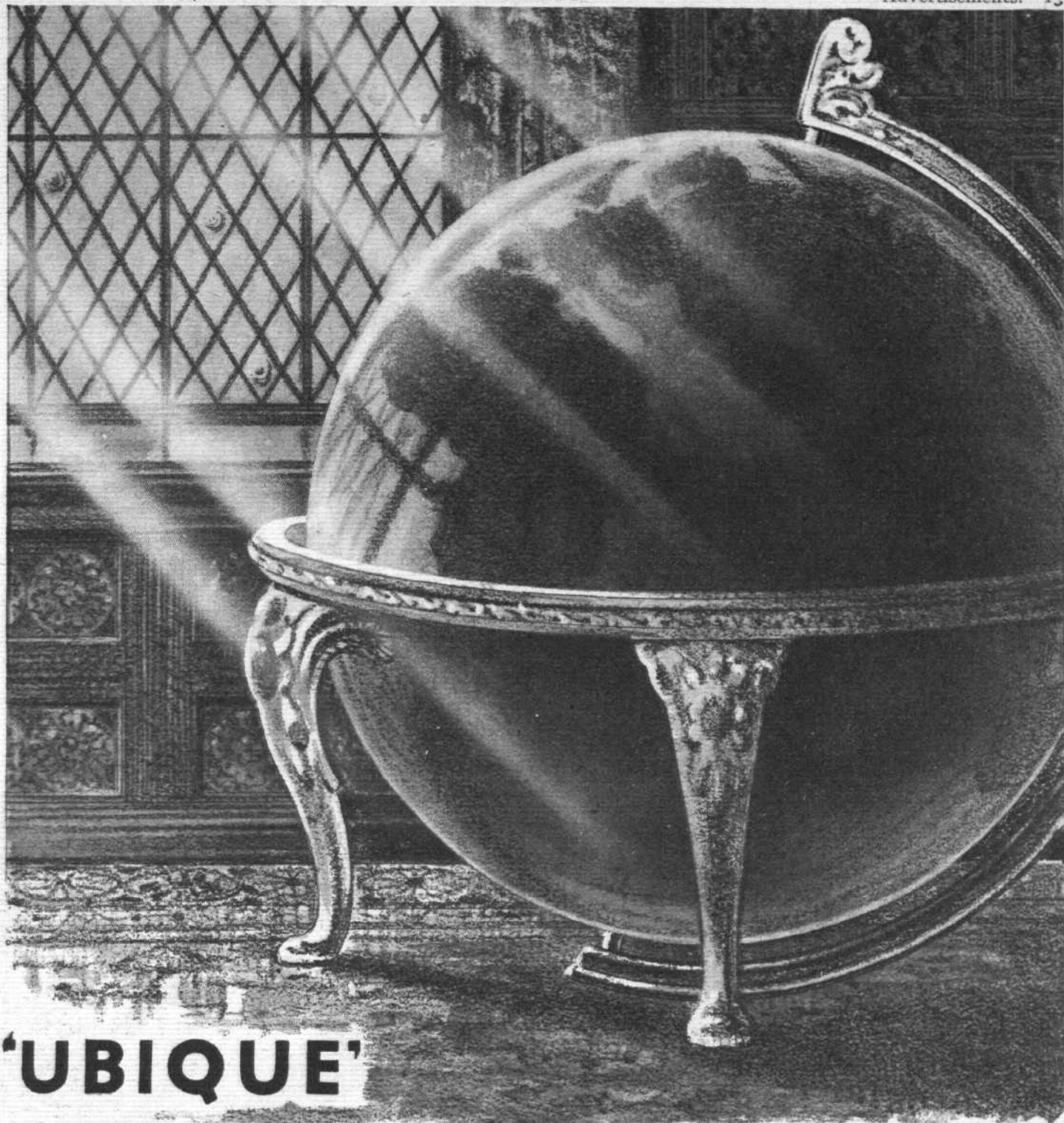
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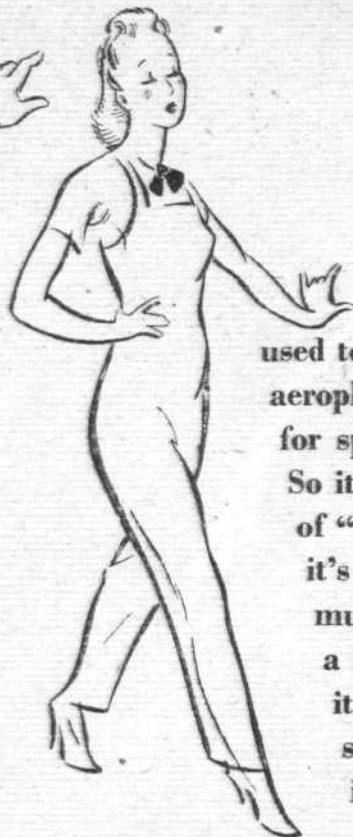
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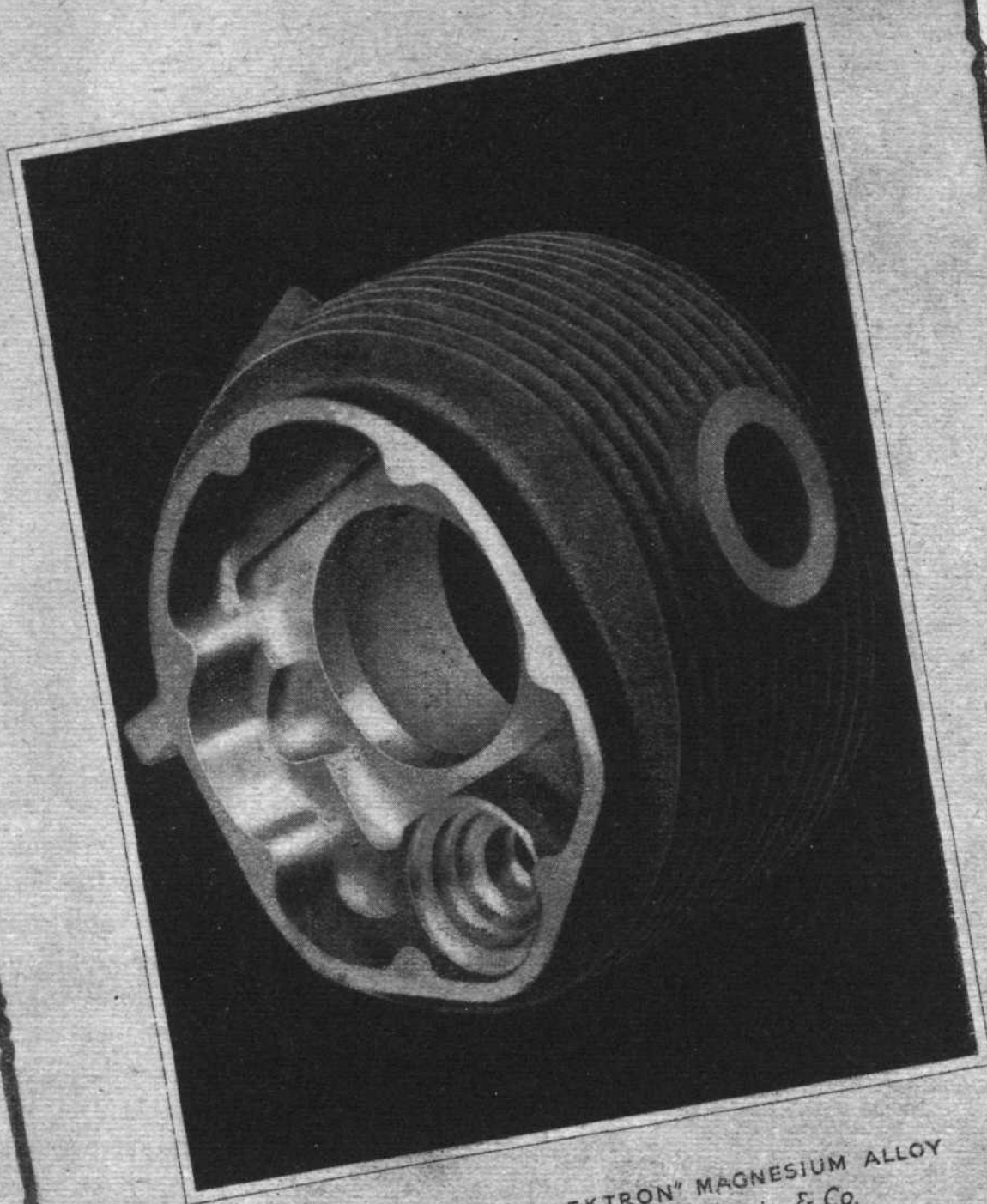
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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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No 1721. Vol. XL.

DECEMBER 18th, 1941.

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The Outlook

Japan's Aircraft Carriers

THE proper way to use aircraft carriers is to send them across the wide oceans. That is a principle recognised by British naval authorities who have studied the subject, but circumstances have not always allowed us to stick to that principle in the present war. We have been obliged to use our carriers at times in comparatively narrow seas, accepting a risk of which we were well aware. In consequence, we have lost H.M.S. *Courageous* and *Ark Royal* (the case of H.M.S. *Glorious* was not quite the same), and have had H.M.S. *Illustrious* damaged and put out of action for a considerable time.

The Japanese, in their surprise attack on the United States and Britain, have dispersed their carriers all over the Pacific Ocean in a way which seems audacious, but was probably, in fact, the wisest thing which they could do. Simultaneously they used aircraft to strike at the Philippines, Hawaii, and the smaller American islands in the Pacific, while their reconnaissance machines are reported to have flown over parts of California. The air attacks on Malaya and the British Far East Fleet off Singapore were doubtless made by shore-based aircraft from Indo-China. Some of these distances are surprising. The Philippines are quite close to the Japanese base at Formosa, as distance is reckoned nowadays (roughly 500 miles, which is within the range of shore-based bombers), but Hawaii is some 3,445 miles distant from Tokyo, and San Francisco is over 2,000 miles farther off.

These attacks were sallies, and, regrettably, they caught the Americans unprepared, but it remains to be

seen whether they can be repeated. It is hardly credible that the U.S. Pacific Fleet has been deprived of a large part of its strength, nor is it likely to be caught napping a second time. The Japanese carriers with their escorts may be able to regain their bases, but whether they will be able to venture so far afield again is another matter.

The Californian Coast

PRESIDENT ROOSEVELT has warned the people of the United States that they must be prepared to hear that the islands of Guam, Wake and Midway have been seized by the Japanese. Much may depend on the use which they may be able to make of these islands. A fleet cannot operate without bases, and the United States Navy found these islands useful. Midway Island lies to the north-west of the Hawaiian group, but, of course, is not in the same category as Pearl Harbour as a naval base.

If, by repeating the tactics of long-range sallies by carriers, or by the use of any of these islands as advanced bases for the carriers, Japanese aircraft are able to continue flights over California, they may be able to cause some interference with American aircraft production. Hitherto, that State has been regarded as very far from the world war, and eminently safe. The factories of the Boeing, Consolidated, and other firms are situated along that coast, and they have been able to work in the open in the fine climate, and to carry on shifts by night with no thoughts of a black-out. If they now have to take precautions of that sort, production must be slowed down.

The danger to the factories need not be very serious. One cannot conceive ship-borne bombers constituting a threat in any way comparable to the threat to London, Coventry, etc., by land-based bombers starting from France. The Americans have their own defence organisation of fighters, A.A. guns, radiolocation, and the rest, and against suitable protection the Japanese airmen are not likely to be more efficient than the Germans in their attacks on industrial targets. The need for blacking-out would probably be the greatest brake on the rate of production, but that might be a nuisance.

The Aircraft Torpedo Again

FULL reports about the sinking of H.M.S. *Prince of Wales* and *Repulse* have not yet been received, but a few salient facts have emerged. Clearly the British Fleet had no carrier with it, and therefore received no protection from fighter aircraft. Within an hour of the news reaching an airfield in Malaya, 160 miles away, shore-based fighters arrived over the scene, but were too late to do any good. The Admiral had relied on the protection of the clouds, but the clouds failed him.

The outstanding fact (and this seems to be definitely established) is that the two capital ships were sunk by torpedoes discharged by aircraft. The preliminary bombing attack from a high altitude did no fatal damage, for only a few, apparently very few, bombs scored hits. This may, however, have caused all the A.A. guns on the Fleet to be pointed upwards. Then came the attack by the torpedo-carrying aircraft. There were three

waves, said Mr. Churchill, each consisting of nine machines, and several torpedoes scored hits on each ship. Seven attacking aircraft were destroyed.

The air-borne torpedo is a weapon which has made good in the present war, but this sinking of two British capital ships is the greatest success which it has had. Previous to this encounter, the only capital ship which we can remember to have been certainly sunk by aircraft torpedoes is an Italian battleship of the *Conte di Cavour* class in Taranto harbour. Two other battleships and two cruisers were hit in that action but not certainly sunk. The *Bismarck* was slowed up by hits from air-borne torpedoes, was then attacked by gunfire, and was finally sunk by heavy torpedoes from H.M.S. *Dorsetshire*.

The air-borne torpedo has been an invaluable weapon to the British Navy, but up to the time of this engagement off Malaya it has been reckoned a delaying rather than a destroying weapon, and therefore in a different category from the torpedo used by surface warships and submarines. Even the latter does not always sink a capital ship, for H.M.S. *Nelson* recently survived a hit by a torpedo which is understood to have been discharged by a ship, not by an aircraft. It has remained for the Japanese to exploit the air torpedo to the full (they have always shone as imitators) and, used in numbers, it has certainly shown itself to be more deadly than either the precision-bomber or the dive-bomber in onslaughts against moving warships. It remains to be seen what riposte the British Swordfish will make against the ships of Nippon.



OFF ON PATROL. A Fairey Albacore taking off from H.M.S. *Victorious*. Ahead is the battleship *King George V*, a sister ship of the ill-fated *Prince of Wales*.

War in the Air



AMERICA AT WAR: The Stars and Stripes flying over the 2nd U.S.A. Eagle squadron of Fighter Command. Will the pilots now return to their own air services?

The Loss of British Capital Ships : U.S. Bombers Sink a Japanese Battleship : Russian Air Superiority

WHILE Japan's sudden attack on the United States and Britain almost monopolises the attention of the public, it seems best in this summary to consider other

fronts first, as further news of the use made of Japanese aircraft may be received before we go to press.

The news from Russia inclines one towards optimism, and one feels inclined to ask whether the tide has not actually begun to turn. In the last war the Russian armies were always on the offensive up to the treaty of Brest Litovsk, and in this war they have hitherto been entirely on the defensive. The conditions of the two wars are very different, for in 1914-16 there was a land front in France, and now there is nothing of the sort. Whatever damage the offensive of Bomber Command may be doing to German production, it does not hold large German armies in the West. So the Russians have been continually on the defensive, falling back stubbornly, and

counter-attacking as they went. But now Marshal Timoshenko has really got the initiative in the south, which is probably the most important part of the front strategically, while round Leningrad and opposite Moscow the Germans have given up promising their people early successes. It is claimed that the Russians now have obtained air superiority, especially on the Moscow front, and speculations are rife as to whether the Germans have withdrawn part of the *Luftwaffe* for use elsewhere.

They certainly need more air strength in Libya, but to make effective use of bombers there it will first be necessary for them to gain mastery with their fighters. There seems little prospect of their being able to do that. The daylight sweeps by Fighter Command force them to hold a large proportion of their best fighters in France, and the Russian front could not be seriously weakened in fighters for fear of allowing the Red Air Force a very free hand in bombing the half-frozen German troops. In fact, the *Luftwaffe* is now stretched to somewhere near its limit, while in fighters the Empire seems now to be in a very fairly happy position. We certainly need more bombers, but our strength in that respect is steadily increasing.

It is not easy to make out the tactics of the long-drawn-out battle in Libya, but it is clear that the tactics of the Empire air forces are reconnaissance and attack on supplies rather than

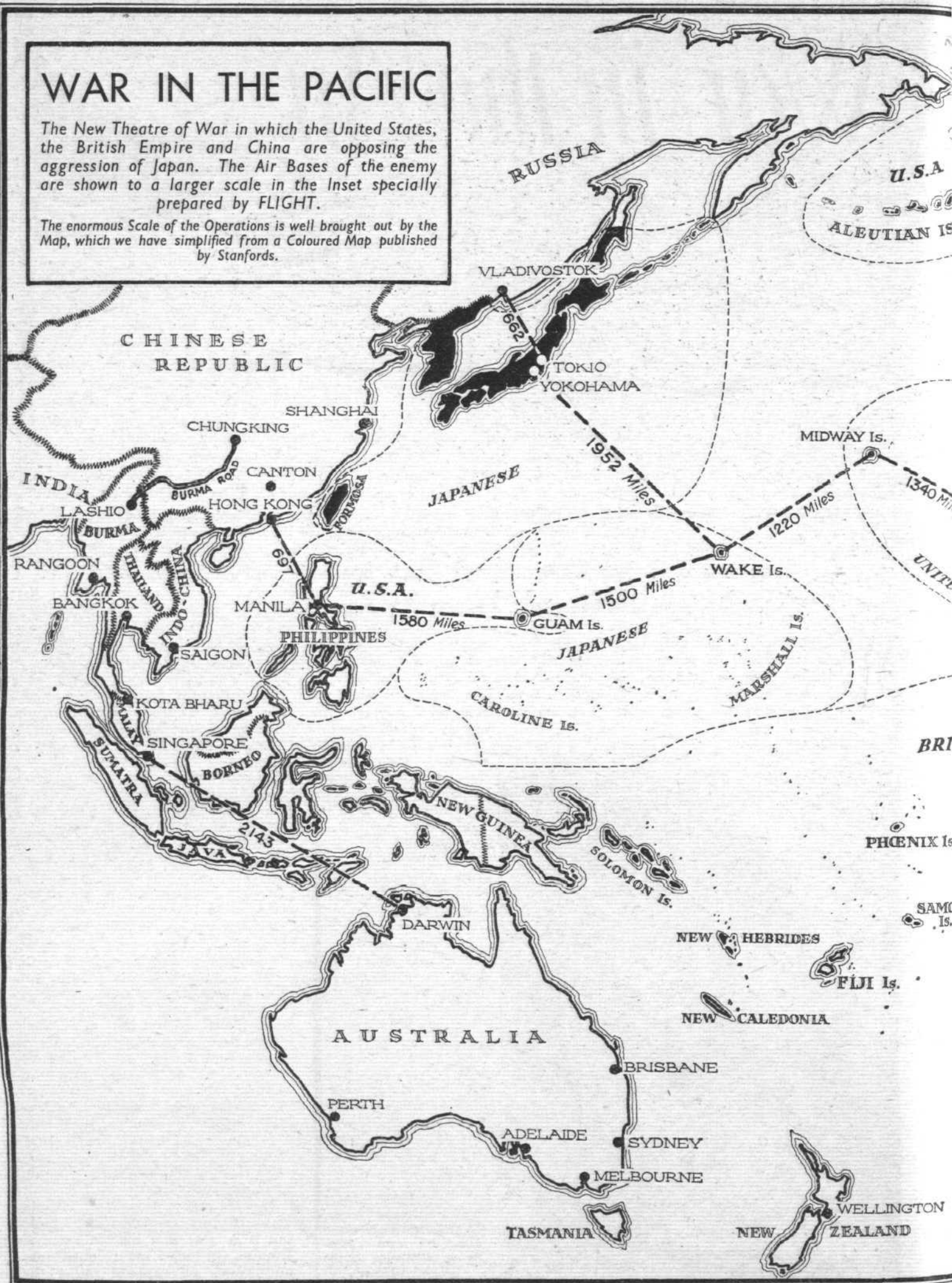


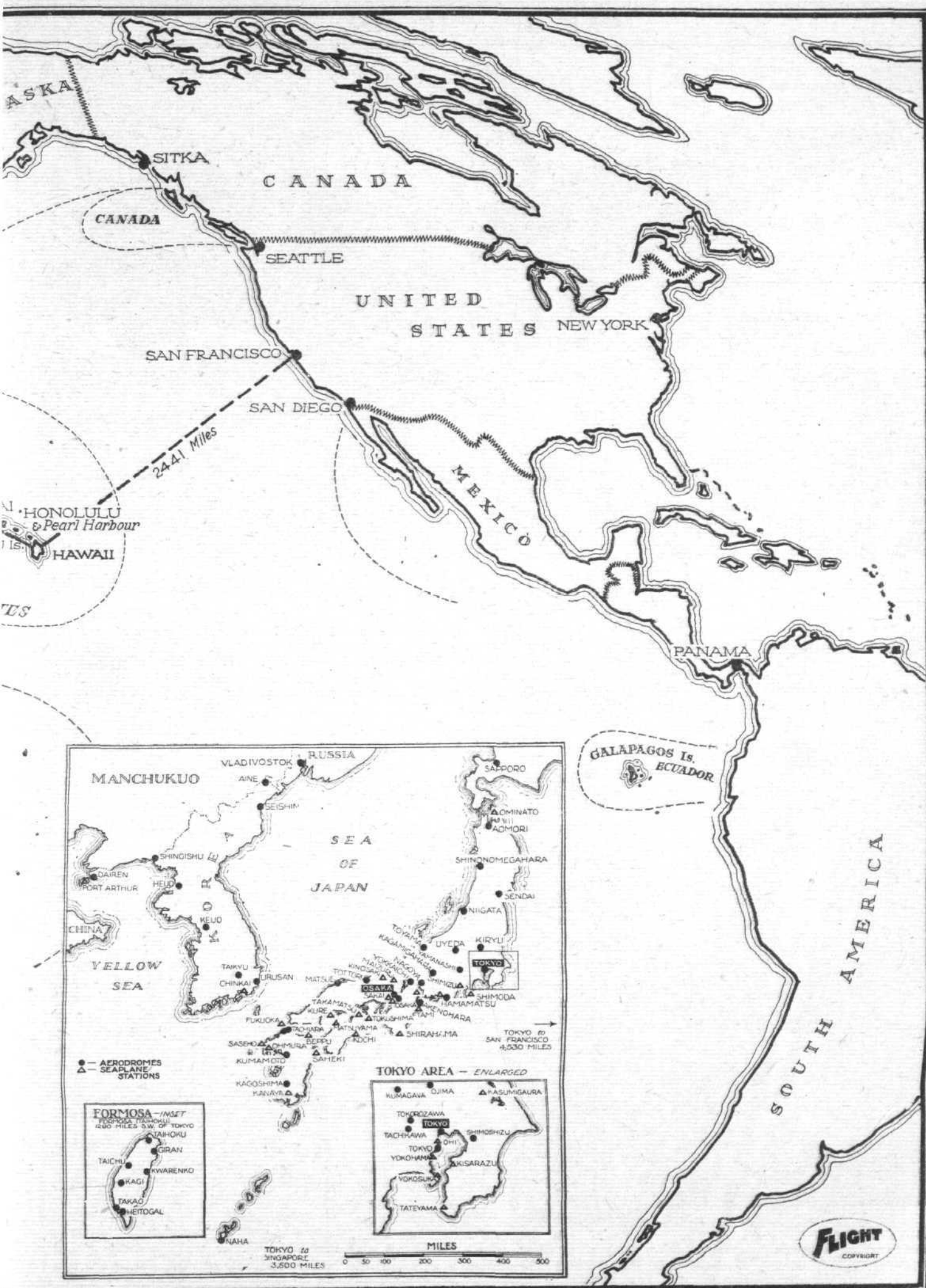
ON THE HOMS ROAD : A fuel tanker and trailer on fire after receiving a direct hit from a low-flying Blenheim in the Western Desert.

WAR IN THE PACIFIC

The New Theatre of War in which the United States, the British Empire and China are opposing the aggression of Japan. The Air Bases of the enemy are shown to a larger scale in the Inset specially prepared by FLIGHT.

The enormous Scale of the Operations is well brought out by the Map, which we have simplified from a Coloured Map published by Stanfords.





WAR IN THE AIR

| BRITISH AIR LOSSES TO DEC. 13th. | | | | | |
|---|-----------|----------------|-------|--------|-------------|
| | Over G.B. | Over Continent | | | Middle East |
| | A'cft. | B'hrs. | Ftrs. | Pilots | A'cft. |
| Dec. 7 | 0 | 4 | 1 | 1 | 8 |
| " 8 | 0 | 0 | 10 | 10 | 3 |
| " 9 | 0 | 1 | 0 | 0 | 11 |
| " 10 | 0 | 0 | 0 | 0 | 3 |
| " 11 | 0 | 3 | 0 | 0 | 11 |
| " 12 | 0 | 2 | 1 | 1 | } 16 |
| " 13 | 0 | 0 | 0 | 0 | |
| | 0 | 10 | 12 | 12 | 52 |
| Totals : North, 3,079 ; Middle East, about 632. | | | | | |

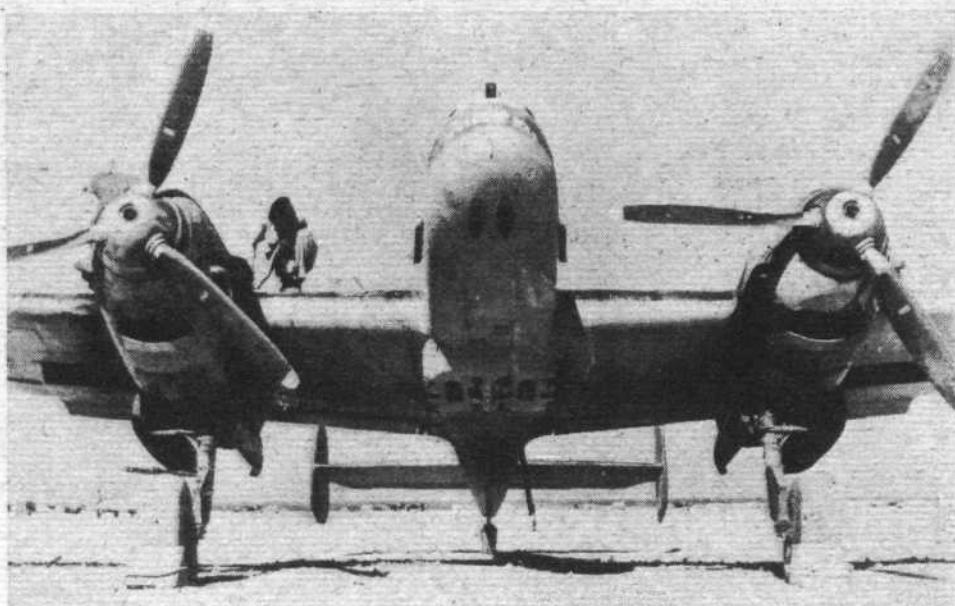
intervention in the actual fighting on the ground. This attack on communications seems to have been effective. The Libyan battle has lasted longer than had been expected and hoped, and the cause may have been partly the over-strain from which Gen. Cunningham was suffering after a long period of great responsibilities and brilliant successes. He has been given sick leave, and General Auchinleck has placed Major Gen. N. M. Ritchie in command of the 8th Army. All authorities have agreed that the air support given to our ground forces in this battle has been beyond all praise, and that the co-operation has exceeded that which exists in the German armies.

The Spreading of the War

THE entry of Japan into the war has been followed by a declaration of war by Germany and Italy on



ANTI-STORMOVIK : Barrage balloons are flown over German supply columns in Russia to defeat the attention of Stormovik dive-bombers.



THE BELLE OF BERLIN : A Messerschmitt Me 110 captured in the Middle East and given R.A.F. markings. The cannon chutes and external bomb racks can be clearly seen.

the United States, and the issue is now clear cut. The Japanese carriers struck far and wide at American and British bases without declaring war, and their bombers and torpedo-aircraft did much damage to the U.S. warships at Manila and Hawaii, sinking the old battleship *Oklahoma*. In the China Sea, as all the world now knows, their torpedo-aircraft sank H.M.S. *Prince of Wales* and *Repulse*. One cause of this was the seizure by Japanese troops of our airfields in northern Malaya. Japanese air raids have taken place on the American islands and on Penang and Hong Kong. Japanese reconnaissance aircraft have appeared over California.

Allied Successes

ON the other side of the picture, American Army bombers have certainly sunk one old Japanese battleship, the *Haruna*, and are believed to have set a second on fire. The R.A.F. has struck back at the Japanese forces in Malaya, and it has been announced that Empire air reinforcements are on their way to that theatre of war. Naval and air forces from the Netherlands East Indies promptly arrived in that area of conflict, and Dutch submarines speedily proceeded to sink a very useful number of Japanese troop transports, with heavy loss to the enemy of military personnel.

A brilliant action has taken place in the Mediterranean. A British aircraft on patrol spotted an enemy convoy steaming southwards somewhere near the island of Pantellaria, and summoned naval forces to deal with it. Three British destroyers and one Dutch destroyer made for the

area and engaged the enemy before dawn with guns and torpedoes. One Italian cruiser and an E-boat were sunk, and the second cruiser was left on fire and blazing fiercely. An enemy destroyer was also hit and damaged—not one enemy vessel emerging scatheless from the action. Our losses were nil.

The Japanese strategy has become clear from the preliminary actions. They are using combined air and sea power in an attempt to dominate the A.B.C.D. Powers. While their carriers have appeared in many quarters of the Pacific Ocean, they have shown that they are well aware of the superior power of land-based aircraft wherever it is possible to use them. Thus they have endeavoured to neutralise our air bases in Malaya and to establish their own, trusting that their bombers will open the way for ground advances, for checking British naval power, and for closing the Burma road. They have, however, attacked Malaya in the season of the North East Monsoon, which is the least favourable period for warlike operations there. Obviously Germany and Italy have urged them not to wait for a more favourable time.

| ENEMY AIR LOSSES TO DEC. 13th. | | | |
|--|-----------|-------------------|-------------|
| | Over G.B. | Over Continent | Middle East |
| Dec. 7 | 0 | 1 | 6 |
| " 8 | 1 | 5 | 8 |
| " 9 | 1 | 0 | 7 |
| " 10 | 0 | 0 | 0 |
| " 11 | 0 | 0 | 15 |
| " 12 | 0 | 0 | } 20 |
| " 13 | 0 | 0 | |
| | 2 | 6 | 56 |
| Totals : North, 5,580; Middle East, over 2,426. | | | |



This three-quarter front view of the *St. Louis* gives a good idea of the large but beautifully streamlined fuselage and the long chord cowlings of the 18 cyl. double row Cyclone engines.

CURTISS-WRIGHT ST. LOUIS

World's Largest Twin-engined Land Plane to be Operated by British Overseas Airways

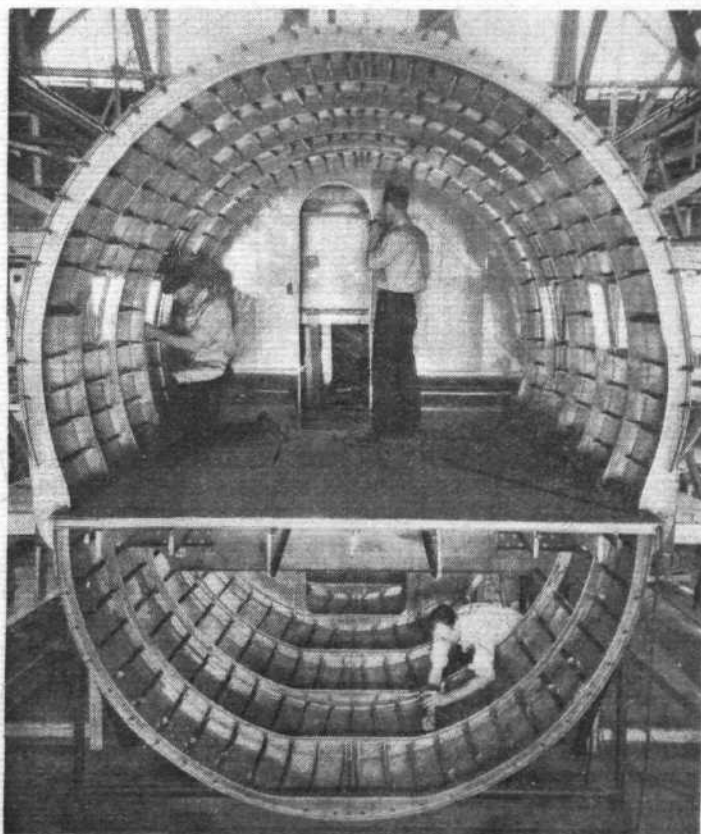
BUILT by the Curtiss-Wright Co. about a year ago as an experimental stratosphere aircraft with pressure cabin, the C.W.20, *St. Louis*, which was bought by the British Government and handed over to British Overseas Airways, arrived recently at a West Country airport after flying the Atlantic—a journey which was completed without incident.

This aircraft, the largest twin-engined landplane ever built, has undergone certain interior modifications to make it suitable for passenger-carrying duties since it was acquired by B.O.A. Chief among these is the removal of the radio equipment from the main cabin and its compact but convenient installation in the small compartment immediately behind the pilot's cockpit.

At the rear end of the 75ft. long fuselage a well-appointed buffet, a lavatory and toilet accommodation have been fitted, and it is a tribute to the skill of the B.O.A. experimental factory that this work has been done in such a way as to give every appearance of being part of the original layout rather than a subsequent modification. Mr. R. E. Leete and his staff responsible for the planning and execution of the work are certainly to be congratulated.

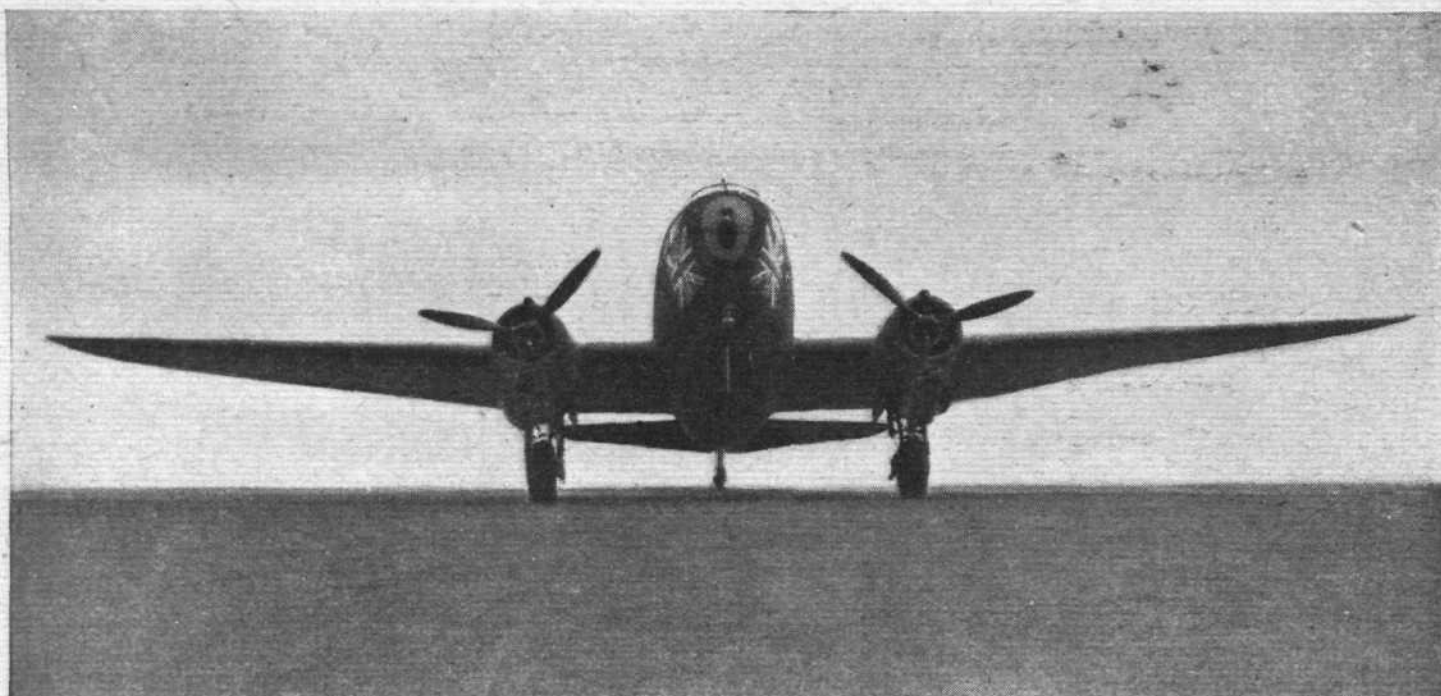
Although the *St. Louis* was originally planned as a pressure-cabin prototype, it should be made clear that this aspect of its design is not in evidence at present; in fact, the special equipment for supercharging the cabin at high altitudes has been removed, and, apart from the actual structure of the fuselage and its window design, about the only outward and visible sign of its original mission in life still in evidence is the provision for rendering the door airtight. This takes the form of a rubber tube which lines the door-fitting and which is automatically inflated to seal the joint when the bolts are thrust home.

The C.W.20 was described in considerable detail in



Taken during the building of the C.W.20, this picture shows the cross-section of the fuselage formed by two eccentric circles with the cabin floor at their intersection.

CURTISS-WRIGHT ST LOUIS



From wing-tip to wing-tip the *St. Louis* measures 108ft. and she is the biggest landplane with two engines yet produced. These two Wright Cyclones, however, supply a total of 3,400 h.p. and she can climb to 13,000ft. on one alone. Her spacious cabin accommodates 24 passengers as well as two 620-gallon supplementary fuel tanks which increase her range to 4,000 miles.

Flight of January 11th, 1940 (shortly before its first test flight), but the main characteristics of this exceptionally interesting aircraft may be briefly repeated. The cross-section of the fuselage is defined by the intersecting arcs of two eccentric circles, the larger one forming the upper portion and the smaller one the lower portion. These are joined at their points of intersection by the floor of the cabin, which acts as a "tie" to resist the internal pressure. In effect the floor of the cabin is only slightly below the centre line of the cross-section, but such is the size of the fuselage that a six-footer may still walk upright along the centre aisle. The design also permits a low mid-wing layout without interfering with passenger accommodation. Furthermore, the space below the saloon floor is generous enough to be compared with the hold of a ship, and the greater part of it can be used as such, access being from doors underneath.

Tail Unit Changed

Like many another prototype, drastic changes in tail unit design have taken place since the *St. Louis* first took the air. The original design employed twin fins and rudders outriggered on the tips of a tailplane which had dihedral angle. As the vertical surfaces were set at right angles to the tailplane they canted in at the top. Now, however, the machine possesses a single fin and rudder, with the result that the appearance as well as behaviour is considerably improved.

Under normal circumstances the *St. Louis* will seat 36 passengers in addition to its crew of three, and its wing tanks give a normal fuel capacity of 1,400 gallons. But in order to extend the range for the Atlantic crossing two extra fuel tanks with a combined capacity of 1,240 gallons were mounted in the cabin.

These replace twelve of the seats, but increase the aircraft's range to approximately 4,000 miles. A point of interest here is that these auxiliary tanks have been so proportioned and located that the additional load is disposed about the machine's centre of gravity, and therefore, whether full or empty, the flying trim is not in any way affected.

Capt. A. C. P. Johnstone, the British Overseas Airways

pilot who flew the *St. Louis* from Newfoundland, spoke in glowing terms of his charge to a member of *Flight's* staff during a recent visit to a B.O.A. airport in the West of England.

"She handles very nicely indeed," he said, "and we had a completely uneventful trip." "I took her up to 18,000ft., and we made the crossing quite comfortably in 9 hr. 40 min."

Climbs on One Engine

Capt. Johnstone said that, using approximately 55 per cent. of the available power from the two 1,700 h.p. 18-cylinder double-row Cyclone engines, the *St. Louis* cruises at 210 m.p.h. at 14,000ft., or 195 m.p.h. at 10,000ft.

Maximum gross weight is quoted at 45,000 lb., but for all practical purposes her all-up "tonnage" may be taken at a round 40,000 lb., at which figure she will climb from 9,000ft. to a 12,000ft. service ceiling on *one engine*—a truly excellent performance. Absolute ceiling on one engine is said to be 13,000ft.

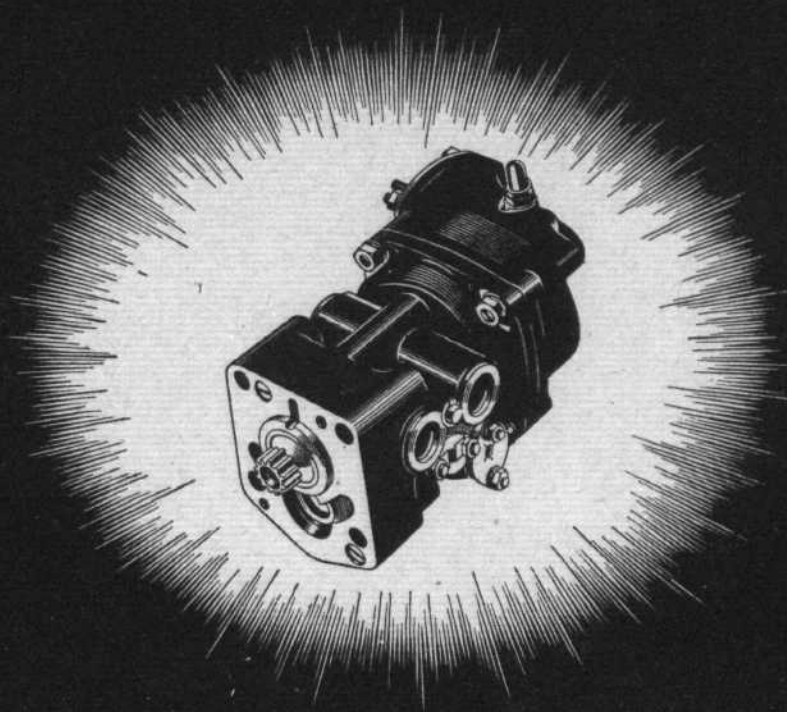
Watching the *St. Louis* making a perfect landing in the experienced hands of Capt. Johnstone, it appeared to come in very slowly. Actually, the final approach is made with flaps down at approximately 90 m.p.h., and the aircraft touches down at a little over 70 m.p.h.

Patent Extension Refused

IN the issue of *Flight* for August 14th, 1941, the evolution of the variable-pitch airscrew was traced, and the original patent specification of Dr. H. S. Hele-Shaw and Mr. T. E. Beacham reviewed. In the High Court recently the inventors and the sole licensees (Gloster Aircraft Co., Ltd.), joined in a petition for a prolongation of the original patent on the ground that the patent covered an invention of such exceptional merit that, in spite of the fact that the petitioners had, between them, received some £30,000 from the Air Ministry, the financial reward was inadequate.

The petition was opposed by the De Havilland Aircraft Co., Ltd., and the Aircraft Corporation of America. Mr. Justice Simonds refused the petition on the grounds that the petitioners had not done all they might have done to exploit the invention.

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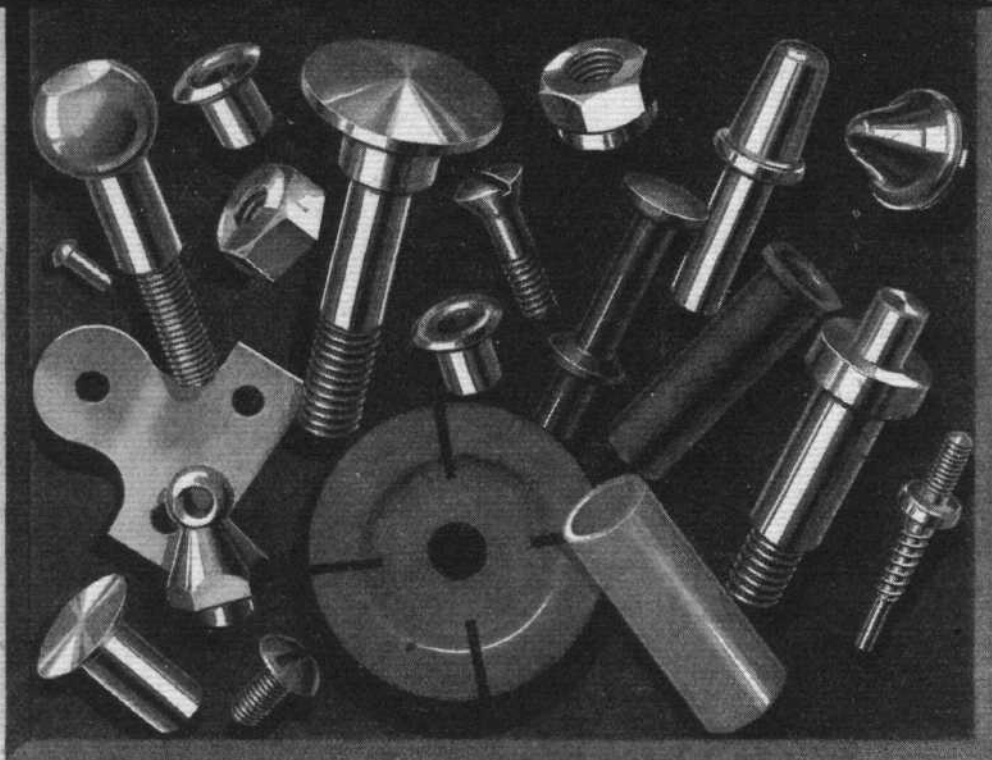


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FROM THE AIR FRONTS

A Selection of Photographs from the Widely Separated Operational Units of the Empire

THE Royal Air Force and the Air Forces of the Dominions are—to use a Churchillian expression—fighting the enemy wherever he may be found. From North Cape to Singapore, over the dreary wastes of all the great oceans, the airmen of the Empire must keep their vigilance. The nation owes these men, and the ground crews, a great debt. Many of the operations entail but a few minutes of intense risk at a time, but the vast majority of war flying requires a very high standard of bravery over long periods. It is also a wonderful tribute to the design staffs and production workers of the aircraft industry that the same type of machine—with scarcely any modifications—is found serving in Arctic snows, in the winter mud of England and in the blazing deserts of Africa.



(Above) A Vulture-engined Avro Manchester of Bomber Command sweeps past the tail of a Hampden.



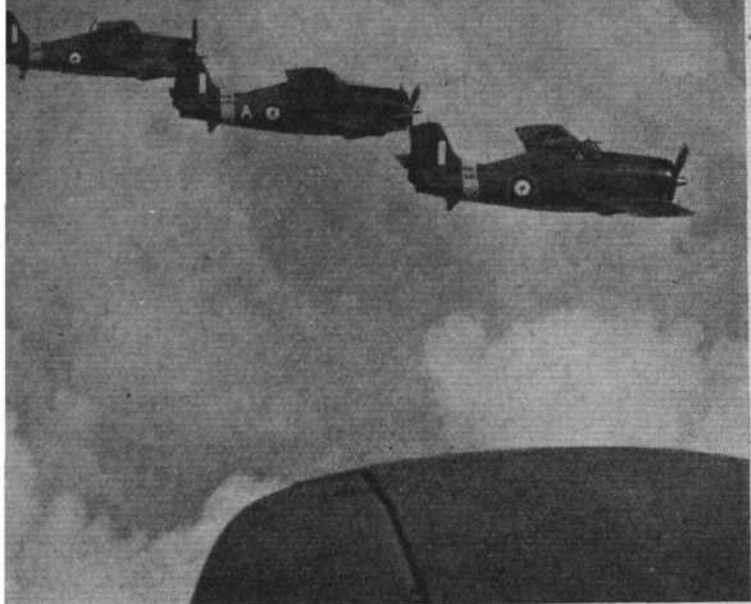
(Above) Black-painted Boulton Paul Defiants of a night fighter squadron, formation flying by day to keep their hand in.

(Right) Lockheed Hudsons of Coastal Command over Heligoland.



(Above) The Battle of Malta. A Hurricane being refuelled and rearmed immediately after landing from an engagement.

(Left) After reconnaissance a Fairey Swordfish is hoisted inboard the battleship H.M.S. Malaya.

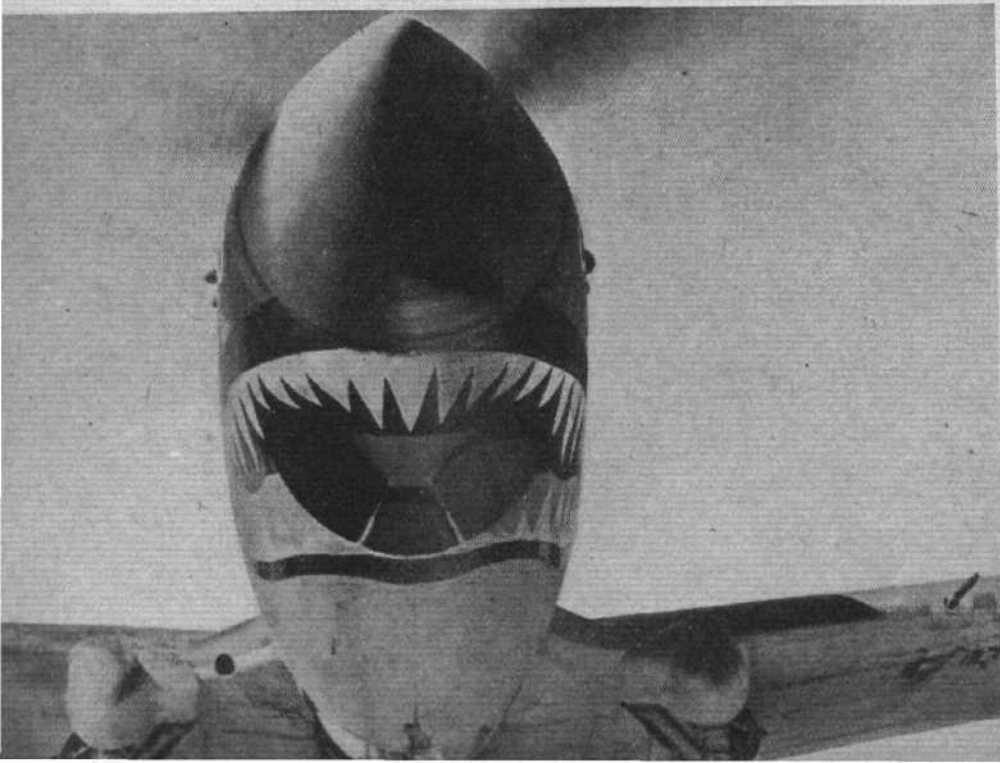
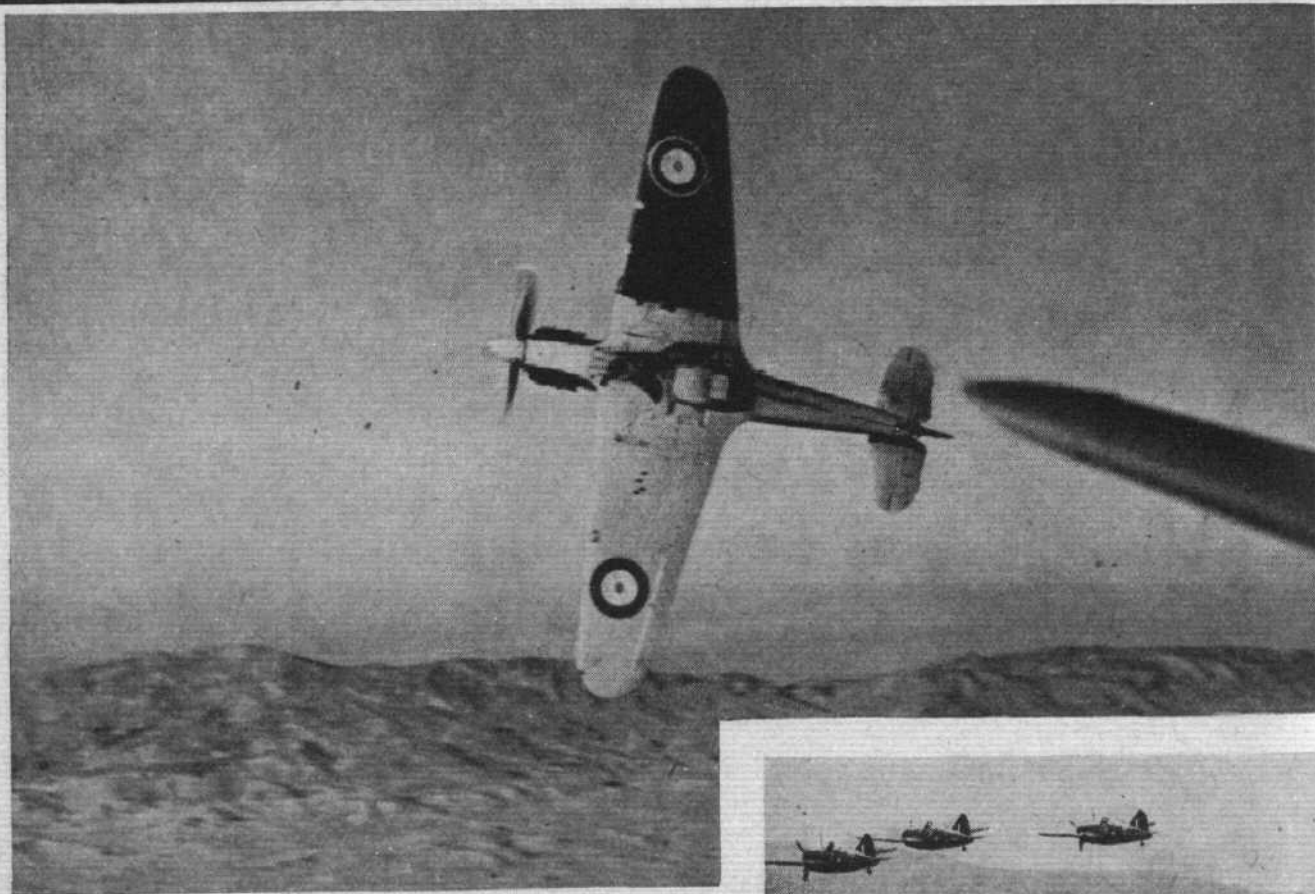


FROM THE AIR FRONTS

(Above) Grumman Martlets of the Fleet Air Arm, who fly wherever men go down to the sea in ships.

(Top, centre) Home Defence Bell Airacobra of Fighter Command above the clouds.

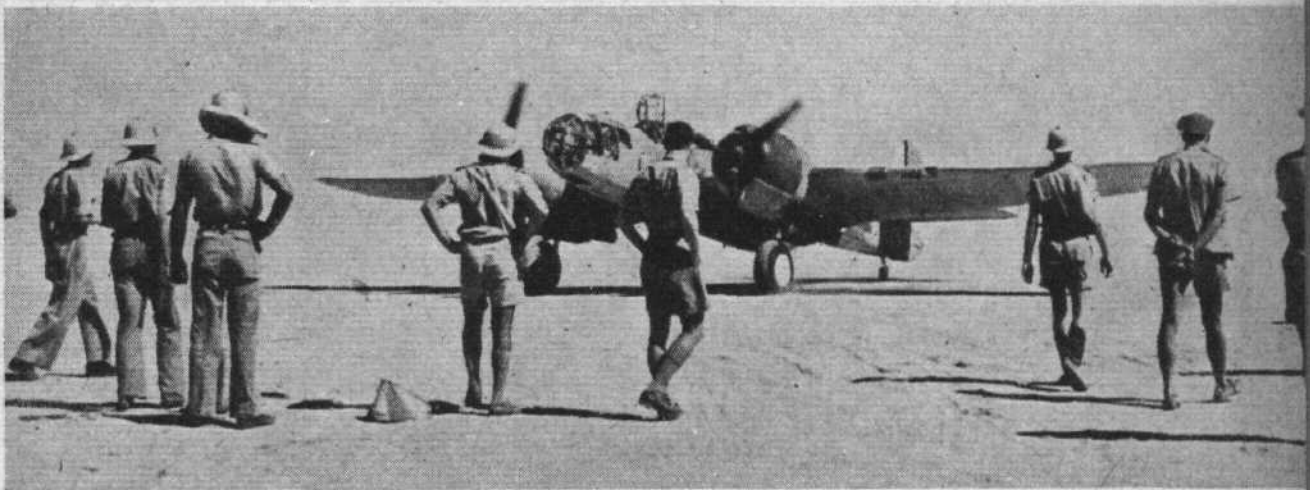
(Right) Hawker Hurricane over the defended Isle of Cyprus.



(Left) A fearsome Curtiss Tomahawk of a Western Desert squadron.



(Top right) Night bomber by day. A four - engine Handley Page Halifax of Bomber Command in superb cloud formation.

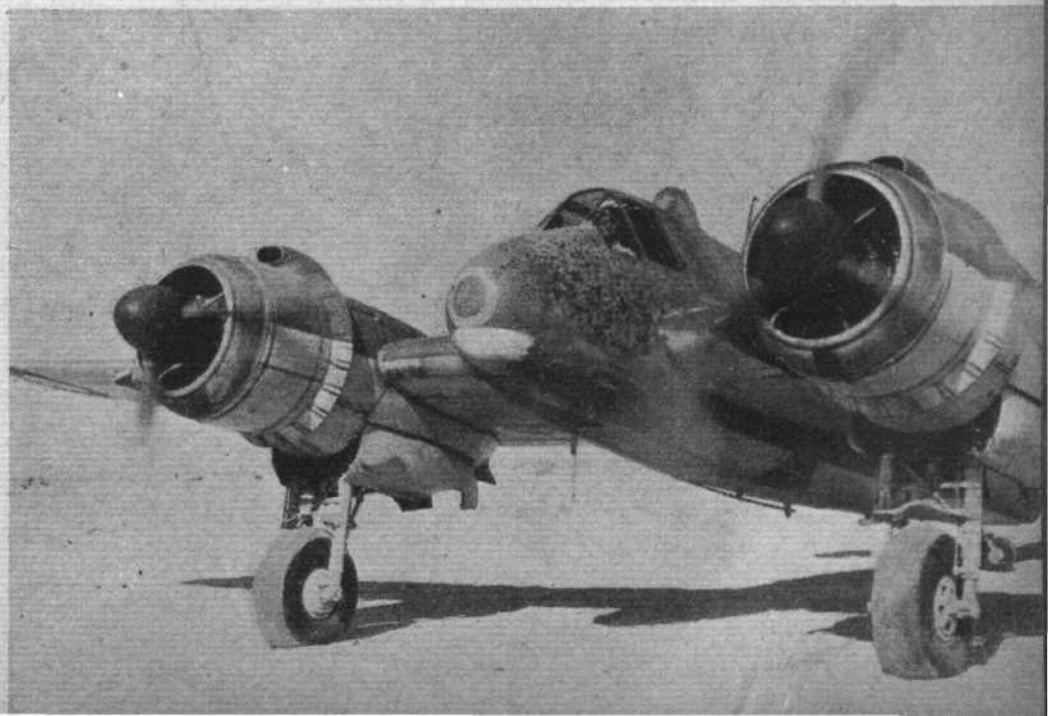


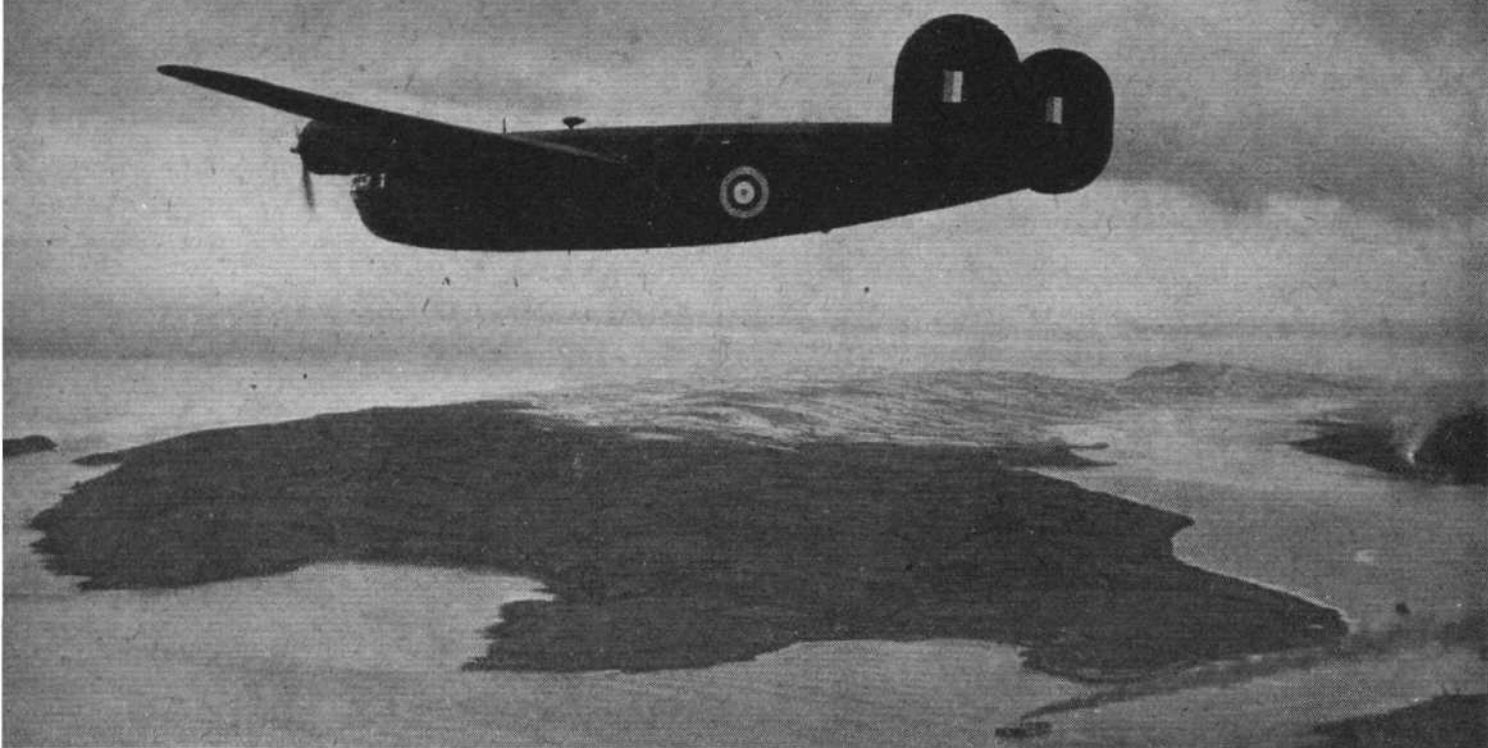
(Above) South African Air Force, Martin Maryland taxiing in on a Western Desert bomber flying field.



(Above) Twelve Brewster Buffaloes in formation over Malaya.

(Below) Cyrenaica ground-strafer. One of many cannon-armed Bristol Beau- fighters which have been used for low attacks in the Western Desert. The Beaufighter is also a standard night fighter.

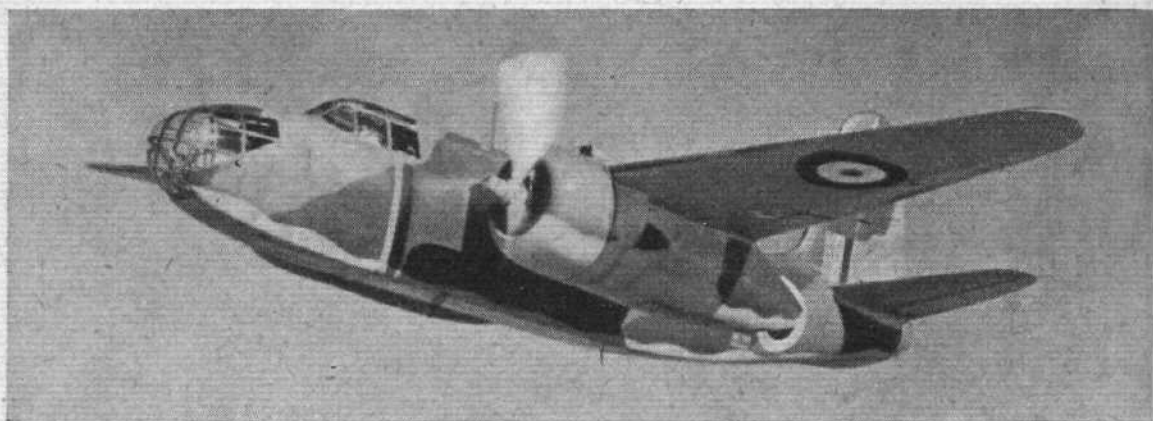




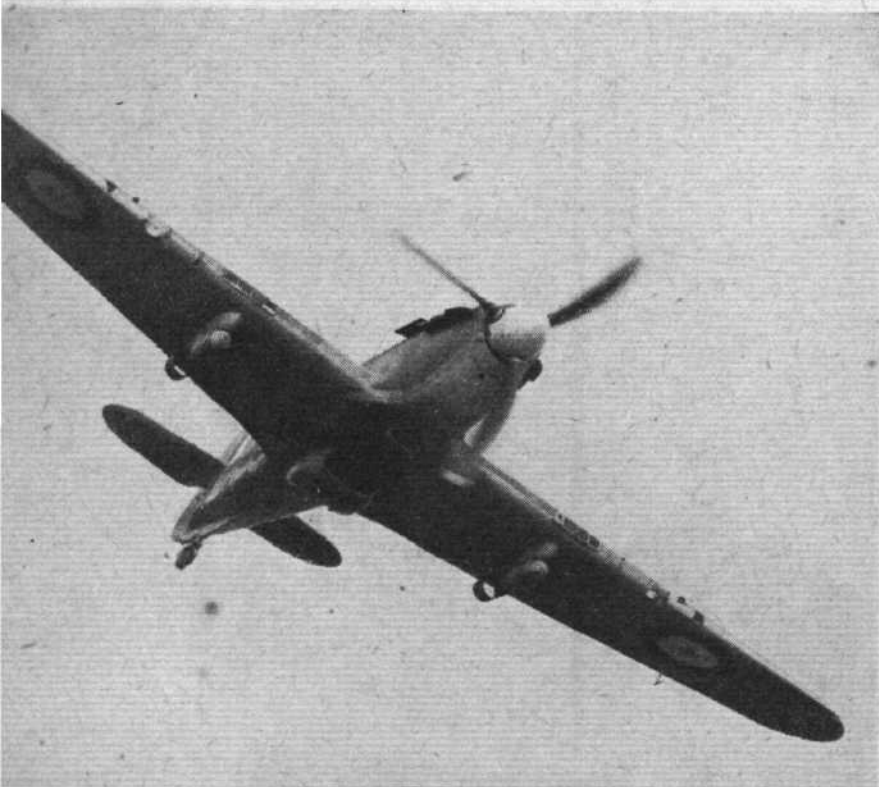
FROM THE AIR FRONTS

(Above) Consolidated Liberator of Coastal Command. Cannon armed, the Liberators have attacked and destroyed convoy raiding Kuriers far out over the Atlantic.

(Right) In daylight camouflage. A Douglas Boston with the usual "sand and spinach" topsides and duck egg blue beneath.



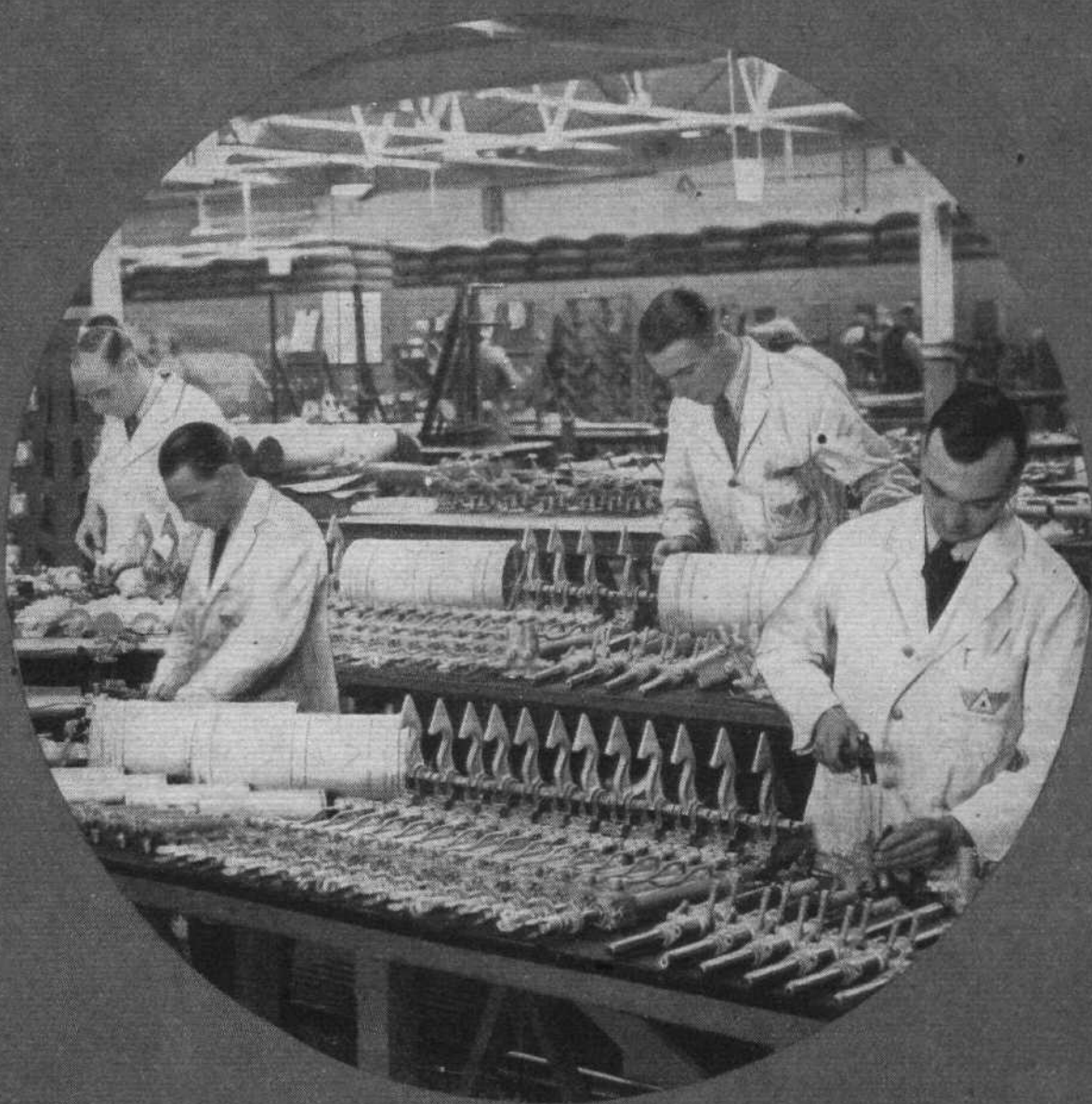
(Below) Westland Lysanders from one of the Eighth Army co-operation squadrons over the Suez Canal.



(Above) Bomber Hurricane of Fighter Command off for an attack on occupied France. The two 250 lb. bombs are carried in streamline racks under the gun bays.



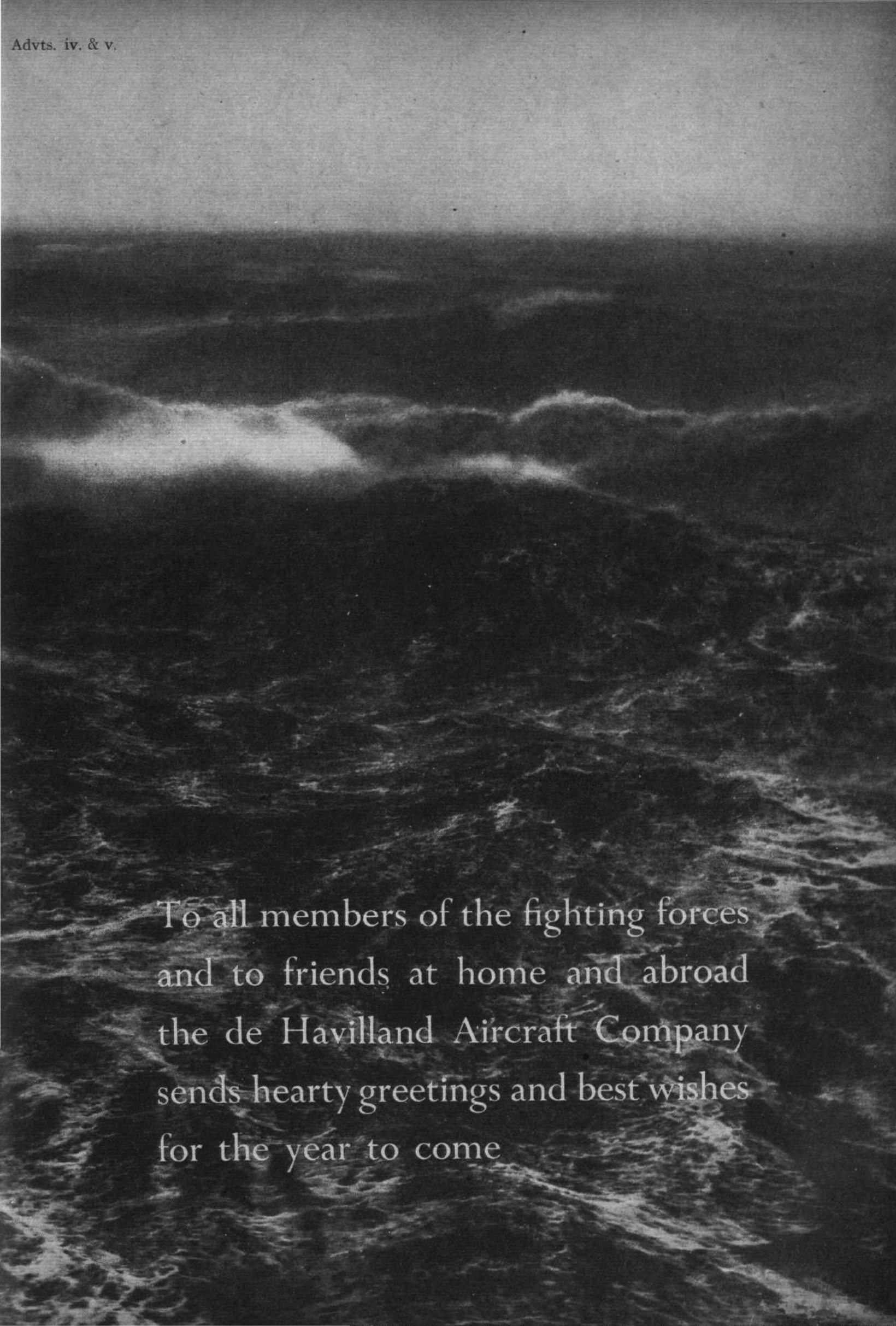
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A dramatic black and white photograph of a stormy sea. The sky is dark and filled with heavy, swirling clouds. A bright, glowing light source, possibly the sun or moon, is partially obscured by the clouds, creating a strong lens flare and illuminating the scene. The ocean below is turbulent, with white-capped waves crashing and churning. The overall mood is one of power and intensity.

To all members of the fighting forces
and to friends at home and abroad
the de Havilland Aircraft Company
sends hearty greetings and best wishes
for the year to come



TO THE EDITOR, STAFF AND READERS
OF 'FLIGHT' — CORDIAL GREETINGS
AND GOOD FORTUNE IN 1942



*Seventeenth of the Second Series***FRIEND or FOE?**

*Two Opposing Flying-boats : Catalina
and Do 24*

CONSOLIDATED CATALINA: Characterised by the prominent blister gun turrets in the wide hull. The retracting wing-tip floats are also a feature exclusive to the Catalina.

ALTHOUGH there should not be much fear of mistaken identity as between the Consolidated Catalina and the Dornier Do 24, it must not be forgotten that our Dutch allies acquired a number of this German type, primarily for service in the Dutch East Indies. In the latest phase of hostilities in the Pacific, therefore, it may well be that the appearance of a Do 24 flying-boat does not mean the approach of an enemy aircraft. Incidentally the Dutch Do 24s were fitted with Wright Cyclone engines instead of the German B.M.W. radials.

The Catalina is a comparatively easy machine to identify, for it has distinctive lines—and good-looking ones at that—and has received so much photographic publicity since the first lease-lend model began service with Coastal Command, that its appearance is familiar to almost everyone. From an underneath rear view the Catalina will be more easily recognised by the large gun-blister on its flanks, and by the double struts running up from the side of its hull to the high pedestal-type wing, than by its actual tail surfaces.

From anything approaching a side view, however, the wide curve of the fin's leading-edge and the straight, slightly sloping trailing-edge of the rudder will be quite distinctive. The tailplane, which tapers on the leading-edge only, is set about halfway up the fin and is of the cantilever type. An unusual feature is that the centre portion of the trailing-edge passes through a slot in the rudder instead of the more usual arrangement of a "bite" for rudder clearance.

One of the chief features of the Do 24—its three engines—is inevit-

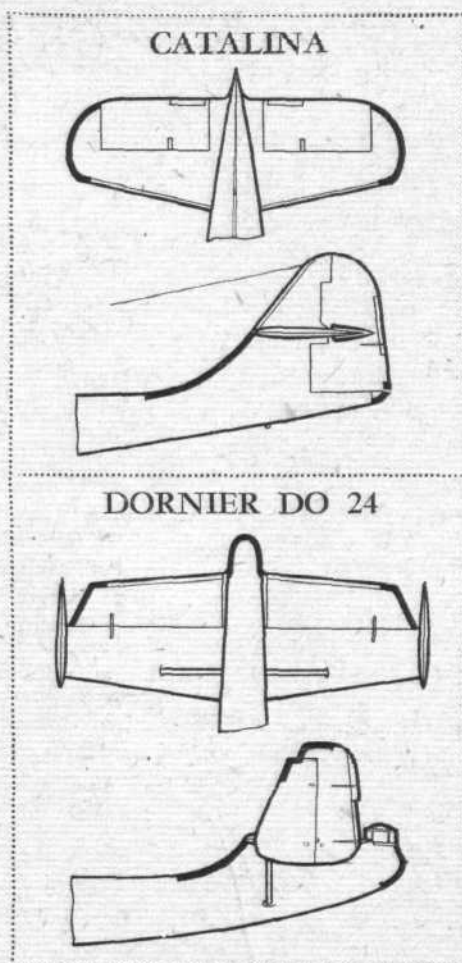
ably masked by its hull when the machine is seen from below and astern and so, in considering identification from this angle, it ceases to be of much importance.

What is immediately apparent, however, are the sea-wings, or sponsons, to which the parasol high-wing is strut-braced. The tail assembly, also, is a prominent feature, with its twin fins and rudders and "pillbox" gun turret set above the rounded, projecting extremity of the hull.

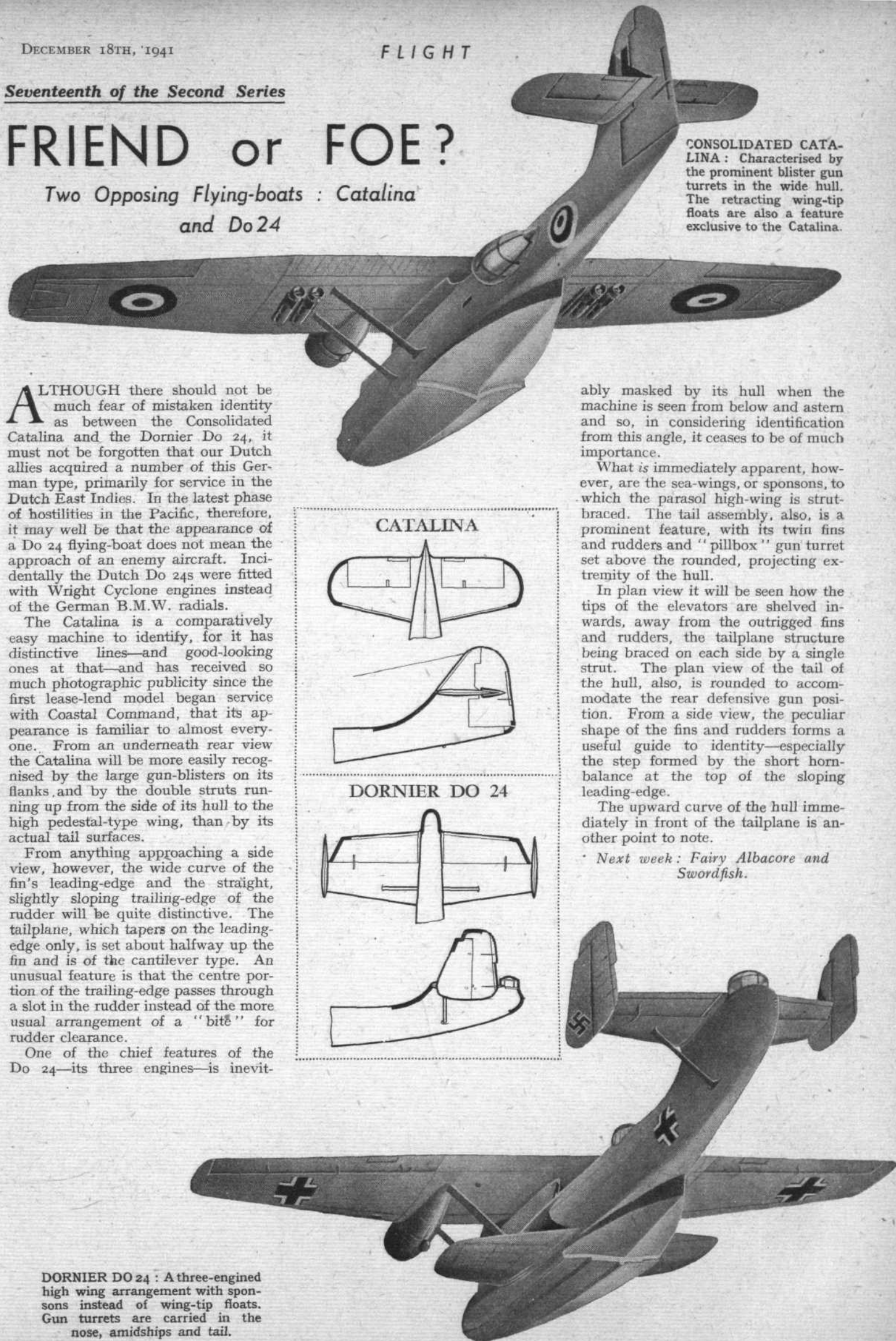
In plan view it will be seen how the tips of the elevators are shelved inwards, away from the outrigger fins and rudders, the tailplane structure being braced on each side by a single strut. The plan view of the tail of the hull, also, is rounded to accommodate the rear defensive gun position. From a side view, the peculiar shape of the fins and rudders forms a useful guide to identity—especially the step formed by the short horn-balance at the top of the sloping leading-edge.

The upward curve of the hull immediately in front of the tailplane is another point to note.

** Next week: Fairy Albacore and Swordfish.*



DORNIER DO 24: A three-engined high wing arrangement with sponsons instead of wing-tip floats. Gun turrets are carried in the nose, amidships and tail.





Nearest the camera is the North American NA73 which will be known as the Mustang in the R.A.F. Facing in the same direction is the Curtiss P40D. or Kittyhawk, and in the background is a Lockheed Hudson and Douglas Bostons.

ACTIVITY AT ASSEMBLY UNITS

How U.S.A. Aircraft are Handled. Misunderstandings Removed

By G. GEOFFREY SMITH, M.B.E.

SOME of the newer types of American aircraft, with the names of which British people are becoming familiar, were on parade last week. The scene was one of the great assembly units under the control of the Ministry of Aircraft Production, to-day a hive of industry as the many and various U.S.A. aircraft arrive, some by air, others in huge packing cases by sea, and are dealt with expeditiously before being handed over to the Services.

Among the types undergoing modification, or the application of radio equipment and other fittings to suit them for war, were the Curtiss Kittyhawk, the Douglas Boston, the North American Mustang, and the well-tried and proved Lockheed-Hudson. On the airdrome there was an example of the Bell Airacobra fighter, which was demonstrated under conditions quite unfit for flying by a former member of *Flight* editorial staff, Pilot-Officer H. A. Taylor, whose experience with various British and overseas types of

aircraft must now be unparalleled after ten years' flying.

A tour of the busy workshops provides convincing evidence that there is now no delay in handling American aircraft for service. As was stressed by Mr. W. C. Devereux, Controller of North American Aircraft Supply, the assembly organisation is now well able to keep on top of the input of machines, and that remark applies to types in hand as well as those promised. Uninformed criticism has been that there was unnecessary tardiness in dealing with new machines on arrival, but before criticism on that point is advanced, some of the difficulties should be recognised.

Operational requirements in wartime demand that machines be kept absolutely up to date for the particular uses to which they are to be put. There is no other way of ensuring that measure of supremacy of which we are proud. In service use, new discoveries are constantly being made, and only by incorporating as quickly as possible any desirable modifications, or additional items of equipment demanded by the experienced pilots who fly the machines can we ensure that they go into action with no excuses or regrets.

This, of course, takes time. Nothing would be easier than to take the line of least resistance and skimp desirable modifications. But that is not the policy of the R.A.F. or M.A.P., who rather tend to allow the experienced personnel of the active service to call the tune, and readily effect changes dictated by war experience. It is part and parcel of modern warfare to be ready to change and so keep up to date. The rumours of big accumulations of U.S.A. aircraft have been greatly exaggerated. To-day there is but one-fifth of the number of machines claimed to be in the reserve pool.

On some types, this problem of modification is not so easy to solve as non-engineering brains



P/O. H. A. Taylor—a pre-war member of the staff of *Flight*—at the controls of a Bell Airacobra.

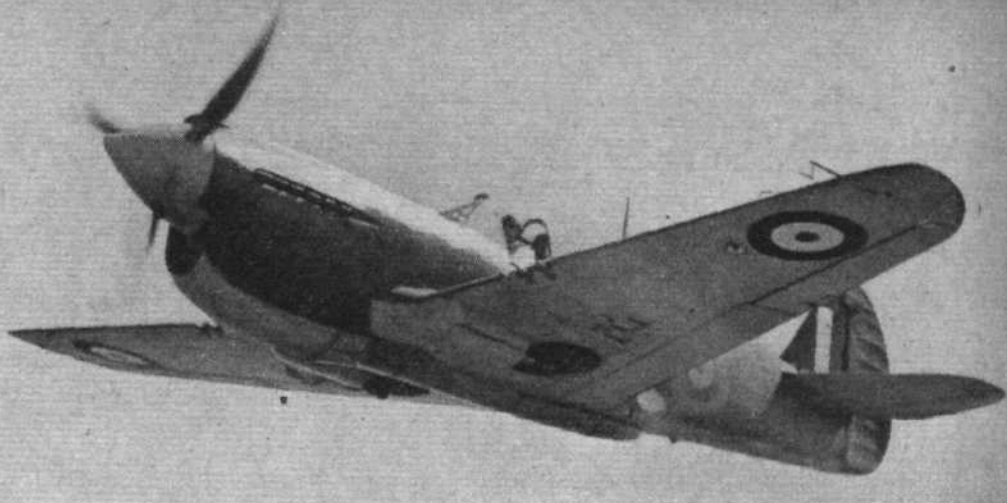
The Allison-engined Kittyhawk as seen from below. It has the typical Curtiss undercarriage which turns through an angle of 90 degrees during retraction.

suppose. First of all, in the case of major modifications, suitable designs have necessarily to be prepared, stresses calculated and approval of D.T.D. obtained as well as the concurrence of the American manufacturer concerned. The modified parts are then manufactured in various factories, what time the aircraft stand idle, which gives rise to some impatience due to failure to appreciate the real cause.

It may be 12 to 16 weeks before the various items are ready for application, but after that period the accumulation of aircraft is expeditiously dealt with.

Nevertheless, three weeks are needed from the time a new bomber arrives in this country to the date it is handed over to the Services as up to date as it is possible to make it. A fighter can be passed through assembly in seven to nine days.

Even in America, this problem of modifications was not



war experience dictates, is a *sine qua non*. And if a heavy bomber is found, by reason of its limited load-carrying capacity, to be better suited to long-range operations over the Atlantic, obviously it should be pressed into the service for which it is ideally suited.

That would necessarily entail some modifications, and in certain types changes are effected to armament, armour, radio, the provision of special items of equipment, and formerly, to rendering the petrol tanks leakproof.

In due time, as the splendid new examples of U.S.A.

aircraft reach these shores with complete armament and power-operated turrets, less and less change will be called for. There is a readiness in the States to incorporate in the original design all those features which war experience demands to ensure maintenance of ascendancy, and nowhere are there greater admirers of U.S.A. accomplishments in the air than among R.A.F. and M.A.P. personnel. One hopes and firmly believes that the Anglo-American collaboration during the last two years or so will have proved beneficial to America as well as ourselves in the struggle against the common enemy, now openly supported by the Japanese. The double record for the Atlantic crossing last week by a four-engined Liberator which left

the figure at 8 hours 20 minutes is another feather in the cap of Uncle Sam and of the pilot, Captain Cramer.

The New Types

Of the particular types being assembled at the unit visited, some are already familiar to our readers. Those not so well known at present included the Curtiss P40D fighter, a development of the Tomahawk, known in R.A.F. circles as the Kittyhawk. This machine has the improved Allison 12-cylinder liquid-cooled V engine developing 1,150 h.p. It is well armed, though no details may be given. In general it follows the lines and specification of its forerunner, but it is longer by 2ft. 9in. Its paces were demonstrated by Wing Commander J. K. Rotherham under con-



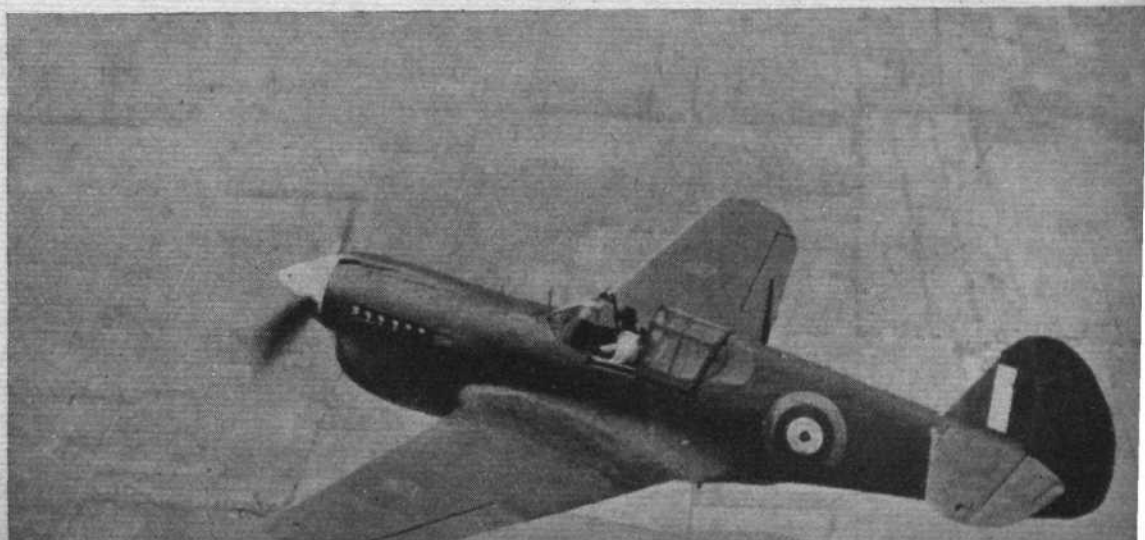
A three-quarter front view of the North American Mustang. From some angles the Mustang is reminiscent of the Me 109F.

understood, and failure to utilise types immediately they were sent over here gave rise to mystification and uninformed criticism. Thanks, however, to personal investigations in this country by leading officers of the U.S. Air Corps, the position is now fully appreciated, and there is an excellent spirit of co-operation existing between British and American authorities. At the assembly unit we visited, for instance, there are now direct representatives of the leading American factories to supervise desirable changes, and they are available for consultation and prompt settlement of problems when the need arises. Mr. H. H. Ogden, General Manager of the Lockheed assembly division, Mr. Paul Young and Mr. Trudell, of the Curtiss Company, among others, are doing admirable work in this regard.

A further step forward will be achieved when, next year, an American organisation on similar lines is in being to attend to necessary modifications on the other side of the Atlantic, under direct factory supervision.

Even so, in this war of quickly changing character, a readiness to incorporate minor modifications in the specification and equipment, which the hand of

A flying picture of the Curtiss Kittyhawk from above. The familiar characteristics of the Mohawk and Tomahawk are accentuated in this view.



ACTIVITY AT ASSEMBLY UNITS

ditions of low cloud, but it was evident that the machine is very manœuvrable and possessed of a fine turn of speed.

Another interesting but comparative newcomer is the North American NA73 fighter, christened the Mustang. This is another of the types equipped with the Allison engine and single stage supercharger, and fitted with a Hamilton three-bladed constant speed airscrew. It is a low-wing cantilever monoplane of metal construction, though the wings, rudder and elevator are fabric-covered.

The wings are fitted with slotted trailing-edge flaps, and the fuselage, of monocoque type, is built up in two sections. Leading dimensions of this aircraft are: Span 37ft. 3in., length 31ft. 6in., height 8ft. 8in. The wing area is the same as the Kittyhawk, that is, 236 sq. ft. The radiator of the Mustang is placed behind the pilot's cockpit, the air duct being immediately underneath. A feature is that separate elements of the single radiator serve for cooling the oil and the Glycol, and that the cabin is heated. The air intake for the supercharger is immediately behind the airscrew on top of the fuselage nose.

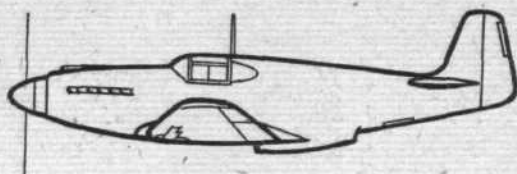
Square-cut Wings and Tail

An exceptionally wide track of 11ft. 10in. enables the hydraulically operated landing legs to fold forward. It is a type that will be readily identified by reason of its square-cut wing tips, tail fin and elevators. After removal from the packing case the two wings are joined on the centre line of the aircraft to form a floor for the pilot's cockpit. This type of construction, which completely eliminates the usual wing centre-section, resembles that of the Curtiss Tomahawk and Kittyhawk.

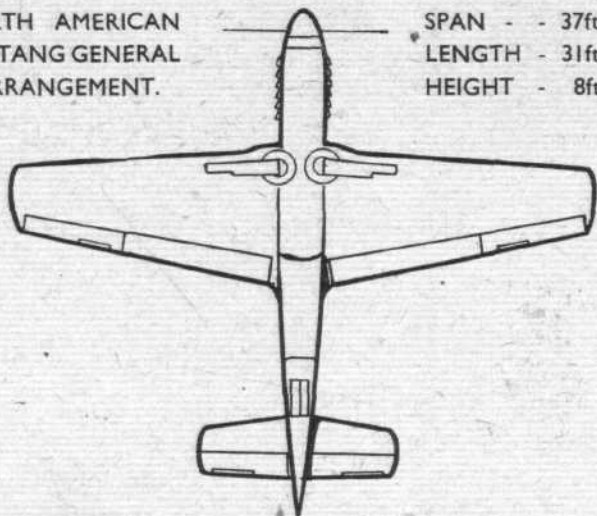
The Douglas Boston is too well known and appreciated to need recapitulation of details, the same remarks applying to the Lockheed-Hudson (fitted with two double-row Wright Cyclones of 1,200 h.p.), of which examples are transferred to the Service daily. On the flying field, the Bell Airacobra, with its engine amidships, was available for inspection as already mentioned. This fighter, now in service with the R.A.F., was described in *Flight* of September 25th, and we requote its specification:

Bell Airacobra P39

Fighter. Engine: Allison 1,150 h.p. Span: 34ft. Length: 29ft. 9in. Height: 9ft. 3in. Wing area: 213



NORTH AMERICAN
MUSTANG GENERAL
ARRANGEMENT.



SPAN - - 37ft. 3in.
LENGTH - 31ft. 6in.
HEIGHT - 8ft. 8in.

sq. ft. Armament: One 20 mm. cannon, six machine guns.

P40D Kittyhawk

Fighter. Engine: Allison 1,150 h.p. Span: 37ft. 4in. Length: 31ft. 8in. Height: 10ft. 8in. Wing area: 236 sq. ft. Armament: No details.

North American NA73 Mustang

Fighter. Engine: Allison 1,150 h.p. Span: 37ft. 3in. Length: 31ft. 6in. Height: 8ft. 8in. Wing area: 236 sq. ft. Armament: No details.



A row of Bostons (two 1,600 h.p. Wright double-row Cyclones) awaiting A.T.A. pilots to fly them to operational stations or store depots.

ADVERTISED GOODS

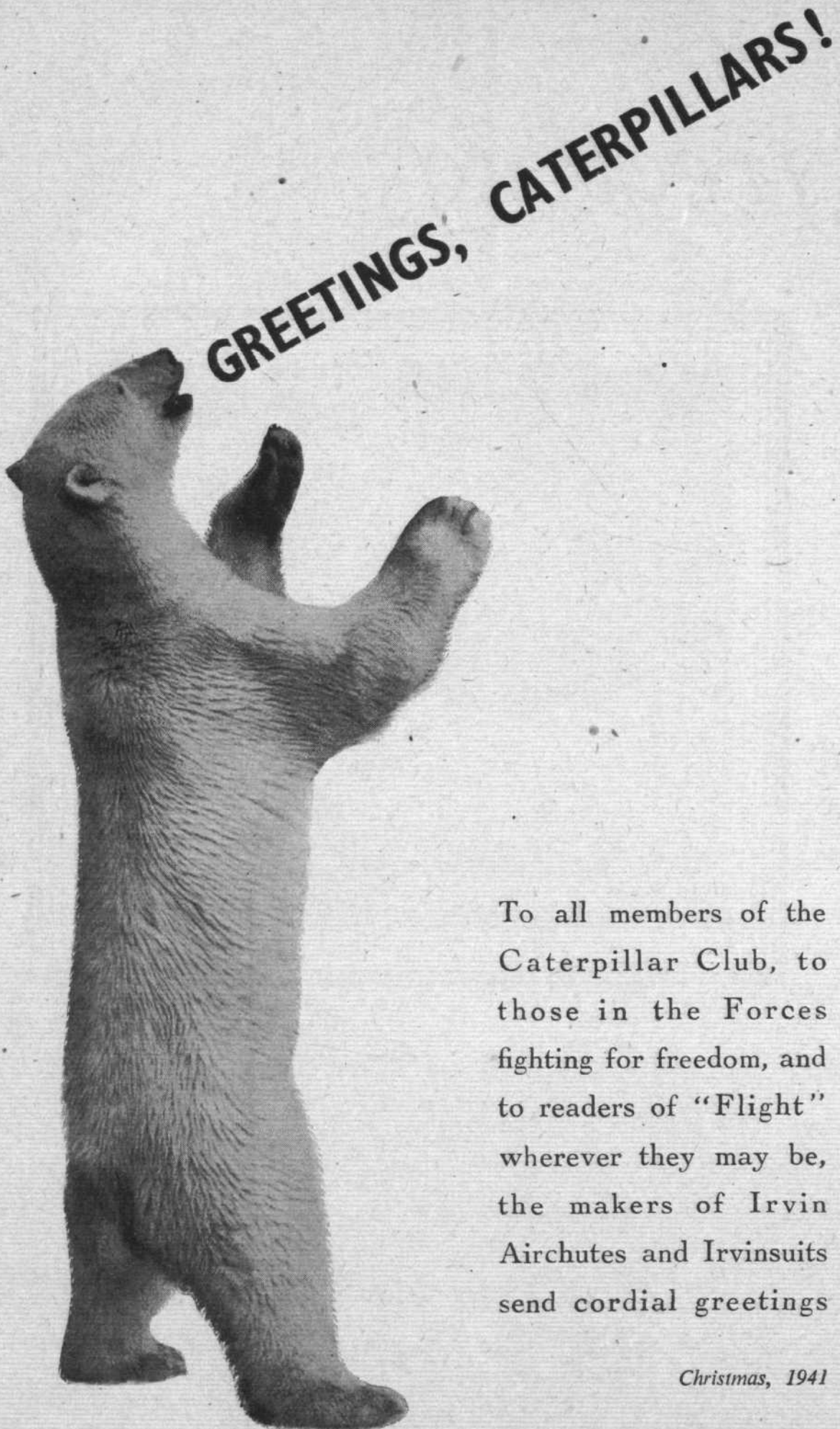
THE fact that goods made of raw materials in short supply owing to war conditions are advertised in this journal should not be taken as an indication that they are necessarily available for export.

Greetings



to our Friends everywhere

HANDLEY PAGE LTD.



To all members of the
Caterpillar Club, to
those in the Forces
fighting for freedom, and
to readers of "Flight"
wherever they may be,
the makers of Irvin
Airchutes and Irvinsuits
send cordial greetings

Christmas, 1941

HERE AND THERE

They'll Tell the Cock-eyed World!

AMERICAN airmen, whether military, naval or commercial, have been given a grand incentive to get busy with a pen in their spare time and "tell the cock-eyed world" all about their mid-air adventures.

This encouragement comes from the New York publishing house of Alfred A. Knopf, Inc., which offers a prize of \$2,500 for the best book-length manuscript of an autobiographical nature by an American airman.

It is not quite clear at the moment whether the contest is open to pilots only, or whether navigators and other "air-crew" are equally eligible, but those interested should write either to the publishers at 501, Madison Avenue, or their agents, Curtis Brown, Ltd., 347, Madison Avenue, New York, who will handle all manuscripts.

Air-minded Brazilians

DR. JOAQUIM PEDRO SALGADO FILHO, Brazil's first Air Minister, recently performed a christening ceremony on a Piper Cub which was presented to the Aero Club of Cuiaba by a leading Brazilian business man.

So enthusiastically air-minded has Brazil become—and Dr. Filho is energetically encouraging this—that no fewer than 167 light aircraft of this type have already been given to various Brazilian flying clubs by public-spirited citizens, and it is hoped that the number will eventually top the 200 mark.

Our own public-spirited citizens are at present busy donating Spitfires to the R.A.F., but the Brazilian example might



Mail arrives for a Royal Australian Air Force fighter squadron in Libya. Journals with news from the home town seem to predominate.

well be borne in mind for after the war.

After the millions that have been donated to provide fighting aircraft, it must surely never be pleaded that we cannot afford a few thousands for peaceful aviation.

Adverts. by Autogyro

THE first autogyro to fly air mail on schedule between a ground station and a rooftop airport has been sold to the proprietor of a tow-sign advertising service.

This was mentioned by Capt. E. V. Rickenbacker, president and general manager of Eastern Air Lines, who said that the wingless autogyro which his company operated between Camden Air-

port (and later, Philadelphia Municipal Airport) and the rooftop airport of Philadelphia General Post Office, for the period of one year, had been thus disposed of.

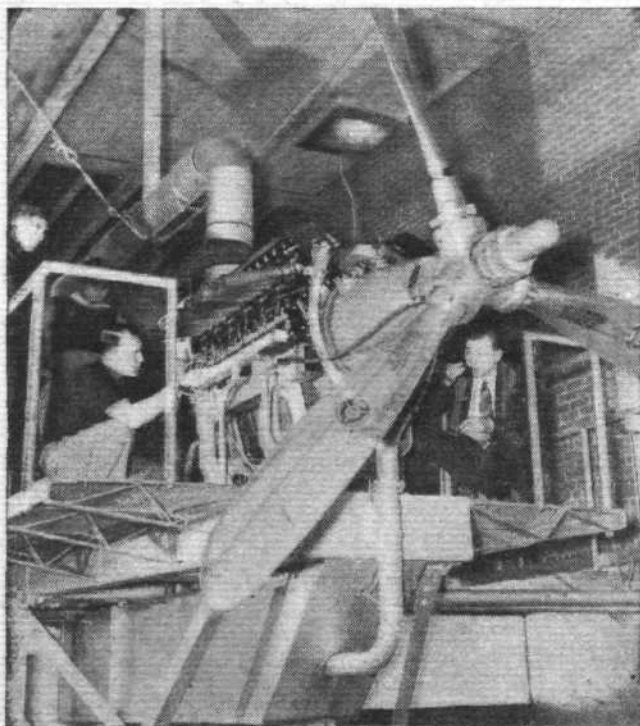
The autogyro airmail service was inaugurated in July, 1939, and continued on a five daily round-trip basis until July, 1940, when the service was discontinued for the duration of the national emergency. Government officials called the experimental service "an unqualified success." Of 3,070 trips scheduled, 2,634 flights were completed, an operations efficiency of 86 per cent. Nearly 90,000 pounds of mail was carried during the year.

The new owner claims the 'gyro is an ideal craft from which to tow signs, because it climbs steeply, gets off quickly and flies slowly.

Successful operation from a rooftop airport, which will no doubt come as news to many readers, suggests post-war possibilities.

Following the War

WITH the opening of hostilities in the Pacific Ocean it has become a matter of some difficulty to follow, in a geographical sense, what is happening in an area so vast that the ordinary maps plotted on the Mercator projection give a totally wrong impression of areas and distances. With commendable enterprise Edward Stanford, Ltd., have produced a coloured map which comes as near as possible to representing on a flat surface the accuracy of a globe. The sketch map published on pp. 438-439 of this issue was prepared from the new Stanford map, but is on a reduced scale and cannot, of course, convey the full details of the large coloured original. Copies of the map, which measures 25in. by 19½in., are obtainable from Stanfords, 12-14, Long Acre, London, W.C.2, and the price is 3s. 6d. This applies to the plain paper edition. For those who prefer a folding map there is a linen-mounted version sold at 6s.



An Allison V-1710 aircraft engine passes its final acceptance test, gets some last-minute currying before shipment. At the General Motors Allison plant in Indianapolis each engine is operated on a test stand until it develops full power. Then it is torn down, inspected, re-assembled and given its final acceptance test. The Allison Division of General Motors is currently turning out liquid-cooled engines under Army Air Corps and British Government contracts at the rate of 350 a month. Workers total 7,200. By late 1941, when additions to plant now under construction are completed, 10,000 men are expected to be turning out 1,000 engines a month.

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.

STERN PROPELLERS

Early British Stern-drive Example

I NOTE with interest the French Paulhan-Tatin of 1911, which had its propeller in the extreme stern. It may be of interest to *Flight* readers to know that a British aircraft, the Petre monoplane, was completed in 1909, embodying the same layout. The power-unit was the 35-40h.p. N.E.C., which was placed approximately midway along the fuselage and which was connected to the stern propeller by a long shaft. Unlike the French machine, the wing pivoted, thus providing variable incidence (another idea considered modern in some circles). The speed claimed, however, was only 30 m.p.h.

There may be even earlier examples of this layout, but the Petre monoplane was known to have been completed in December, 1909.

"RECOGNITION ENTHUSIAST."

BARREL ENGINES

Advantages of the Wobble-Plate

MAY I add my quota to your interesting article on "Barrel Engines" by E. S. Hall in the two issues of *Flight*, dated November 27th and December 4th.

The opening remarks on engine form and shape, and on crank mechanism, bring out some startling facts not fully appreciated by engine designers. The orthodox multi-cylinder engine with crank and trunk piston movement has, over a period of many years, been developed to a surprising state of efficiency in spite of its limitations.

It is time, however, that a little more thought and energy were given to other forms of engine construction having possibilities of effecting considerable savings in space and weight.

The wobble-plate form of construction has been largely favoured by exponents of the barrel-type engine for reasons stated.

Hitherto few examples have survived or even passed their teething troubles, through failure to realise the peculiarities of construction, movement and balancing of this mechanism.

The torque reaction component has long been a stumbling block on wobble-plate mechanism and many devices have been tried to maintain true wobbler motion without fluctuating loads and vibration. The reaction must be taken at equal and opposite symmetrically disposed points giving true wobbler

ing shaft can be entirely eliminated if two opposing groups of cylinders are symmetrically disposed on each side of the wobble-plate so that the opposing groups of cylinders apply equal and opposite thrusts on each side of the wobble-plate.

The thrusts from the pistons and reciprocating masses balance out in pairs throughout every stage of the working and return strokes, and all combine to form equal and opposite couples about the centre of oscillation of the wobble-plate, applying equal and opposite turning moments to the symmetrically disposed crank-pin bearings.

One compact wobble-plate construction with these features is shown in the accompanying picture. This arrangement also eliminates the excessive shock loads on the crank shaft bearings so prevalent over top-dead centre of the orthodox crank engine.

This feature has distinct advantages on high-compression and Diesel type engines where these shock loads are more than four to six times the mean effective piston loads.

WM. R. STEELE.

JET PROPULSION OF AIRCRAFT

Details Shown in a Photograph

REFERRING to the interesting half-tone cut illustrating the short article "Jet Propulsion of Aircraft," by Mr. Geoffrey Smith, in the December 4th issue of *Flight*, it would appear that the cut shows twin orifices at the tail end of the plane, the tail wheel being located on a part of the fuselage between them. This would suppose duplex propulsive jets, which supposition is further borne out by the distinct bulge that occurs on the side of the fuselage, slightly forward of the leading edge of the wing. In such case, space for the pilot would be provided between the two driving shafts.

It appears extremely doubtful whether this cut was made from an actual photograph of the plane,* there being much about it that suggests that the picture originated as a sepia wash or water-colour artist's sketch. How reliable it may be, under such circumstances, as showing a true picture, is a matter for conjecture; it is, however, none the less extremely interesting.

J. G. DORRAN.

[* The positive was from a photograph, suitably retouched, —Ed.]

Shortcomings of Dry Fuels

I HAVE just finished reading an article, "Rocket Propulsion," by Dr. Lanchester, in the August 7th issue of *Flight*, which appeared very interesting, especially the conclusions.

The article emphasised again, as shown many times in the past, the lack of needed energy in using dry fuels, such as gunpowder or similar combustibles, for continued flight. Even when employing alcohol and liquid oxygen (and disregarding higher B.T.U. combinations), the main difficulties in the construction of a successful rocket motor appear to be the securing of the oxygen, and the boiling off of a minute quantity of the liquid.

At the present time I, personally, believe all essential design data for a successful alcohol-oxygen jet propulsion motor is available, except possibly a small amount of data needed for minor refinements in regard to the most advantageous rate of propellant flow, fuel pressures, etc.

A small amount of really scientific research—with experiments foremost—would, without doubt, develop jet propulsion motors of high efficiencies in a few months.

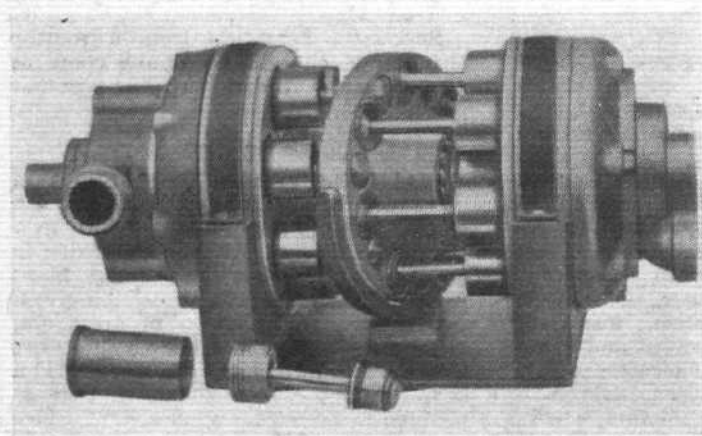
CEDRIC GILES

(Chairman of the Technical Committee,
American Rocket Society).

Motor Development the Immediate Problem

YOUR correspondent, Mr. Richardson, stated that energy great enough to propel a jet-propelled craft to points where gravitational attraction is small cannot be developed with even the most powerful fuels which exist to day.

This contention is incorrect, for it is known that if a rocket



motion to eliminate entirely fluctuating loads and vibration.

Double universals on two Hooke's joints in series correctly disposed in relation to the centre of oscillation of the wobble-plate will fulfil this requirement. Cylinder area and piston displacement reaches its optimum value in any given circle of frontal area with seven cylinders fitted as closely as possible round the shaft.

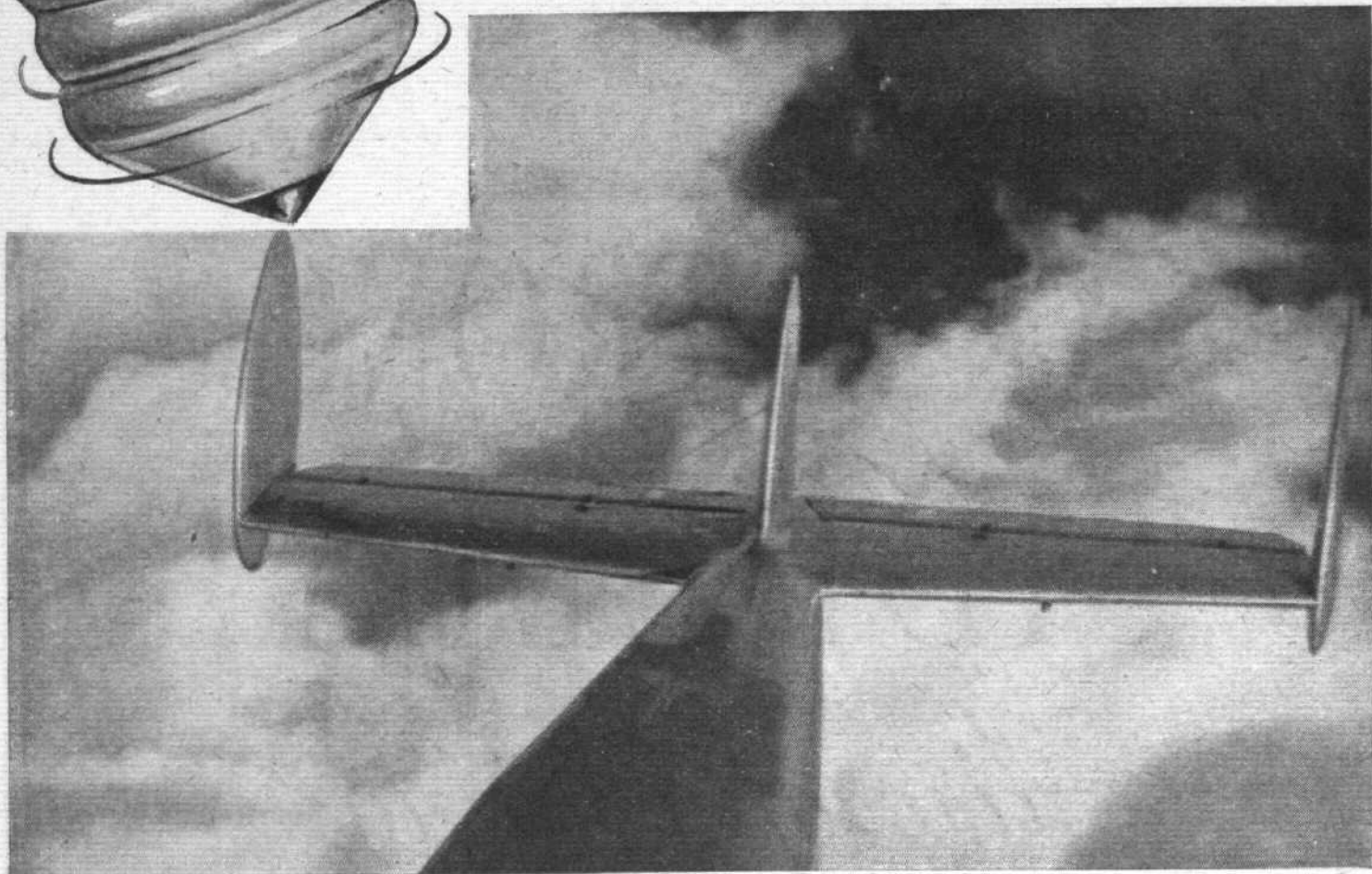
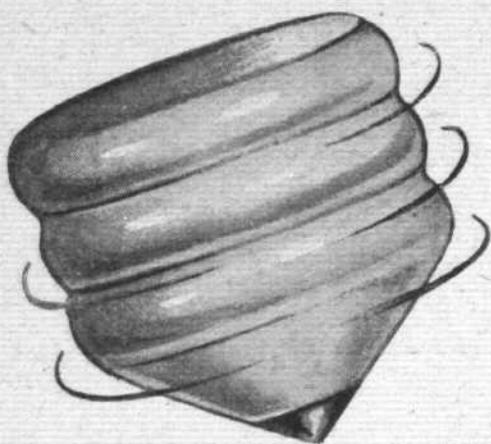
Lack of symmetry and balance of thrust and inertia forces on the wobble-plate and its connecting members have precluded full advantage being taken of this highest concentration of power. End thrust between the wobble-plate and the revol-



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That is the kind of post we like to open, for it keeps our experts on their toes. The Cellon laboratories are at the disposal of all who are faced with finishing problems and, touch wood, we have never been beaten yet. Let Cellon work for you. Write to Cellon Ltd., Kingston-on-Thames, or telephone Kingston 1234.

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CELLON
CERRIC CERRUX

CORRESPONDENCE

can reach a certain velocity, the velocity of liberation, then it can leave the gravitational attraction of the planet in question. It is also known that the resultant velocity of a rocket is proportional to the jet velocity and to the logarithm of the inverse of the ratio of the mass at the instant considered. Therefore, if the ratio of the actual mass to the initial mass is made sufficiently small, the final mass can be made to attain a velocity in excess of the jet velocity. Therefore, with known fuels, providing the ratio of mass is sufficiently small, rockets can be made to escape from the gravitational attraction of the earth. The idea of more powerful fuels is, of course, to increase the mass ratio and hence the payload of the rocket.

In my opinion, the immediate problem is not the discovery of new fuels, but rather the development of the rocket motor in order for it to function more efficiently with the present fuels. Present known fuels, if used in conjunction with a motor that is really efficient, are capable of giving us sufficient energy and payload for our immediate needs, namely, terrestrial rocket flight and inter-planetary travel to the nearer planets and, of course, the Moon.

The object of the astronautical societies should, therefore, be the development of the rocket motor, and the application of the motor to sounding and stratosphere rockets. I am confident that when we have improved the motor itself and made it capable of using more powerful fuels, then these more powerful fuels will be discovered as a natural matter of course.

E. BURGESS

(President, Manchester Astronautical Association).

CONTRA-ROTATING AIRSCREWS

Periodic Variation of Velocity

IN replying to Mr. Cleaver's letter in your November 27th issue, I would like to point out that he ignores the main point that was brought forward in my letter. This was the presence of a periodic variation of velocity field around the airscrew disc with a consequent possibility of vibration trouble.

With regard to the achievement of perfect torque balance, inspection of my original letter will show that the words "in general" were inserted. In any case, in practice the engine ratings used and varying compressibility effects would, again in general, operate against such achievement.

J. A. C. WILLIAMS.

AIRSCREW BLADE MATERIALS

Another Point in Favour of Wood

THERE is one point in Mr. Chown's otherwise comprehensive article ("The Case for Wood," *Flight*, November 20th) which might be amplified: the ease with which prototype blades may be made is not simply a question of simplicity of manufacture in the case of wood. Metal blades have to be strain-gauged on the bench (and preferably in flight also) before the design can be passed, and, indeed, it is only by virtue of this procedure that thicknesses can be kept to a minimum and a reasonable low-weight blade produced.

In the case of wood, as Mr. Gillmore admitted, vibration stresses are so low that no such tests are required, so that there is no delay in flight-testing due to this cause—an important consideration.

J. LOCKWOOD TAYLOR.

AID TO NAVIGATION

Adaptation of the Link "Crab"

MAY I submit an idea which, though I feel it is probably not original, would, it seems to me, eliminate most of the errors and hard work involved in D.R. navigation.

Put simply, it consists of a crab (similar to that used in a link trainer) controlled from a master or gyro compass which would automatically run over the chart and thus give an air plot. The speed at which the crab moved would be dependent on the true air speed of the machine and the scale of the chart.

All the navigator would then have to do would be to take occasional drifts and thus determine the wind speed and direction, and any changes that might occur in it.

The advantages of such a method seem to me to be:—

(1) That the pilot need not fly a straight course (the crab would plot this just as accurately so long as the speed did not vary unduly).

(2) It eliminates errors due to the pilot not steering accurately the courses given him.

(3) It considerably reduces the pressure of work placed on the navigator when many changes of course occur in a short time, thus enabling him to keep a very accurate wind plot.

(4) It can also be used for the determination of winds; the procedure being as follows: The aircraft is flown over a landmark, the point that the crab has then reached being marked on the chart. The machine is then cruised round about for, say, ten minutes, finally passing over the same object again. This point is also marked. A straight line drawn between the two points giving the direction of the wind and the distance that the machine has flown against it in ten minutes.

Any changes in variation on a long flight would periodically be allowed for.

The crab would probably be best placed under the chart in a navigation table with a false bottom. The chart would be visible through a sheet of glass forming the table top and any further plotting could then be done with a suitable pencil on the surface.

Would not such a device be a godsend to men engaged on patrol work over the sea or those having to take evasive action?

"SIMPLICITAS,"

Sgt. Pilot.

A.T.C. SQUADRONS

Teach Them Airsense with Gliders

I MAY be (in fact, probably will be!) stirring up a "hornet's nest" by these observations, but for a considerable time past I have felt very sincerely that all was not well with our A.T.C. squadrons.

Now perhaps there will be many people who will be only too glad to enlighten me, or even to attempt to suppress my views. But in the few squadrons I have been able to observe, there does seem to be something lacking in their organisation, in spite of all the good work (and hard work) carried out by the instructors and others.

There seems to be sometimes an atmosphere lacking in confidence towards the cadets themselves. They join with the bloom of enthusiasm which is essentially the prerogative of youth. Perhaps they may be too ambitious, but after all, if a lad joins with visions of practical work and study of matters aeronautical, and then finds (very slowly) a stunted apathy which instils the most monotonous drudgery of his school days into a spirit craving to sprout wings, then it is not to be wondered at if he should gradually fade away.

I know full well that A.T.C. regulations do lay down the courses of instruction, but after all, they are flexible according to squadron facilities, and I do think that squadron committees could give the lads credit for a certain degree of intelligence, and if some of those committees, for example, who have devoted surprising amounts of energy towards the organisation of dances and the like to provide funds for musical instruments had provided workshops and materials or even a technical library instead, I would condone their action.

Whilst the communal spirit of a squadron must be maintained, don't let us go to extremes and turn them into social clubs and the like.

I believe there has been a very small amount of gliding done in the past. Let the Air Ministry requisition the few gliders which still exist, and let the cadets learn airmanship. By this I mean airsense, the care and maintenance of the fundamentals of aircraft, rigging and construction, in addition to the actual flying.

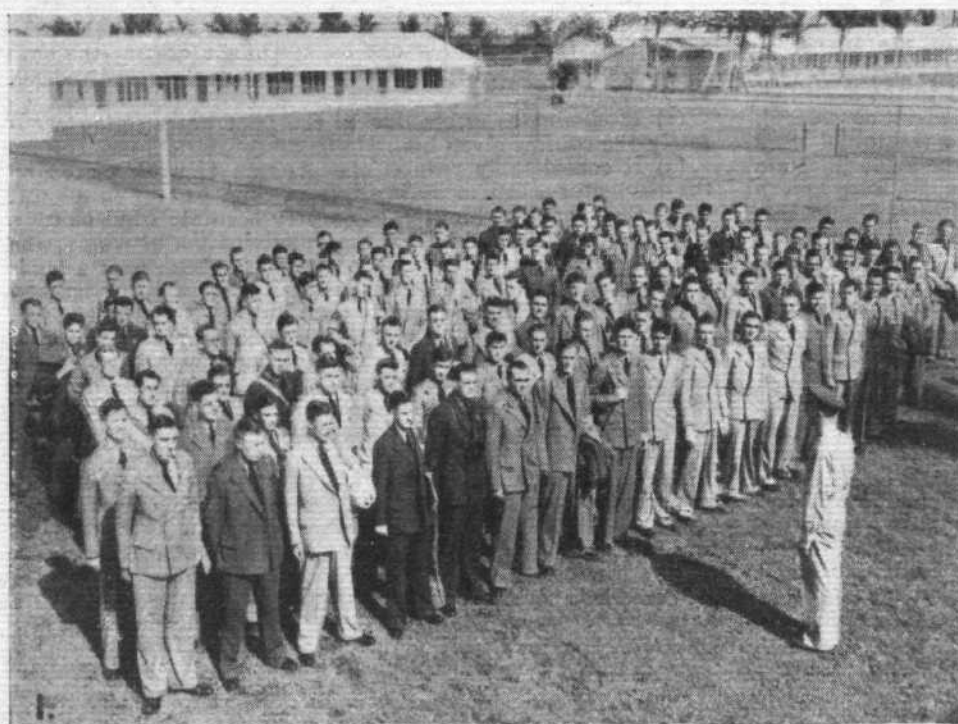
Where there are no hills, I still have faith in the methods of auto-towing or even winch-launching.

I would go so far as to say that it would actually pay the Air Ministry to release materials for the squadrons to construct their own gliders. When you realise how much can be learnt in this process, and how many would benefit from these courses, it is beyond doubt that it would attract, and what is more important, hold these potential recruits.

There are many other phases to this contention, but in view of the latest Government urge to youth to play its part in these movements, it is up to us all to remember that these cadets are of the breed to so few of whom "so much is owed by so many."

G. A. CHAMBERLAIN.

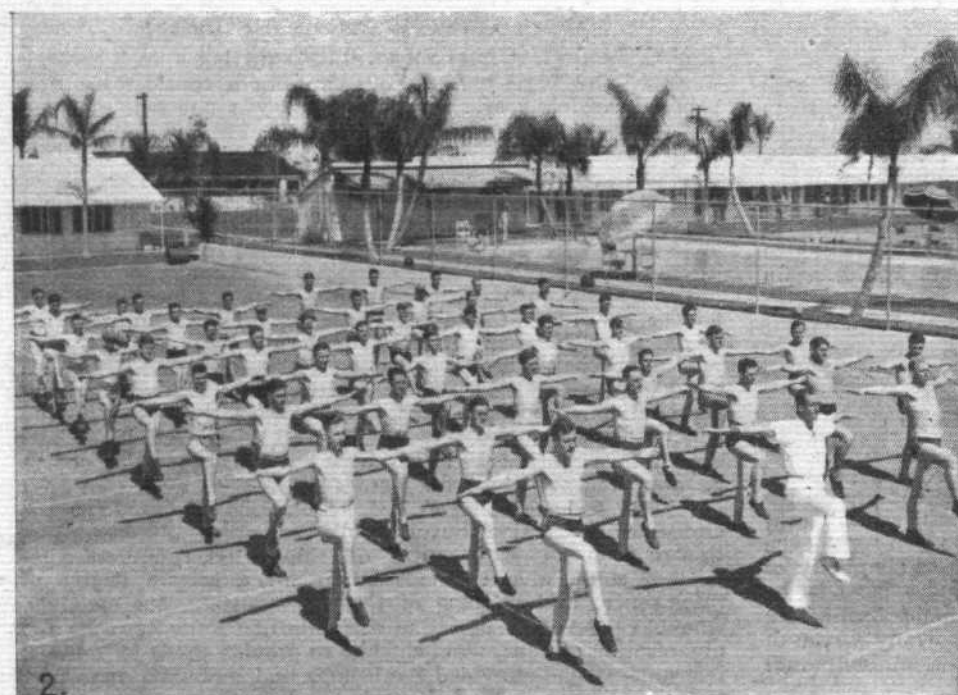
R.A.F. FLEDGLINGS IN AMERICA



U.S. Army Air Corps and Naval Air Service Co-operate in Producing Thousands of British Airmen

EARLY this year the training of selected R.A.F. aircrew personnel in America came into operation, and to-day a number of schools in various parts of the U.S.A. have several thousand pupils under training.

This flow of highly trained personnel, who return to Great Britain to complete their operational training, has been made possible by the ready co-operation of the U.S. Army Air Corps and the U.S. Navy Air Service, and these pictures are selected from the first batch to be released of R.A.F. trainees at one of these schools.



(1) A batch of new arrivals being addressed by an instructor.

(2) Physical training, under ideal climatic conditions, is an important part of their instruction.

(3) Instructors (in white) each take a class of four pupils into the air in Stearman PT-13 trainers.

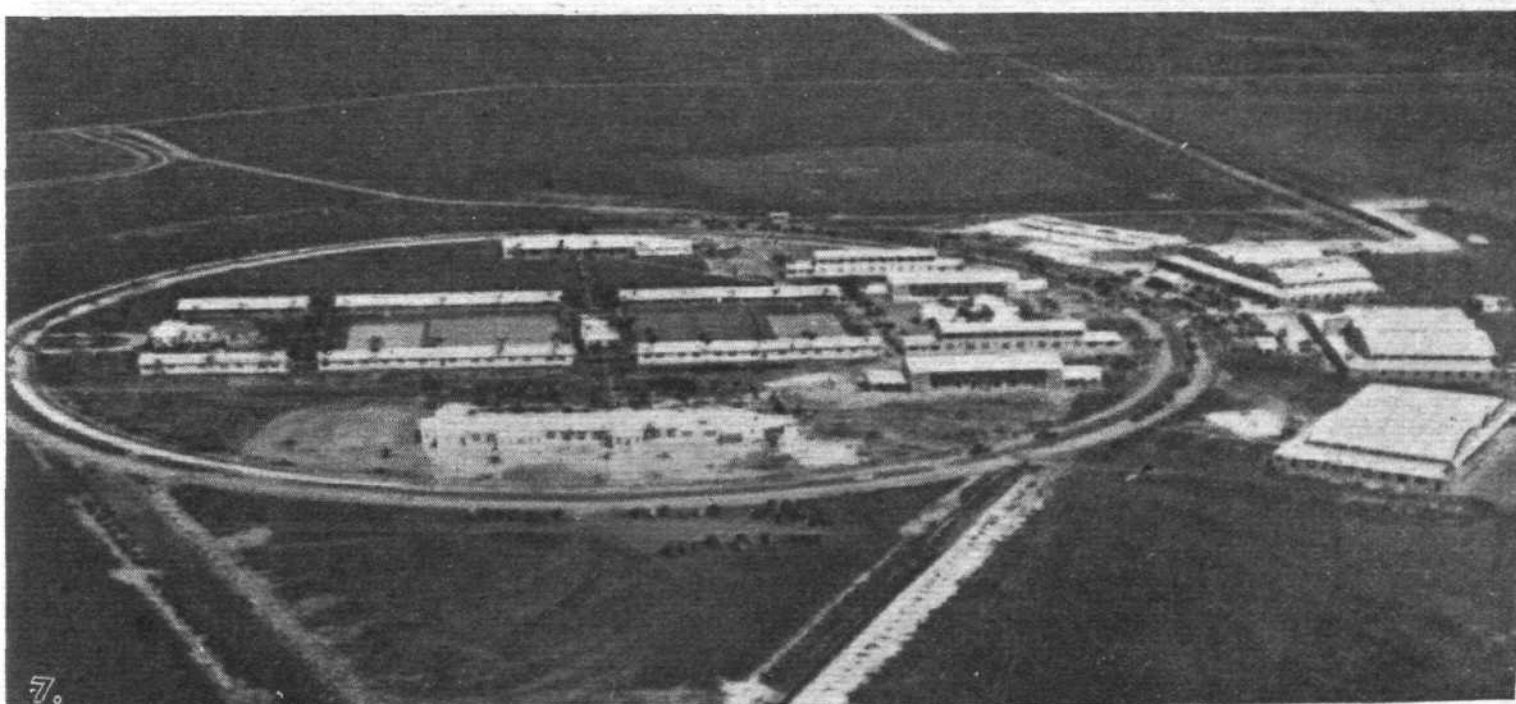
(4) An impressive line-up of Stearman trainers on the airfield with a couple of Ryans and two Sikorski amphibians in the distance.

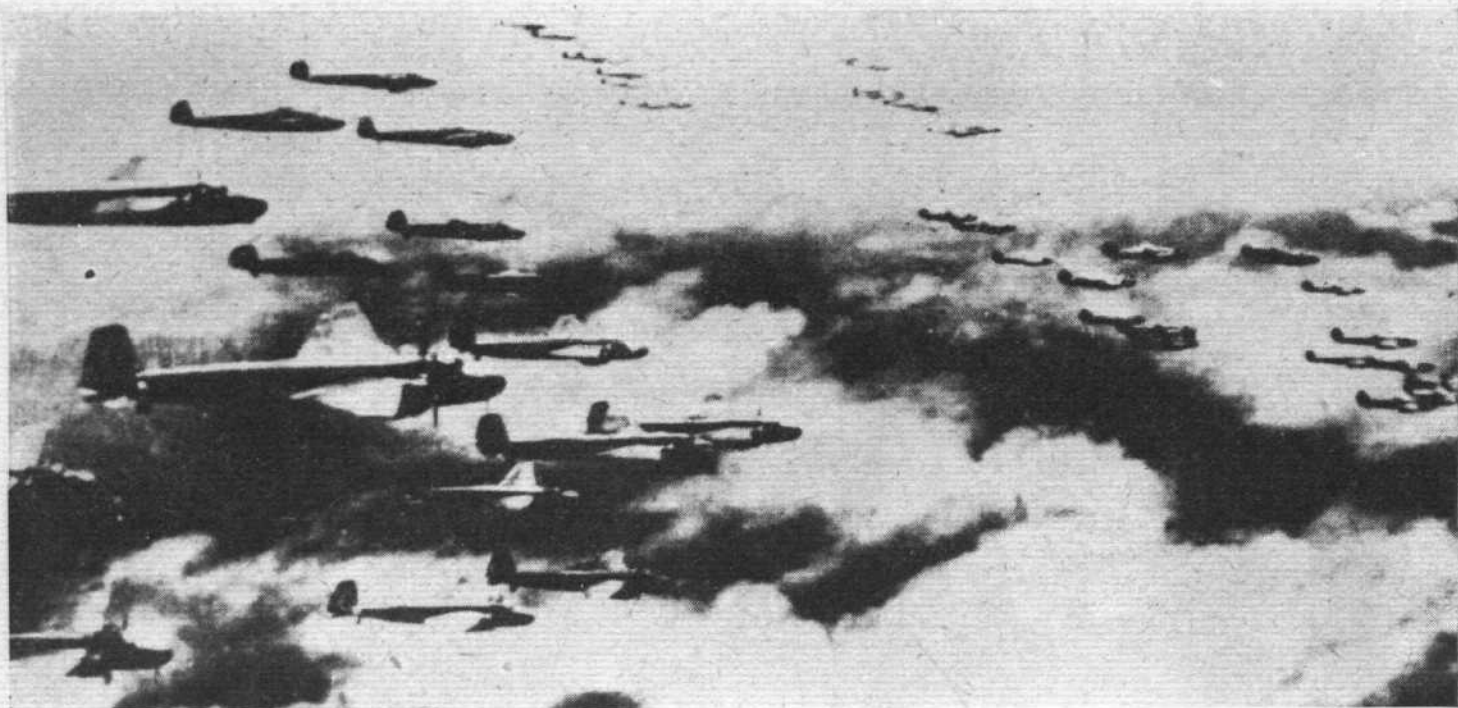
(5) Pupils marching from the lecture room; half their working hours are devoted to theoretical instruction.

(6) Stripped for action; a party of pupils off for a game of baseball in bathing shorts.

(7) An air view of the school; the buildings on the right (outside the circle) are the hangars.







A formation of Mitsubishi twin-engined bombers over China.

AIRCRAFT IN THE PACIFIC

Japan an Unknown Quantity : Multiplicity of Types in Use by the Allies

COINCIDENT with any mention of the war in the Far East arises the query, "What has Japan got in the way of modern aircraft and how many can her factories turn out per annum?" It is impossible to give an exact answer but from probabilities and past history a fairly accurate assessment can be made.

In easy going pre-war days—when the great democracies thought that all men had become of good will, and air forces and suchlike were a cross between national toys and insurances against very improbable wars—the Japs used to crowd our aviation meetings armed with a polite insolence and miniature cameras. Right up to September, 1939, this went on; we have yet to meet a single Englishman who has been accorded the same privileges in Japan.

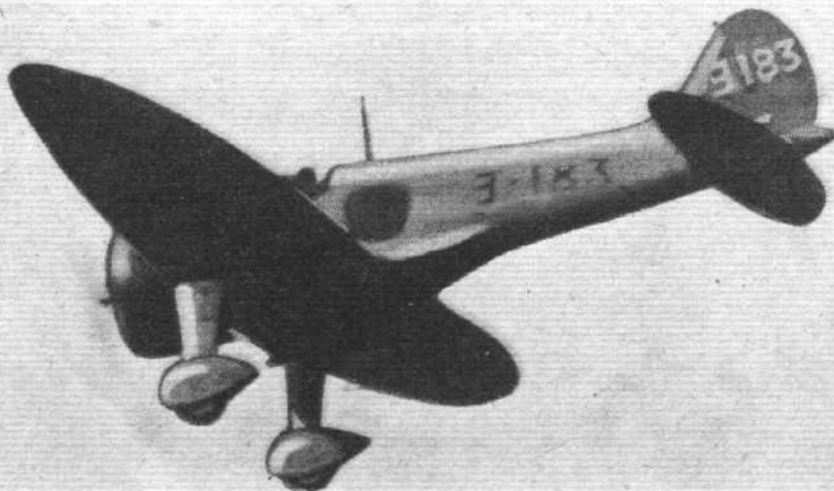
It is notorious that the Japs have little inventive power of their own, but they have got a certain sagacity in choosing whom to follow. For military matters the Germans have always been their ideal, regardless of the fact that they have not the money nor the resources to provide the wealth of equipment needed for such an army. In naval affairs they have copied us slavishly, since they see themselves as the Britain of Asia, and maybe of the world, for every Japanese midshipman has been promised the day would come when he would sail against the British Fleet.

In considering their air arm they have chopped and changed from one instructor to another according to who they felt had the best aircraft—or the biggest air force—at any particular moment.

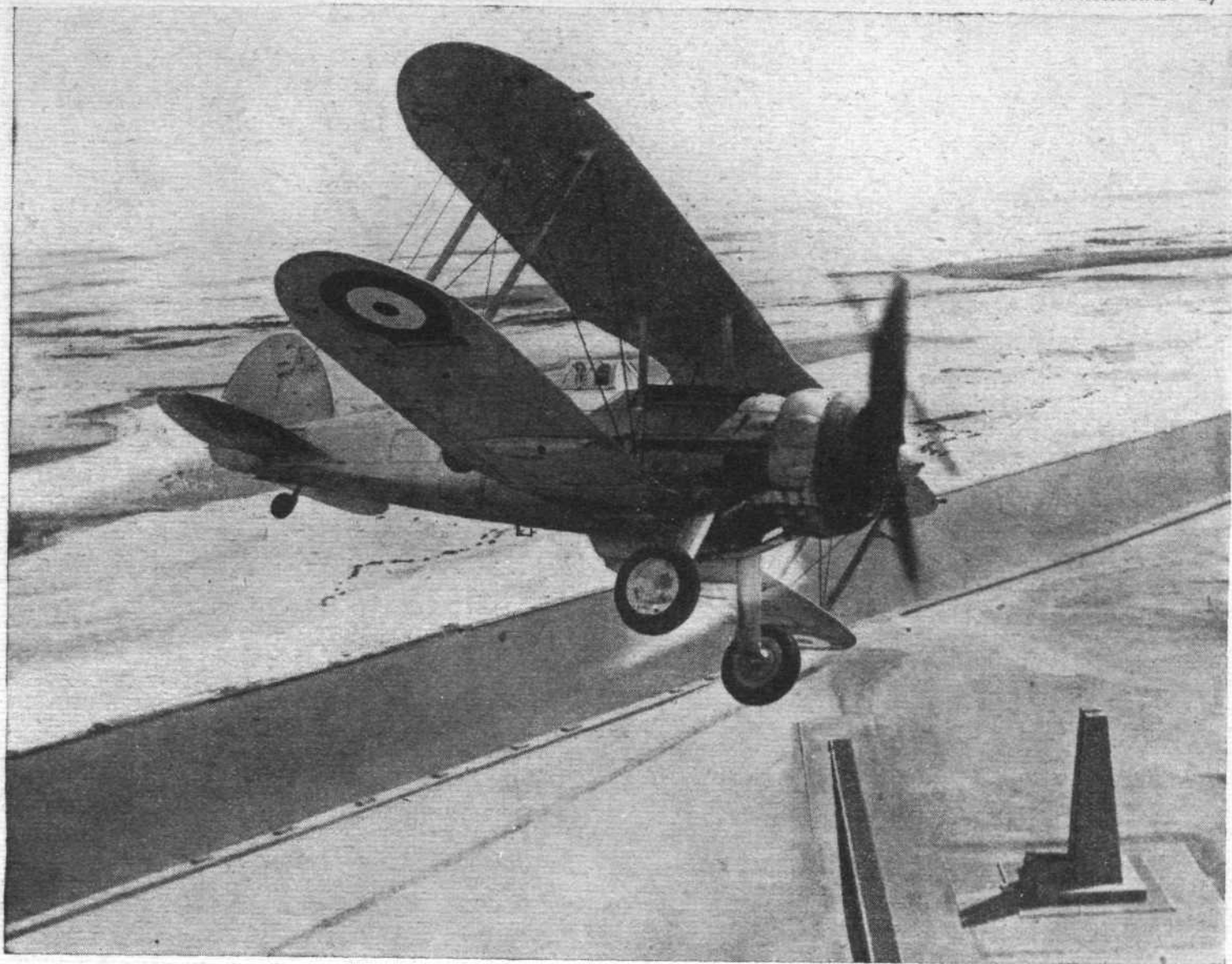
At one time the Junkers influence was very strong, at another period the French *multiplace de combat* type with its innumerable projecting turrets seemed to them to be ideal. So much

so that many of the early efforts at original design by the Japs looked for all the world like the old French flying conservatories translated by Dr. Junkers. With the advent of the successful military low-wing cantilever monoplane in America the Japs switched over to this type. In some cases they built under licence, but in most cases they unashamedly copied from one machine specially bought for this purpose. This copying attained such proportions that just prior to the war no firm of repute would tender blue prints or sell single machines to Japan.

In view of the foregoing it can with certainty be assumed that since the outbreak of hostilities in 1939 they have been re-equipping themselves to standard Axis pattern; ninety per cent. German and five per cent. Italian. It is, in fact, known that they have for some while been building Junkers Ju 87 and Ju 88 and also Heinkel He 111s in quantity. It has been suggested that they have adopted the He 112 as a fighter, but since this proved such a flop (literally) in the hands of the *Luftwaffe* it is unlikely that it will be proceeded with. Of the Italian types we know that the Fiat B.R.20 is being built under licence and a number of these were supplied direct from Italian factories



The Mitsubishi 96 monoplane which is used by the Japanese Navy for both fighting and dive-bombing. It is armed by two synchronised machine guns.



The Gloster "Gladiator" has proved itself to be one of our most effective fighter aircraft under circumstances in which the qualities of climb and manoeuvrability have enabled it to defeat the faster enemy types



GLOSTER AIRCRAFT CO. LTD

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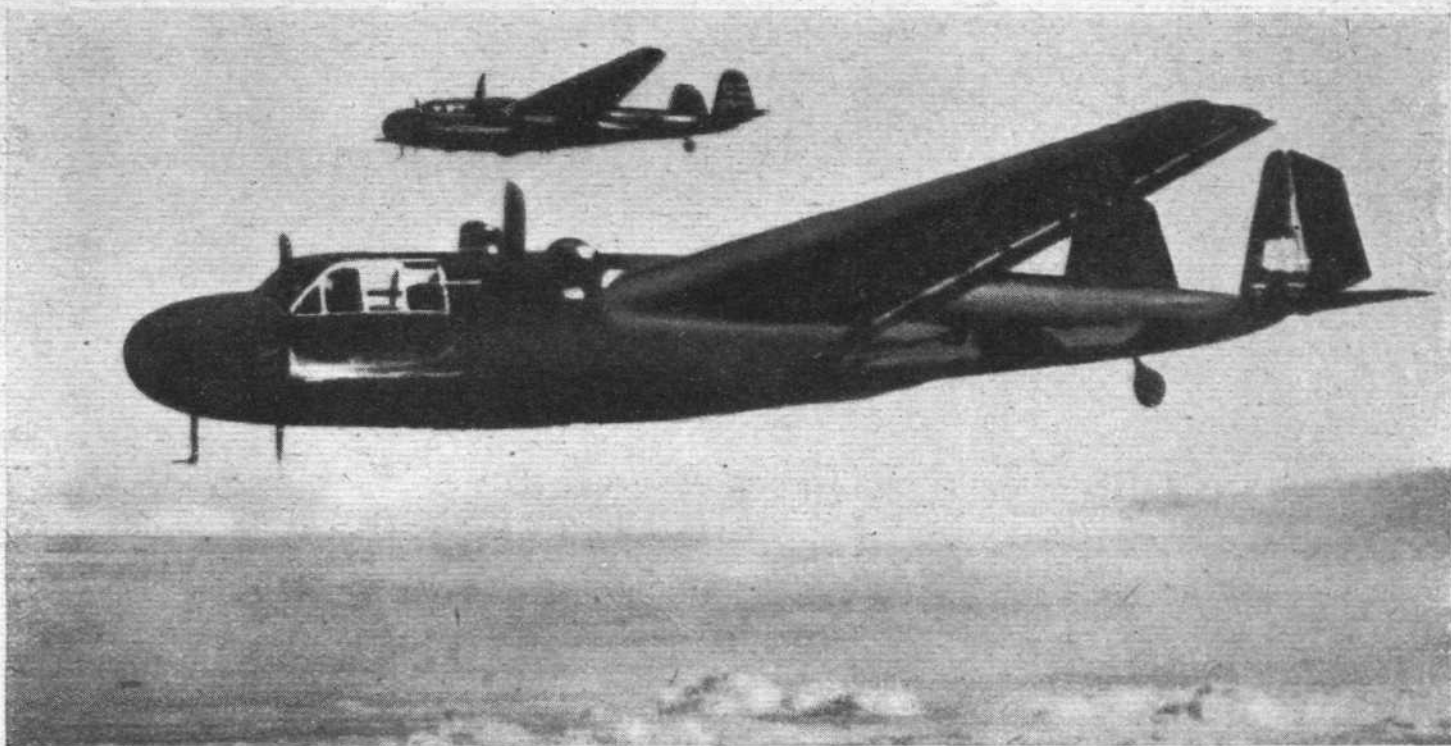
SIR W.G.
**ARMSTRONG
WHITWORTH**
AIRCRAFT
LIMITED

BRANCH OF HAWKER SIDDELEY AIRCRAFT Co. Ltd.

DESIGNERS AND CONSTRUCTORS

OF THE WHITLEY HEAVY BOMBER

AIRCRAFT IN THE PACIFIC



Twin-tailed Mitsubishi 96 bombers which are an adaption of the Junkers Ju 86.

in 1938. It will be remembered that the Italians are using the B.R.20s as torpedo-bombers in the Mediterranean—one of them hit the *Nelson*—and it is reasonable to suppose that the blue prints of the necessary modifications have been passed on. Flying boat design is a good deal slower to change and it is to be expected that it will be some while before they depart from the four-engined type which is based on the Potez Cams 141 Reconnaissance flying boats. A feature of this boat is the internally stowed bombs which are pushed out on racks in guides under the wing before release. This system of bomb-dropping is copied from the Short Sunderland.

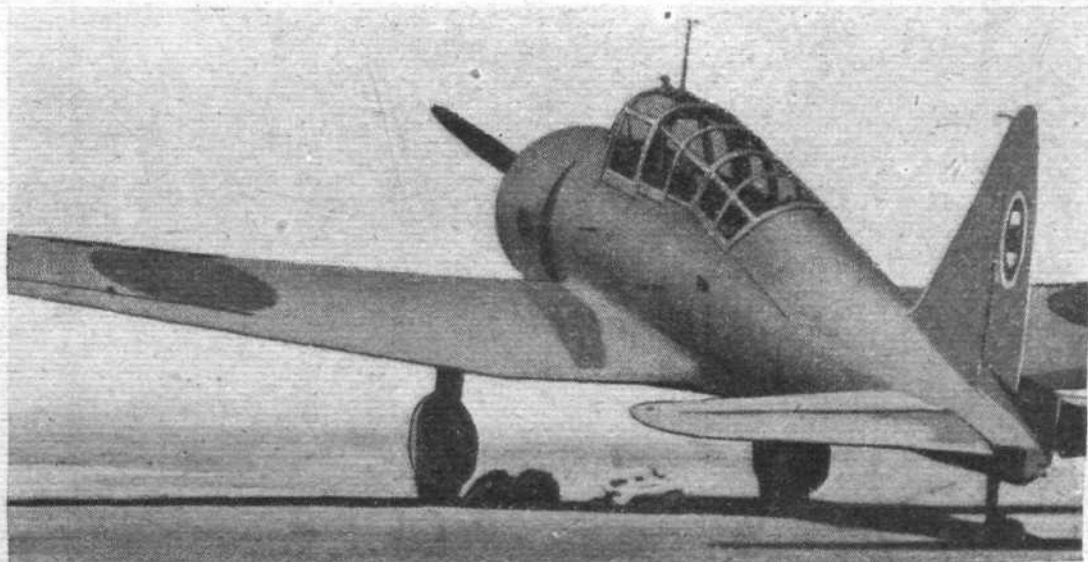
We know, to our discomfort, how long it takes to switch over a quantity-producing factory to a new type. Bearing this in mind it is not to be expected that the new Axis designs have entirely ousted the pre-1940 types and, therefore, we have reproduced some photographs of the more successful pre-war machines. These include the twin-engined, single-tail Mitsubishi bomber; the little Mitsubishi 96 monoplane which the navy uses both as a fighter and a dive-bomber; the Mitsubishi 96, a twin-tail twin-engine bomber which follows closely the design of the Junkers 86K and the Army 98 or Mitsubishi Karigane, a copy of the Northrop A.17.

The Japanese system of numbering their aircraft types by the last two numbers of the year in which they are taken into service can be very confusing. For instance, if one of the factories produce two types in the same year—say a fighter and a twin-engined bomber—the y

both receive the same number. The number is derived from the Japanese calendar, which starts at 660 B.C. and, therefore, 1938 would be year 2598.

Having considered the probable quality let us turn to assessing the quantity. It is now some three years ago since a big expansion of the army and navy air services was considered necessary and an ambitious five-year plan commenced. It is remarkable how this five-year idea constantly crops up in dictator countries. First-line strength at that time was in the region of about 2,000 aircraft, of which about half were naval and the remainder military. Of the 1,000 naval machines it is computed that 40 per cent. were ship-borne on battleships, cruisers or aircraft carriers. The others, of course, are shore based and correspond rather more to our Coastal Command than to the Fleet Air Arm.

No official figure has been given of the number of first-line machines aimed at by the end of the five-year period. Having regard to the known shortage of some raw materials and also of the foreign exchange to buy any, it is fairly safe to assume that at the end of this period they will



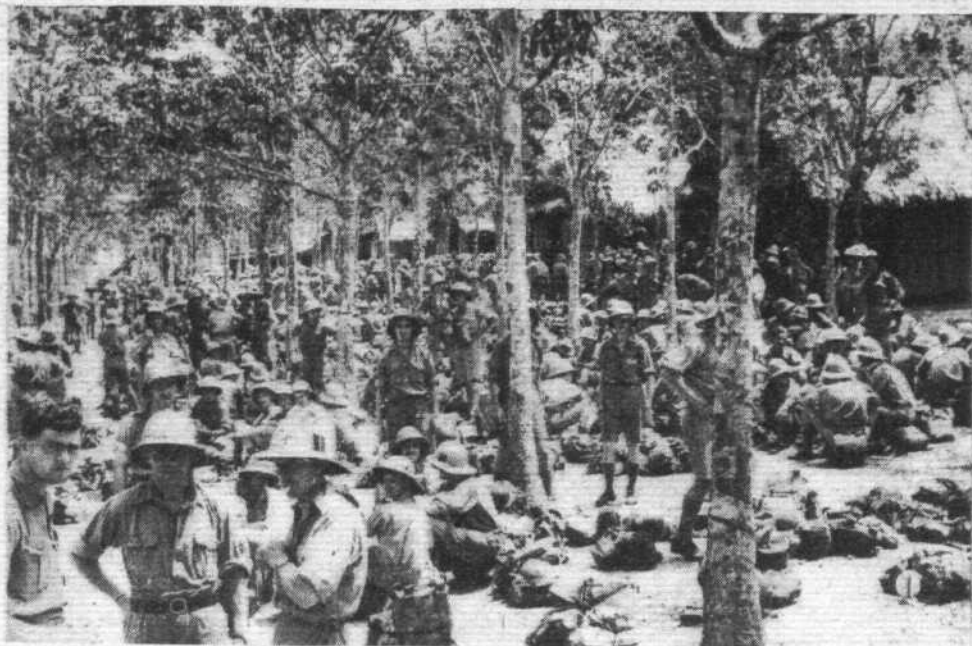
A Japanese edition of the Northrop A.17. It is known as the Army 98 or Karigane. The latter word means wild goose.

AIRCRAFT IN THE PACIFIC

have achieved a strength not exceeding 5,000 machines available at any one time. Three of the five years have passed without any very heavy losses in air battles, so we may take 3,800 as a probable correct figure for first-line aircraft of all types.

Until the adoption of Axis designs only light armament was to be found on any of the Japanese fighters. It was usual to have two-rifle-calibre machine guns in the fuselage, synchronised to fire between the airscrew blades. Doubtless there are a number of these still in service with the fighter squadrons. The majority of the modern fighters, however, are armed with four machine guns or, in a few cases, with two machine guns and two 20 mm. cannons. There was a time when we used to hear of special Italian squadrons, the pilots of which were going to show their patriotism by remaining with their aircraft until it hit the target in order to be certain of bull's-eyes every time. These squadrons have been strangely quiet since Italy's heroic entry into the fray. The mental make up of the Jap, however, plus his religious belief that the only short cut to Heaven is via death in battle, will probably produce quite a number of pilots really prepared to go to such lengths. An instance was the sinking of the *Prince of Wales* and the *Repulse*. To have made sure of getting so many torpedo hits the attacking aircraft must have flown to very close range through a terrific barrage of fire. Turning now

THE HUMAN MATERIAL : Stuck in his waist is the Samurai sword, which is a mark of the wearer belonging to a special military caste. The pistol is much more modern.



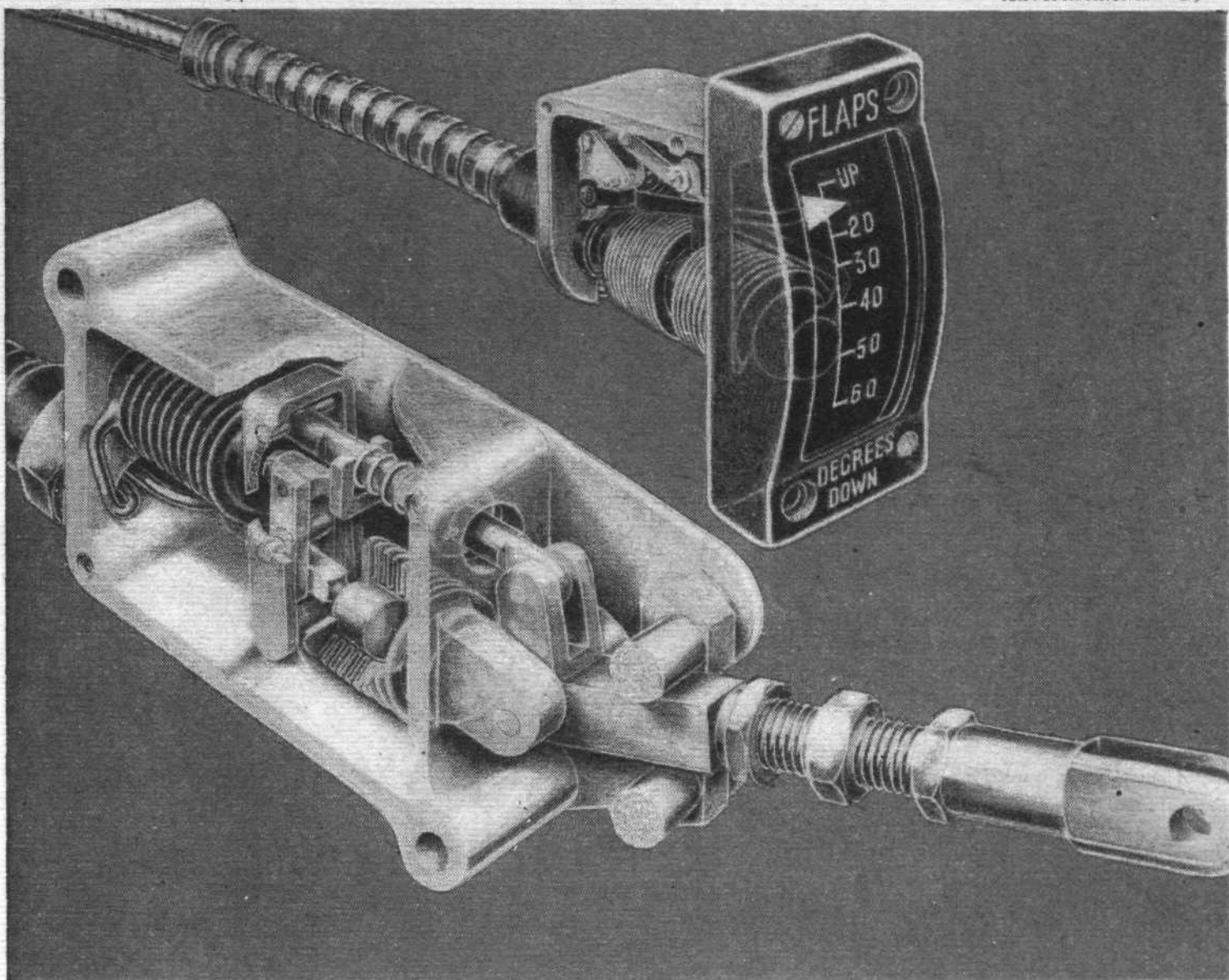
(Above) R.A.F. personnel sitting in the shade of rubber trees in a "Transit Camp" near Singapore. They are awaiting posting to an operational station.



to our strength in the Far East it is of interest to remember that Air Chief Marshal Sir Robert Brooke-Popham is Commander-in-Chief, Far East. When he took over this command some months ago he was promised a continual increase in munitions. This promise has been kept, and substantial numbers of aircraft and men have been arriving in a steady stream. Military strength has also been built up. The Fleet Air Arm will have their own Fulmars, Skuas, Swordfishes, Albacores and Walruses, but the land forces are almost entirely equipped with American aircraft. A glance at a map of the world will show the wisdom of this arrangement. Some of the types in use are Brewster Buffaloes, Lockheed Hudsons, Martin Marylands and Consolidated Catalinas. All of these have proved themselves to be first-class machines. English machines in the area are the Sunderlands of the Royal Australian Air Force, and considerable quantities of Blenheim bombers and Blenheim fighters which have arrived from time to time recently. Another useful fact to remember is that Bristol Beauforts are new in quantity production in Australia. A number of these torpedo bombers will probably be available.



The Ubiquitous Blenheims (left). Natives and airmen erecting long-nosed Blenheims in Malaya.



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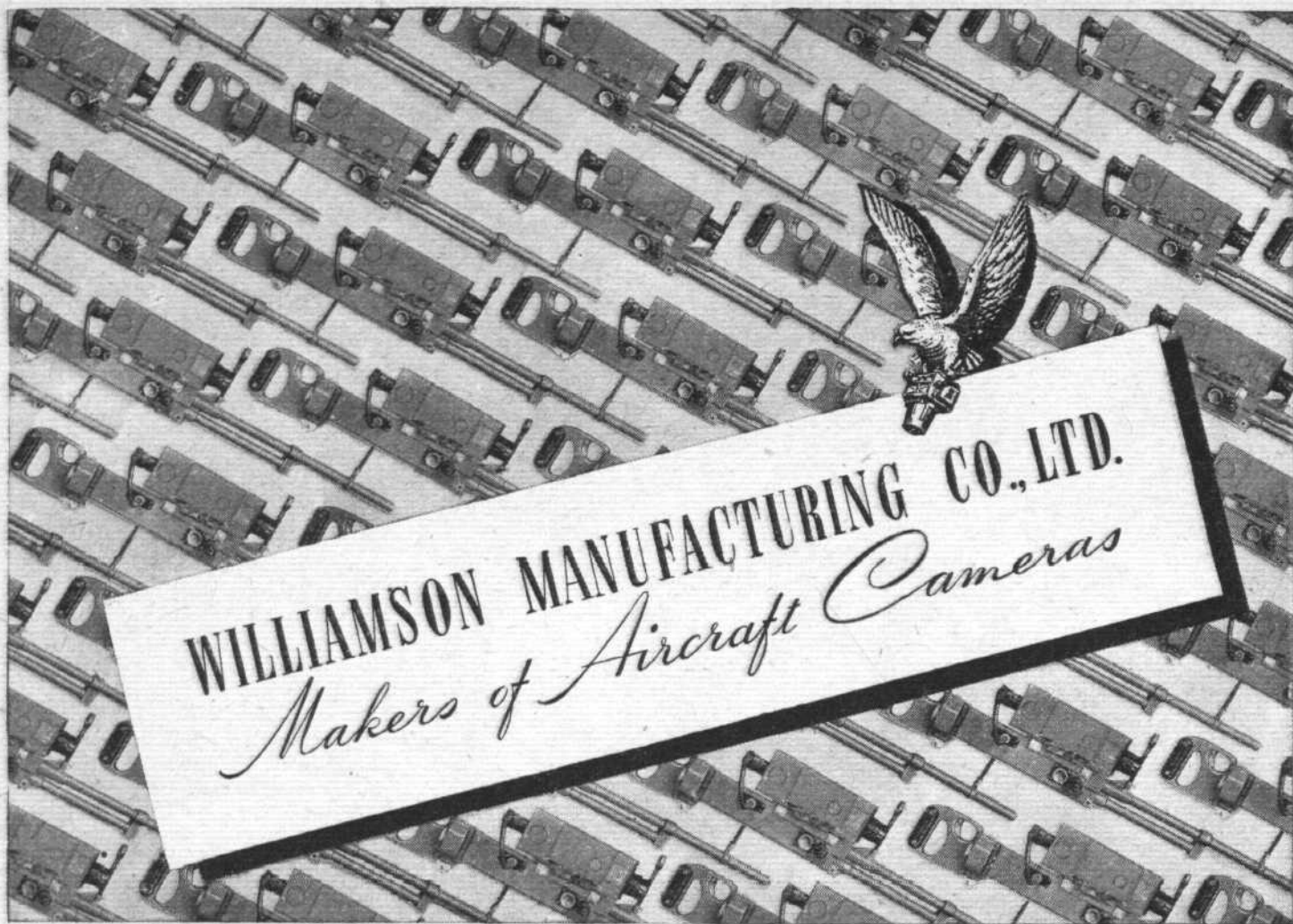
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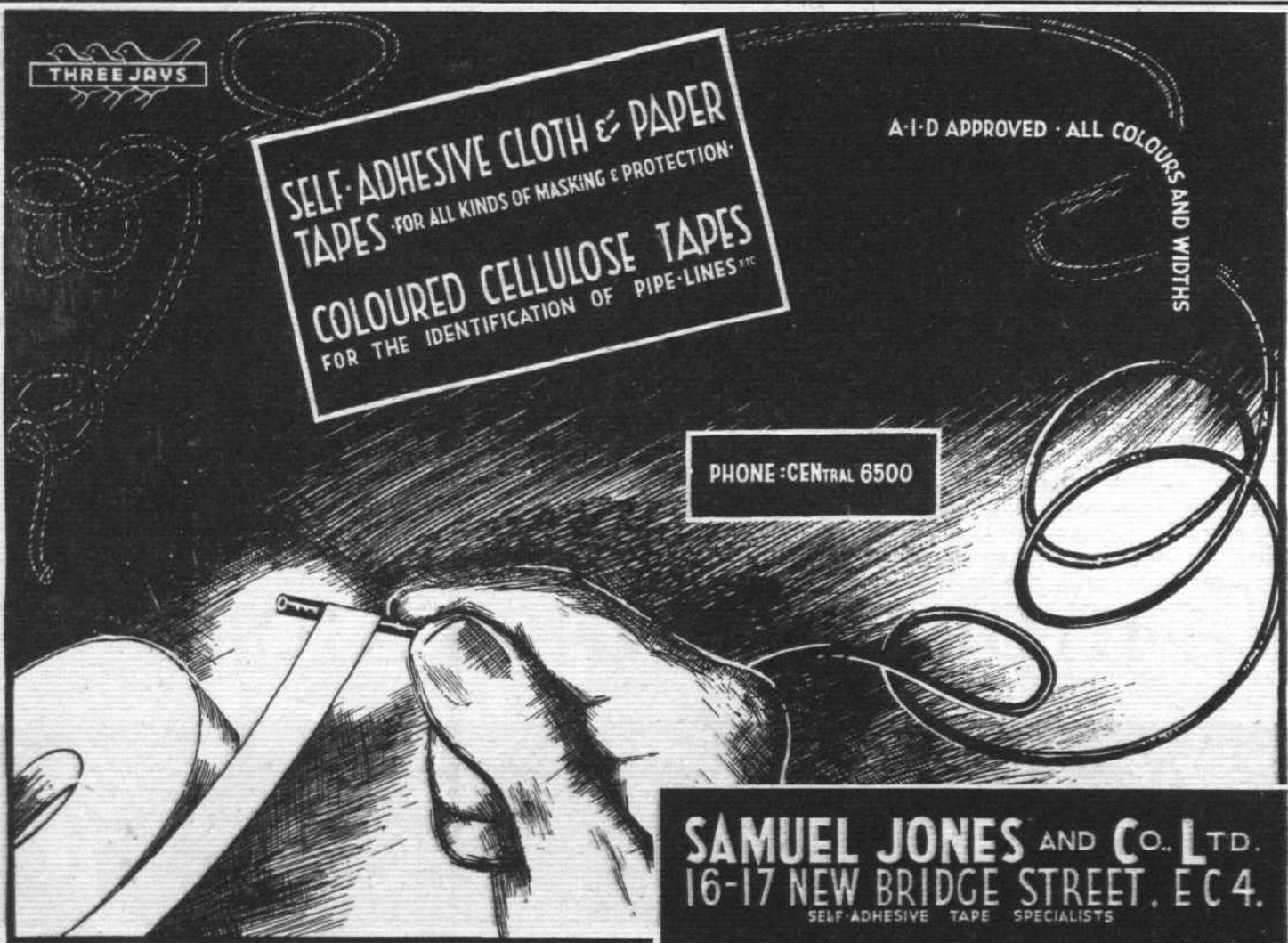
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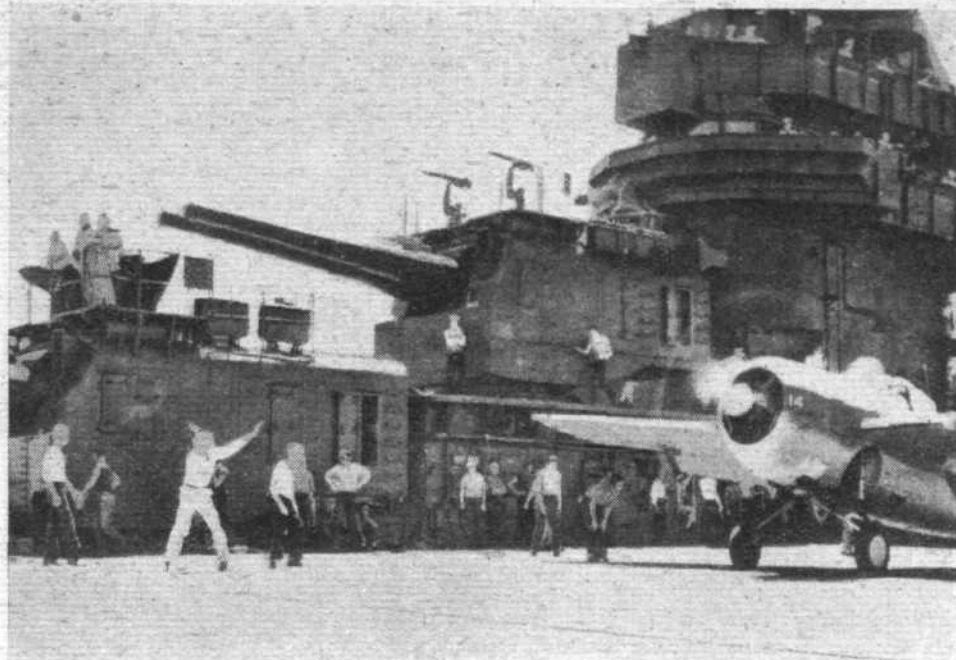
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AIRCRAFT IN THE PACIFIC

Important though the Far East is to us, quite obviously to the Americans it is more important still. The possibility of war in the Pacific has always influenced the design of American military aircraft. Irresponsible opinion in this country has sneered at the small bomb loads of some of the American bombers by comparison with those carried by our comparatively short-range aircraft. The distances to be covered over the Pacific make range more important than bomb load. To get to the target with one 1,000 pound bomb is much more effective than not getting there with three tons.

It is impossible even to guess at all the types which the two U.S. air services will be using in their attack on Japan and its fleet, but most of the familiar names will be in the forefront. The Consolidated B.24 bomber—known to us as the Liberator—and the Boeing B.17E (Fortress) with its exhaust driven turbo blowers should soon be setting some of the paper and wooden houses alight in Japanese cities. Lockheed P.38 (Lightning) and Bell P.39 (Airacobra) will doubtless be operating in the Philippines and on the north-west coast of America. Consolidated PB.4 Patrol Bomber flying boats (Catalina) will be able to use their combination of time and range to full advantage. The Catalina can stay in the air for more than 24 hours without refuelling. For work with the Army the Douglas A.20 Attack Bomber should now be operational in considerable numbers. This twin-engined machine, it will be remembered, is practically identical with our Boston and its sister night-fighter-bomber, the Havoc. It is probable that engines of higher horsepower have been installed with a corresponding increase in performance.

Prominent in the shipborne types will be the Douglas SBD-1 dive-bomber, which together with the Brewster Buffalo and Grumman Martlet fighters, make up a large



A Grumman shipboard fighter taking off from one of the U.S. aircraft carriers. It has a speed of 350 m.p.h. and a ceiling of 37,000 ft.

proportion of the U.S. aircraft carriers' complements of aircraft. The U.S. Navy Air Service has always been a great exponent and believer in the dive-bomber, right from the days of the Curtiss Helldiver biplane. Some good work is to be expected from these Navy dive-bombers. The capital ships and cruisers, which are all fitted with catapults, are mostly equipped with single-float Vought-Sikorsky OS2U-1 observation machines. This is a good sturdy job but it is doubtful whether it will stand up to the racket of bad weather and gun blast as staunchly as do our Walrus amphibians.

It will probably take the Americans some while to get ruthless—it took us two years and several ruined cities—but we would like to suggest that an occasional trip to Tokyo by the Douglas B.19, with its bomb load of 18 tons taken up exclusively by incendiary bombs, would go some way to wiping off some of the debit balance which has accrued during the past week.

Finally, there is the Netherlands East Indies to be remembered. While, perhaps, their contribution is not huge, the service personnel is first class. They have in service a number of float seaplanes and three-engined Dornier Do 24 flying boats which they bought from Germany prior to the outbreak of war. If any boats of this type have been loaned to the Japanese by their Axis partners it will mean considerable headaches for the local aircraft spotters. The only external difference will be the orange triangular markings of the Royal Dutch Air Force instead of the German Swastika. These boats have 750 h.p. Wright Cyclone engines.

The Dutch also have a number of Fokker T.5 long-range bombers which are fitted with two 925 h.p. Bristol Pegasus XXVI engines. These mid-wing monoplanes are useful craft with a maximum speed of over 250 m.p.h. Cruising speed is in the neighbourhood of 200 m.p.h. on two-thirds throttle. Although airframe spares will now be unobtainable, new engines can probably be had from our stores at Singapore.



Douglas SBD-1 dive-bombers with a Grumman fighter in the foreground with engines running ready to take off in quick succession from the flight deck.

AIRSCREWS AND ART

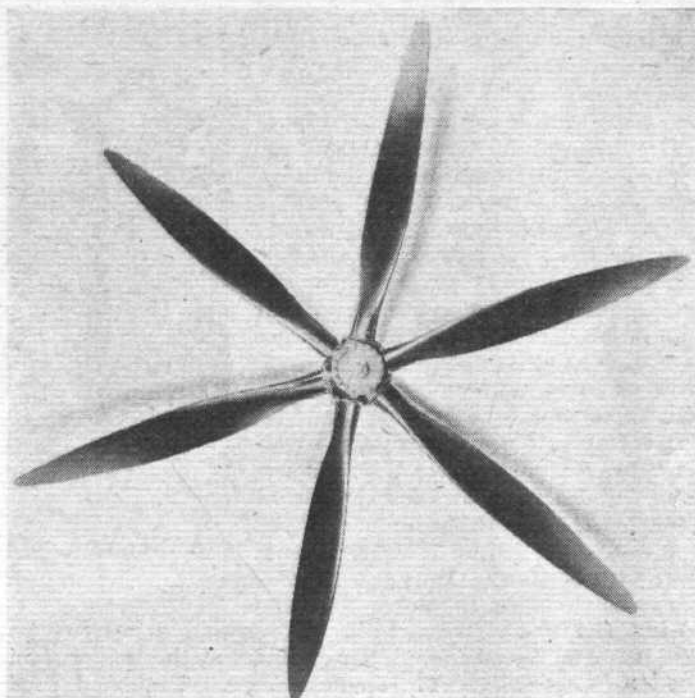
Some New De Havilland Technical and Artistic Issues

FOR the second time in its history the airscrew has become a vital factor in aircraft progress. The previous occasion was about ten years ago, when all far-seeing aircraft engineers began to realise that any further considerable progress in aircraft design required the acceptance of the variable-pitch airscrew. Now, the continued rise of aircraft speeds, coupled with, and mainly resulting from, engine developments giving extremely high powers at great altitudes, requires a further big step in airscrew design. This is the introduction of large pitch range, high-solidity airscrews, using four or more blades, and, in many cases, the principle of contra-rotation. In addition, the use of more refined blade designs having the thinnest possible sections and roots of good aerodynamic form is also demanded.

A New Report

The engineering department of the de Havilland Aircraft Company, Ltd., have recently completed a report (No. R.83, by K. B. Gillmore, A. V. Cleaver and J. Mullin) entitled "Airscrew Performance Calculations." This work describes the routine methods of airscrew selection and performance estimation in use at de Havilland's, and is the result of an extensive programme of analysis carried out mainly during the past two years. It is, in effect, an extension of the work reported by Mr. F. M. Thomas in a lecture to the R.Ae.S. ("Practical Airscrew Performance Calculations") in October, 1937, and supersedes the method then described. The new report is being issued through a limited private circulation to the British aircraft industry in the hope that it will prove generally valuable at this present stage in the development of the airscrew.

The new de Havilland report, like Mr. Thomas's older work, is empirical in conception. It incorporates the results of all available airscrew test data, analysed into a form which makes it possible to deal with almost all variations in airscrew design. The method employed is, briefly, to have some basis charts from which it is possible to estimate the performance of an arbitrarily chosen "standard" airscrew design operating at optimum conditions. Other charts are then used to supply factors which correct



Front view of the new De Havilland contra-rotating airscrew.

the performance to that of any actual airscrew design and operating conditions.

It has now also become permissible to publish illustrations of the new de Havilland contra-rotating airscrew, a front view of which is given. It will be seen that a large blade area is provided without the large blade width which would have been necessary in a single airscrew. Another advantage is that diameter, and therefore tip speed, can be kept down to a reasonable figure. In the new six-blader the fundamental design features of earlier de Havilland and Hamilton airscrews have been retained, and the compactness of the hub assembly is notable.

Colour Reproductions

Our readers will doubtless remember the de Havilland announcements which appeared on our centre pages some months ago. They illustrated modern R.A.F. aircraft types, and were reproductions of oil paintings by Frank Wootton. It was generally agreed that both for artistic merit and technical accuracy these paintings were very much out of the ordinary. The de Havilland Aircraft Co., Ltd., has now had the splendid idea of issuing a limited number of fine-art reproductions, in colour, of these paintings. These will make very suitable Christmas presents and measure 17in. by 12in. Single copies are offered at £1 1s., post free, and sets of six at £5 15s. 6d. A still smaller number of proofs signed by the artist are available at £2 2s. single copies and £10 10s. for a set of six. Of the purchase price one-half is credited to the R.A.F. Benevolent Fund.

The prints are obtainable from Mr. R. A. Loader, Samson Clark and Co., Ltd., 57-61, Mortimer Street, London, W.1, by post. A remittance must accompany the order.



Hurricane fighters, from a painting by Frank Wootton. Coloured reproductions of this and other works by the same artist are now available.

Service Aviation



Royal Air Force and
Fleet Air Arm News
and Announcements

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

DISTINGUISHED FLYING CROSS.

P/O. H. B. HUNT, R.A.F.V.R., No. 220 Squadron.

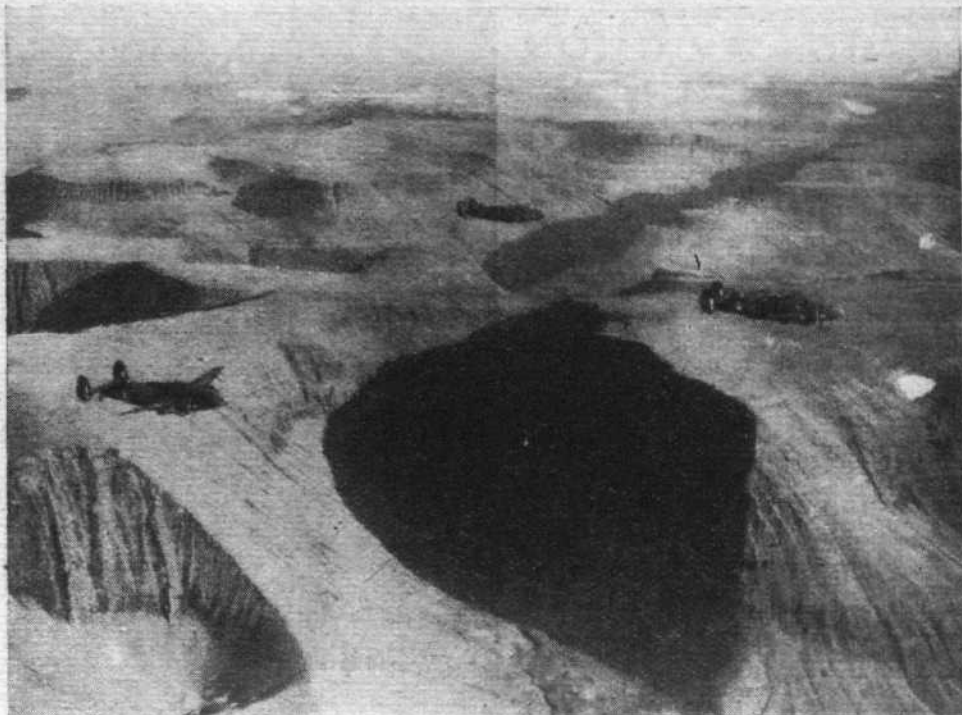
Act. Flt. Lt. J. K. ROSS, R.A.F.V.R., No. 134 Squadron.—Act. Flt. Lt. Ross has taken part in over 200 operational flights, many over enemy territory, both in France and elsewhere. His leadership and keenness to engage the enemy have been outstanding. He has destroyed at least four, and probably a further three, hostile aircraft.

Act. Sqn. Ldr. P. G. ST. G. O'BRIEN, No. 247 Squadron.—This officer has commanded the squadron for the past 13 months and has participated in a large number of sorties both by day and night. On one occasion he participated in one of the longest night flights ever undertaken in a single-seater fighter aircraft, during which he displayed good judgment and fine navigational skill. His outstanding qualities as a leader have set an excellent example.

Flt. Lt. R. E. THOROLD-SMITH, R.A.A.F., No. 452 (R.A.A.F.) Squadron.—This officer has participated in 50 operational sorties since July, 1941. He has proved himself to be a first-class fighter pilot and a most determined and capable flight leader. He has destroyed 5 enemy aircraft and shared in the destruction of another.

P/O. H. P. LARDNER-BURKE, R.A.F.V.R., No. 126 Squadron.—In November, 1941, this officer was the pilot of one of 4 aircraft which engaged a force of 18 hostile aircraft over Malta and destroyed 3 and seriously damaged 2 of the enemy's aircraft.

During the combat P/O. Lardner-Burke, who destroyed one of the enemy's aircraft, was wounded in the chest and his aircraft was badly damaged.



Hudsons of the R.A.F. in open vee formation over Iceland. Many of the flying operations of the Battle of the Atlantic start from Iceland.



Flt. Lt. Brendan Finucane, D.S.O., D.F.C. and two Bars, leaving Buckingham Palace after a recent investiture.

Despite this, he skillfully evaded his opponents and made a safe landing on the aerodrome; he then collapsed. Throughout the engagement, this officer displayed leadership and courage of a high order. He has destroyed 5 enemy aircraft over Malta.

Roll of Honour

Air Ministry Casualty Communique No. 97.
THE Air Ministry regret to announce the following casualties on various dates. The next-of-kin have been informed.

Royal Air Force

KILLED IN ACTION (WHILE FLYING IN OPERATIONS AGAINST THE ENEMY).—Sgt. J. T. Peacock; Sgt. T. A. Whitmore.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. M. Anderson; Sgt. R. Bennett; Wing Cdr. V. Q. Blackden; P/O. J. C. A. Bond; Sgt. F. H. Bridgman; Sgt. A. R. Cain; F/O. K. Campbell; Flt. Sgt. J. Frodsham; Sgt. R. J. Garlish; P/O. J. A. T. Garrould; P/O. C. G. Gibson; P/O. R. J. Hamilton; Act. Wing Cdr. C. G. Hill, D.F.C.; Sgt. R. W. Hillman;



Air Vice-Marshal Coningham, A.O.C. Western Desert, works while taking an open-air meal during the early stages of the new Libyan campaign.



College of Arms
November 1941

Crest Herald
and Inspector of Royal
Air Force Badges

The Crest of the China British Fighter Squadron subscribed for by the British in China. The Chinese characters "Chu Feng" mean "Fierce Wind."

SERVICE AVIATION

Sgt. J. Howell, D.F.M.; P/O. T. Keightley-Smith; P/O. N. J. Kerr; Sgt. R. S. L. Keymer; Sgt. E. W. Laban; Flt. Sgt. C. D. McPhee; Act. F/O. H. Marshall; Sgt. W. C. Mullis; Sgt. A. J. Neal; P/O. R. Needham; Sgt. L. Nuttall; Sgt. E. Oakes; P/O. J. A. Parry; P/O. E. R. Pierce; P/O. A. W. Ryan; Sgt. A. P. Smith; Act. F/O. R. F. Tapp; Sgt. G. R. Thistle; P/O. R. G. Wales; Sgt. R. K. West; Sgt. A. R. Wickens.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Flt. Lt. J. R. Aldis.

WOUNDED OR INJURED IN ACTION.—P/O. A. Abels; Sgt. B. V. Caskie; Flt. Sgt. W. Clemmet; Sgt. R. A. Horwood; Sgt. R. H. Loughorn; Flt. Sgt. J. H. Millns; Sgt. L. E. Taylor; Sgt. R. J. Titterton; Sgt. F. A. Wait.

MISSING, BELIEVED KILLED IN ACTION.—F/O. C. D. Strickland.

MISSING.—A/C.1 A. H. Agus; Sgt. J. J. Ashurst; A/C.1 T. H. Atkin; Sgt. R. E. Austin; Sgt. S. N. Bailes; Sgt. R. J. Banks; Act. Flt. Lt. E. A. Barsby; P/O. R. H. Batten; A/C.2 W. Benson; Sgt. W. D. Black; Act. Sqn. Ldr. H. G. P. Blackmore; Sgt. J. W. Bradley; Sgt. H. Brown; P/O. G. F. Bunday; F/O. N. E. Canton; Sgt. A. F. C. Couch; Sgt. R. W. Curtis; Sgt. D. R. Davis; Sgt. F. E. V. Day; Sgt. E. J. Diplock; Sgt. C. R. Eastman; Sgt. D. R. Fawcett; Sgt. R. S. Feakins; Sgt. J. G. Foulkes; Flt. Sgt. J. R. Franco; P/O. R. U. Gee; Sgt. L. J. Harris; Sgt. A. C. Hayter; Sgt. E. W. Hewitt; P/O. W. E. Hinchliffe; A/C.1 W. A. Hodges; Sgt. R. Jackson; Sgt. H. Jones; Sgt. J. H. Kay; Sgt. E. D. Kennedy; Sgt. J. H. Knight; Sgt. F. V. Lane; Sgt. K. C. Lawry; Sgt. N. R. Lawson; Sgt. J. D. H. Lewis; Sgt. W. F. W. Lewis; Sgt. W. Lowe; Sgt. T. H. C. Mahon; Sgt. W. H. Martin; Sgt. A. A. Miles; Sgt. T. P. Mowan; Sgt. B. W. Nicholls; Sgt. A. J. Page; Sgt. J. D. Paine; Sgt. R. D. Partridge; Sgt. L. Pearman; Sqn. Ldr. F. C. Phippe; Sgt. D. A. Potts; F/O. C. C. Proby; Sgt. A. S. Riddell; Sgt. G. A. Robbins; Cpl. J. B. Robinson; P/O. C. F. Rogerson; Sgt. W. A. Ross; Sgt. R. R. Rutland; Flt. Sgt. M. L. Sharpe; Sgt. E. W. Sherwood; P/O. F. Simpson; Flt. Sgt. W. H. M. Smith; Sgt. D. W. Soden; Sgt. E. J. Sprange; Sgt. T. V. Steele; L.A/C. A. L. S. Tennent; Sgt. D. R. Thompson; Sgt. D. H. Townshend; Sgt. W. Virgo; A/C.1 M. B. Wade.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE (WHILE ENGAGED ON NON-OPERATIONAL FLYING DUTIES OR ON THE GROUND THROUGH ENEMY ACTION).—F/O. A. F. Baldwin; Sgt. W. A. Broadbear; A/C.2 G. Kidd; A/C.1 J. K. Kidd; A/C.2 S. O. Wainwright; Act. Flt. Lt. D. K. A. Wordsworth.

KILLED ON ACTIVE SERVICE.—Sgt. R. W. Ballard; Sgt. A. W. Beynon; L.A/C. D. N. Birtwell; A/C.2 C. Blyth; Sgt. R. Brown; P/O. M. A. Bunn; L.A/C. G. P. Cahill; L.A/C. C. Chapman; P/O. J. G. Coxetter; Flt. Lt. D. H. Dey; Sgt. W. Dott; Sgt. R. B. B. Fitchie; Sgt. R. Goff; Sgt. S. W. Green; Sgt. R. Hall; Sgt. R. E. Hatherill; F/O. F. N. Heapey; L.A/C. G. W. Higham; L.A/C. A. V. Hinks; Sgt. C. T. L. McL. Ironside; Sgt. J. Jack; Sgt. A. Jarrett; L.A/C. B. N. Lee; Sgt. L. Levy; L.A/C. J. J. Lewis; P/O. A. E. Mackie; A/C.2 E. C. Mason; L.A/C. D. W. Middleton; F/O. C. R. Miles; Sgt. P. L. M. Morau; L.A/C. V. C. S. R. Newman; Sqn. Ldr. J. Sample, D.F.C.; Sgt. L. A. Scott; Sgt. S. J. Sculley; Sgt. J. M. Smith; Sgt. G. L. H. Steede; Sgt. H. H. Taylor;



H.R.H. The Princess Royal chatting to a W.A.A.F. patient during a visit to a R.A.F. hospital.

L.A/C. J. A. MacD. Teacher; Sgt. J. P. Townsend; Sgt. K. S. Turner; Flt. Sgt. J. M. Wilde, D.F.M.; Sgt. E. V. Williams; A/C.1 G. G. Wyatt; L.A/C. P. Zarraga.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. F. A. Pritchard.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. E. G. Chapman; P/O. I. S. Galbraith; Sgt. T. G. Holden; Sgt. J. I. Morris.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. W. E. Quince.

DIED ON ACTIVE SERVICE.—A/C.2 V. E. Ahman; Cpl. S. F. Andrews; Sgt. W. H. Atkinson; A/C.2 J. Baseley; L.A/C. de M. M. Brady; A/C.2 J. J. Campbell; A/C.2 W. B. Coombes; A/C.2 R. L. Coppin; A/C.2 J. Ewen; L.A/C. T. H. Fisher; A/C.2 L. H. French; A/C.2 K. J. Fuller; Sgt. K. Gaukroger; A/C.2 W. H. T. Greenland; A/C.2 B. Hassall; L.A/C. J. H. Jones; A/C.1 R. J. Lenthall; A/C.2 D. B. Long; A/C.2 R. Manley; L.A/O. B. G. P. Medwin; A/C.2 F. Poulter; L.A/O. E. R. Reynolds; A/C.2 H. Ritz; A/C.2 C. F. Roberts; A/C.2 H. E. Roberts; A/C.2 R. Rosenthal; L.A/C. H. T. Stokes; A/C.2 N. E. Topp; Flt. Lt. R. Williamson, M.B.E.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Cpl. A. W. Bond; L.A/C. A. Crawford; L.A/C. F. D. Greenhalgh; Cpl. H. Gulliver; A/C.2 A. H. Pritty; L.A/C. W. L. Spalding; L.A/C. E. W. Walker; Sgt. H. E. C. Young.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. G. B. Haydon.

WOUNDED OR INJURED IN ACTION.—Sgt. W. Carson.

MISSING.—Sgt. K. I. Duffin; Sgt. L. C. Rhodes. MISSING BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. P. Spackman.

KILLED ON ACTIVE SERVICE.—Sgt. B. C. Gray; P/O. H. J. Thiele; Sgt. F. D. Ward.

Royal Canadian Air Force

KILLED IN ACTION.—Sgt. T. S. Royan. PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. R. E. V. Anderson; Sgt. J. P. Scott.

WOUNDED OR INJURED IN ACTION.—Sgt. H. R. Franklin.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. D. A. Woodman.

MISSING.—Wing Cdr. R. G. Briese; Sgt. R. J. A. Cleverdon; Sgt. E. O. Grimsdick; Sgt. W. T. Hall; P/O. W. J. Hoover; Sgt. V. Sature; Sgt. E. Warburton; Sgt. S. G. Westbrooke.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. R. L. Brunette; P/O. G. D. Gilmour; P/O. A. J. Jodoin.

KILLED ON ACTIVE SERVICE.—Sgt. C. A. Bergsten; Sgt. S. McD. Jackson; Sgt. J. Parsons; Sgt. L. G. Rowe; Sgt. B. R. Stevenson; Sgt. J. A. R. Turner.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. G. S. Douglas.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. M. Brodie.

WOUNDED OR INJURED IN ACTION.—Sgt. I. J. McLachlan.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. W. R. DH.

MISSING.—Sgt. W. D. Cole; Sgt. C. L. Jenkinson; Sgt. C. I. Johnstone; P/O. S. D. Steel; Sgt. W. D. Stuart; P/O. J. M. Waddell.

MISSING BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. J. A. Johnston.

KILLED ON ACTIVE SERVICE.—P/O. J. E. Falconer; Sgt. A. I. Gate; Sgt. D. N. Law; Sgt. C. F. McCullough.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. C. H. Brumby.

South African Air Force

KILLED IN ACTION.—Lt. D. B. Stuurman. WOUNDED OR INJURED IN ACTION.—Lt. C. Yeats.

MISSING.—2/Lt. E. N. Burr; Lt. C. H. Evans; Act. Cpl. H. N. Hawke; Major S. D. F. Scott.



Douglas B.T.1 two-seater dive-bombers, from a U.S. Navy school, flying over Miami. Hooks are fitted under the fuselage for use when landing on aircraft carriers.

**PERHAPS YOU ARE NOT
LOOKING IN THE RIGHT PLACE!**



Don't allow yourself to stray over to the right hand side is good advice to drivers, but it sometimes pays an executive to let his eye rove about among alternative sources of supply.

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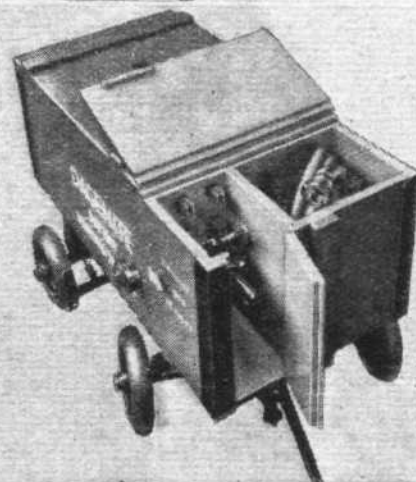
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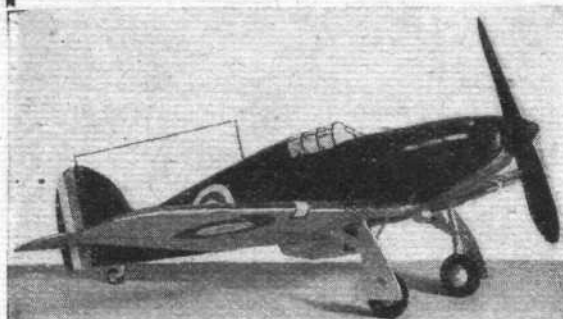
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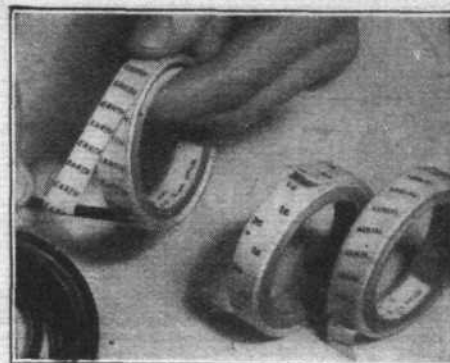
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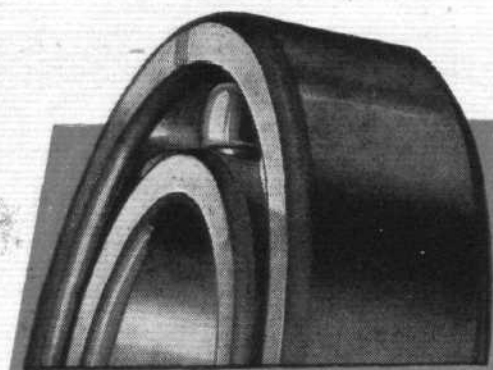
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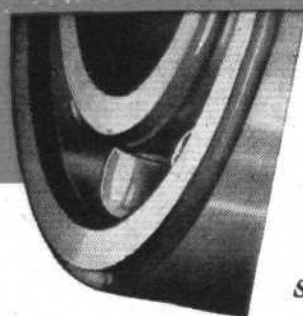
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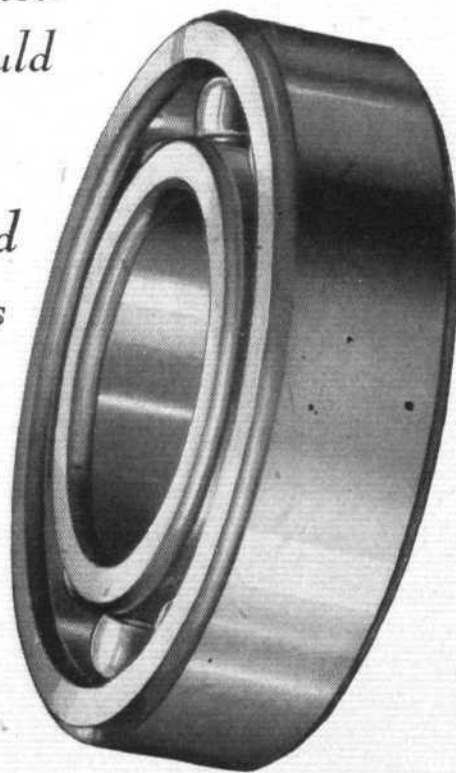
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