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It is my hope that you find the file of use to you personally – I know that I would have liked to have found some of these files years ago – they would have saved me a lot of time !

Colin Hinson

In the village of Blunham, Bedfordshire.



AIA
TRAINING CORPS
GAZETTE

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Second Thoughts

RECENTLY I have visited a number of Initial Training Wings. I talked with ex-cadets who were in the final stages of their I.T.W. training. I asked them the subjects to which they would give greater attention if they were able to have their time over again in the Air Training Corps. Nearly all of them said that they would like to have more practice in plotting. They all emphasised that if in their A.T.C. training it had been impressed upon them the need for speed and quickness and familiarity with this subject it would have been of undoubted advantage to them.

Many cadets wished that they had studied more meteorology. They found it very interesting. They told me that they had not realised in their squadrons how great was its importance. Many others would have spent more time on the Aldis lamp, and there were quite a number of others, too, who would have liked more time on armaments, and in particular the Browning gun. One and all, however, were emphatic in saying that they would have taken greater advantage of playing games and P.T. if they had only realised how unfit they were. Many said it was only when they really started doing their

I.T.W. training that they realised their lack of condition. Most ex-cadets with whom I spoke had put on anything from half to one stone in weight, and some as much as a stone and a half.

When I asked these ex-cadets how they would be able to do this extra work with the limited time at their disposal, many of them said that they could have found more time had they known what was required of them.

I also found some proficient ex-cadets who for one reason or another after becoming proficient had not maintained their proficiency standard, with the result that they had gone rusty, and they were much regretting that they had not continued with their work right up to the time of their joining the Service.

I had the opportunity of talking to a number of cadets who, although they had obtained their Part II certificates, nevertheless were taking the whole of the I.T.W. course. They could have got off part of the course, but did not want to, because they felt that they could not get physically fit enough unless they went right through the course, and they all wanted to be as fighting fit as possible. Also, they told me that they wanted to pass out of their subjects with 100 per cent marks at the top. They were hoping to be able to do this because of their A.T.C. training.

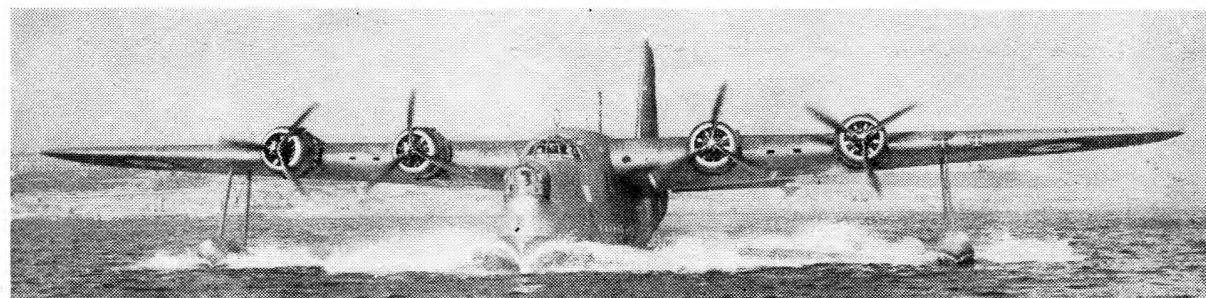
When I asked them if they felt that by taking Part II they had wasted their time, they were one and all most emphatic that there was no waste, and that if they could have their time over again in the A.T.C. they would do exactly the same.

I have thought it desirable to give to the Corps this collective information of their experiences which I have obtained from personal conversation with hundreds of ex-cadets at the Initial Training Wings, to show how really worth while is the hard work that you are all doing and in particular how helpful will it be found for proficient cadets to do as much advanced training as possible.

H.W. Wakefield

DIRECTOR, AIR TRAINING CORPS.

A Sunderland flying-boat taking off for an anti-U-boat patrol.





The Wackett Wirraway. A number of these Australian trainers are believed to have been modified as dive-bombers on the Pacific Front.

The Vought-Sikorsky Corsair, America's newest naval fighter. Powered by a Pratt and Whitney Wasp 2,000 h.p. engine, it has a maximum speed of over 400 m.p.h. Armament consists of three .5 Browning machine-guns in each wing.



MANY far-sighted people are thinking of Air Transport after the war, and although our business at the moment is to get on with the war as fast as we can without bothering too much about what is going to happen afterwards, we are justified in using some of the spare time which the war inevitably brings to consider what is going to happen afterwards.

For the moment let us consider only the fact that there is bound to be some air transport after the war, and that therefore there will certainly be some jobs in air transport. The question is, how many?

Some wildly optimistic prophets see aircraft of the future carrying all the world's freight, until a level-headed realist comes along and points out the absurdity of carrying cargoes, say, of pig-iron at two or three hundred miles an hour when they could quite as conveniently and much more cheaply be carried by ship—for water transport must almost be the cheapest method of transport.

The fact is that air transport after the war is likely to get only urgent freight and hurrying passengers. The man who

crosses the Atlantic has always wanted to go as quickly as possible, and therefore he will probably choose the airway. The Mediterranean traveller, on the other hand, may quite well prefer to cruise along gently in an old-fashioned steamship to see the sights.

Some time ago Mr. W. A. Patterson, President of the American United Air Lines, made a comparison of freight-train transport with cargo aircraft in normal peace-time conditions. He pointed out that it would take 57 Douglas Mainliners to do the work of one freight train. His other figures are illustrated below. Another of his startling remarks was that it would require 600,000 transport aircraft employing 2½ million pilots and 20 million other personnel to carry all America's freight by air.

These figures are sobering, but they are not discouraging to those who are hoping for jobs in civil aviation. They imply that there will be plenty of employment if aircraft are carrying only a small percentage of the world's total freight. And remember that for every pilot a large

number of other people are required on the ground and in the air—navigators, engineers, flight clerks, stewards, and a whole army of ground personnel.

Here are some figures of personnel employed by some American air lines, together with the number of aircraft employed and the route miles operated.

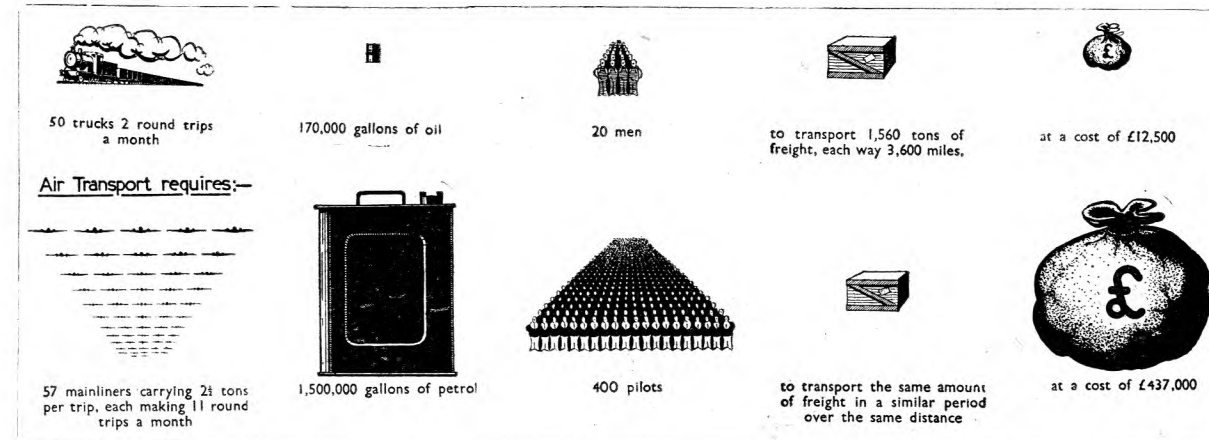
Airline	Personnel	Aircraft	Route Miles
P.A.A.	21,846	102	90,600
Eastern	2,650	35	5,749
American	5,118	48	8,689
United	4,795	33	5,655
T.W.A.	3,275	25	5,726
Pennsylvania	1,345	8	1,746
North West	4,495	7	2,344

There seem to be wide differences in the proportion of personnel both to aircraft and to route miles. These may perhaps be explained by the fact that development work is going on, that some airlines keep their aircraft more fully employed than others, and that some routes can be operated with less personnel than others. Flying-boats, for instance, require more handling in port than land-planes.

These figures make it quite clear that even a small number of aircraft provide a considerable amount of employment. If thousands of aircraft are used all over the Empire, as they should be in a well-run Empire, then there should be a good chance of employment after the war.

The question remains, Is war training of any value to the prospective civil pilot? Before the war it was thought that a good military pilot had a lot to learn before he could be regarded as a good civil pilot. But then military pilots did comparatively little flying and under fairly easy circumstances. To-day the R.A.F. pilot or navigator has not only a very thorough training, but also very exacting practice in the most difficult of conditions and is faced with hazards not met with in peace-time. The prospective civil pilot will still have a lot to learn, but he will find that his war training gives him a good start.

So if you want to become a civil pilot after the war, or get any job in air transport, you should get on with your present training and learn thoroughly the job that you have to do in war-time.





Some Distinguished Pilots

1, Air Marshal Sir Trafford L. Leigh-Mallory, K.C.B., D.S.O.; 2, Air Commodore R. L. R. Atcherley, O.B.E., A.F.C.; 3, Air Commodore G. L. Carter, D.S.O., A.F.C.; 4, Wing Commander E. W. Wells, R.N.Z.A.F., D.S.O., D.F.C.; 5, Wing Commander J. E. Johnson, D.S.O., D.F.C.; 6, Wing Commander J. E. Pelly-Fry, D.S.O.; 7, Squadron Leader A. C. Bartley, D.F.C.; 8, Squadron Leader R. W. Oxspring, D.F.C.; 9, Squadron Leader T. M. Bulloch, D.S.O., D.F.C.; 10, Squadron Leader G. W. Gilpin, D.F.C.; 11, Squadron Leader F. H. Boulton, R.C.A.F., D.F.C.

The Aces... by Captain W. E. Johns

TWENTY-SEVEN years ago an old word, international in its construction, was suddenly given a new meaning. Subsequently abused and misapplied, it has nevertheless played a prominent part in aviation, possibly because it was brief, apt, and in its meaning unmistakable. That word was "Ace." The ace, in playing-cards, is the top honour, the high spot. In aviation, in its original application, it meant the same thing. Who first adapted the word is not known, but as the ace system had its inception in France the inspiration must have occurred in that country. For inspiration it surely was. In one crisp syllable it said so much that the popular press could hardly have managed without it. But to the student of air history there is more to it than that, and those new to the business should know just what they are saying before they employ a term so far-reaching and generally misleading. It is a fascinating story.

In 1915 a man's name ran the course of air force messes in France. It was Immelmann. He was a German, and he had, it was averred, shot down no fewer than 16 allied aircraft, a record so far ahead of imagination that it strained the credulity. Up to that time no one had thought of keeping a score, for the simple reason that no one else had a score to keep. In the spring of 1916 the name was linked with another—Boelcke. He had equalled Immelmann's score and looked like taking the lead.

Although they did not know it, these two men were the first aces, and it is no spirit of belittlement that we can ascribe their success largely to superior equipment. In a new Fokker monoplane, the first efficient fighting aeroplane to be designed, they not only had speed and height of their opponents, but were provided with twin machine-guns that fired through the airscrew. They could hardly have asked for more. This machine, the germ of the "Fokker scourge" so hotly debated in Parliament, made rings round Allied opposition. The R.F.C. took the punishment on the chin, as tradition demanded; but French morale, which is capable of soaring to sublime heights, can also sink low; and before the invincible Fokker it sank very low indeed, so low that something had to be done about it.

The ace system was the answer to the burning (literal) question. French in conception, it was admirably suited to the French temperament. Aside from that, it was probably one of the cleverest publicity stunts ever hung on any war machine, and the most successful—for a time. It was quite simple. Any pilot shooting down five enemy aircraft became qualified for the title of "Ace." This reward for virtue was no wooden spoon. Adulation in the press brought material gain. Holders of the title were at once gods among men (and women) when they went on leave in Paris. The scheme went over in a big way—so much so that other nations sat up and took notice. Even pilots of heavy bombers were performing prodigious (if futile) deeds of valour in their enthusiasm to qualify.

Italy, Belgium and Germany adopted the scheme forthwith, although Germany lifted the qualification figure to

ten. In a few weeks the press of every warring nation was extolling the exploits of its aces to the exclusion of real war news—particularly when the war news was not bright. That is, all except Great Britain. The

Air Board, for reasons not then apparent, would have nothing to do with it. At the time this looked like sheer churlishness, and the immediate result was lamentable, because it was assumed that Britain had no aces to laud. More questions were asked in Parliament. But in the long run it proved to be a wise decision, one that, to the discomfiture of the critics, revealed unsuspected depths of vision on the part of the Higher Command.

The Air Council, under pressure, gave its reason. It was not (they stated in effect) British practice to publicise the deeds of the individual, or of one branch of a Service, when all were doing their duty. True enough, but there was more to it than that, and there is no doubt that they must have already perceived some of the snags that were soon to project through the pretty background of high romance and public applause.

In France the rot soon set in. The honour being reserved for scouts, the bomber and reconnaissance pilots, observing that they were automatically eliminated, demanded to be transferred to fighting units. This, obviously, was not possible, and the result was a severe attack of heartburn. The thing went farther. Infantry, toiling in the mud and blood and sweat of the trenches, took a dim view of their winged comrades basking in the limelight. Morale suffered.

Germany was even more ill-advised. In her anxiety to produce aces she created synthetic ones. These much-decorated playboys, introduced into society to dazzle those who saw the prospect of victory fast diminishing, were known contemptuously to the real fighting-men as *prima donnas*. This sort of thing is bad in any service. As it transpired, Germany made a rod for her own back. So high were her aces boosted that when one fell the nation was stricken as though its army had suffered a major reverse. The death of Richthofen threw the whole nation into mourning. Once possessed of efficient equipment, British non-aces shot the German stars out of the sky, as the records prove. Berlin, blind to more important events, staggered under these successive blows upon its idols. Worse still, the German aircraft industry stepped in and made aces of its own, for the express purpose of smearing its products with reflected glory. Goering, protégé of the Fokker-Mercedes combination, was one of them.

After the war (the last war) was over, the once-proud title suffered a tragic fall from grace. Tagged first to a few meritorious long-distance pilots, it was pushed by an incoherent section of the press lower and lower down the scale of values, until anyone who had enough money to buy a light 'plane could become an ace overnight by throwing a few loops, or tearing from one aerodrome to another in less time than prudence demanded.

The Air Ministry has maintained its code. Only with reluctance does it acknowledge individual scores, and these, when published, are usually unofficial. For purposes of citation they prefer to use such terms as victor of "several" or "many" combats. The word "ace" does not appear in the records. It never has.

Training the AIR GUNNER BY "DUTY PILOT"

An American Bendix turret, an armoured power-driven gun-mount with two .5 calibre machine-guns which fire at the rate of 800 rounds per minute.

To meet the need for continued and advanced instruction the Royal Air Force has, in addition to its ordinary gunnery schools, a Central Gunnery School at which experienced air-gunners and pilots are trained by still more experienced men to become gunnery instructors and squadron gunnery leaders. There are two separate wings at the school—one for the fighter pilots and one for the air-gunners and wireless-operator/air-gunners—but each can learn something from the other, and by being

THE successful man must be for ever learning. As soon as he stops learning he begins to be a failure. In safe occupations the failure may be a slow decline, but for the air-gunner it is sudden and irreversible for himself and for others. And what is true of the gunner of a Lancaster or Halifax is true equally of the pilot-gunner of a Spitfire, Mosquito or other aircraft with fixed front guns. All the fighter pilot's flying skill is futile if his shots go wide when he presses the button. It is a noteworthy fact that although there have been successful air fighters who were not first-class pilots, there has never been a successful fighter pilot who was not a good shot. A man can only remain a good shot by constant practice, by continually learning the new problems that result from new tactics, improved performance of aircraft and increased armour.

located at the same school the air-gunners of a bomber can have the advantage of dealing with dummy attacks by the most highly competent fighter pilots.

The fighter pilots come to this school to be trained as pilot gunnery instructors, and go back to their squadrons to pep up the squadron marksmanship.

The air-gunner or wireless-operator/air-gunner who takes the gunnery-leader's course will go to a bomber squadron or other unit with a rather bigger job, offering in itself good scope for promotion. He will be virtually in command of all the gunners in his squadron—responsible for their training in marksmanship and aircraft recognition, for ensuring their physical fitness, and will be required to

deal with administrative matters concerning them. As a gunnery leader he may rise to squadron leader, wing commander or even higher. This is very good going, considering that air gunnery as a separate officer branch is an innovation of the war. Of course, a man who aspires to such rank must show administrative abilities and leadership qualities to a high degree as well as being a good gunner.

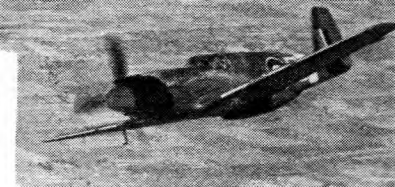
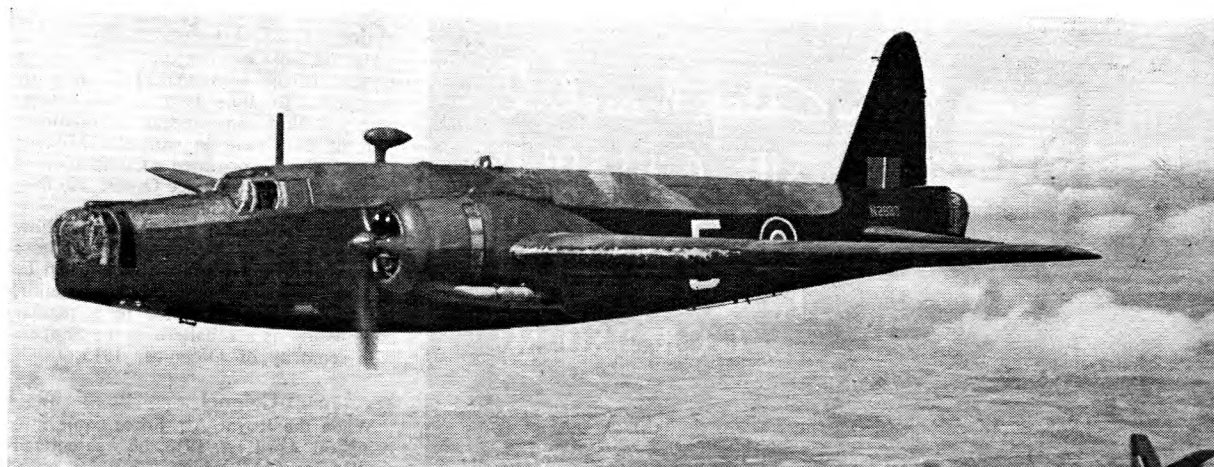
At the Central Gunnery School the future air-gunnery leaders practise in Wellingtons, both as ordinary air-gunners and as fire controllers. Camera guns faithfully reproduce every detail of the exercises, the results of which are carefully analysed and recorded on graphs and registers. The fire controller occupies either the astro-hatch or the tail turret, and through the inter-com. he gives directions to the other gunners and also to the pilot, who, in taking evasive action, must follow the fire controller's orders implicitly, doing steep turns or perhaps dives so sudden that anyone who happens to be relaxing would find himself for a second or two floating in mid-air between floor and roof in an apparent miracle of levitation. There is also firing with live ammunition at drogues. For marking purposes these are divided into three sections, a hit on the front part corresponding to the nose of an aeroplane, counting twice as much as one on the section behind.

Though naturally of greatest importance, air exercises are only part of the C.G.S. training, many synthetic devices having been developed for exercising quickness and co-ordination of hand and eye.

In one room a cinema film throws on the interior of a hollow globe a picture of an attacking aircraft on which the gunner can direct his sights, the results being immediately visible, since the out-

line of the sight ring is also projected on the screen.

Not all the ground-training devices at the C. G. S. are complicated ones. Such ordinary and ancient things as .22 and .303 rifles are used and clay-pigeon shooting is a popular acti-



city. There is scientific study of deflection angles and cinema films of actual recent combats sent to the school by operational squadrons.

Everyone who is anybody in air fighting comes to this school at some time or other, either as a pupil or as instructor, or both. Some come as pupils, and after a further tour of operations return as instructors. Instructors are continually changing, so that teaching can be given by men with recent operational experience. Looking through the photograph records of previous courses of instruction one can see the names and faces of many famous pilots, British, Dominion and Allied. Most are young men, but there are some veterans of the last war. There are tall men and short men, men with Oxford accents and men with Yorkshire accents. Yet among all this diversity there are qualities common to all—good eyesight, physical fitness, alertness and self-confidence.

Though the A.T.C. cadet who wants to join their company cannot hope at the moment to enjoy their mechanical aids to expert gunnery, he can cultivate in himself the basic qualities on which good gunnery is based. Fast ball games, such as cricket, hockey and squash are useful. All physical training is helpful. Keeping cigarette smoke out of the eyes is a good negative precaution, and no one who hopes to be a good gunner should neglect any opportunity of firing any sort of weapon that may be available. Aircraft recognition with knowledge of wing spans is essential—not the laboured recognition of the man who is trying to make up his mind whether a certain outline is that of a Spitfire or a Wellington, but the instantaneous snap recognition now widely practised in the Corps and at spotters' clubs.

The Corps does indeed offer many facilities for the man who hopes to become a good gunner. The really successful gunner is the one who not only takes advantage of everything the Corps can offer, but who tries to find more. The ability to put your bullets where you want them (like Beurling, a pupil of the C.G.S., who can shoot down three air-

craft and return with half his ammunition) demands a natural aptitude, but it equally insistently demands practice, constant practice, and training. Lots of young men rather fancy themselves in the dangerous job of pressing the firing buttons of an aircraft's guns. The Royal Air Force wants men who will reduce the danger to a minimum by becoming crack shots, so just as the Central Flying School has brought R.A.F. flying to a high pitch of efficiency, so the Central Gunnery School is constantly raising the number of bullets that hit a Hun.

Gunners get the best possible training at the C.G.S. as some of the world's best fighter pilots are there on gunnery courses. Here a Mustang, piloted by a famous fighter pilot, is shooting-up a Wellington.

An air-gunner gets the feel of his turret in a working model on the ground.

Here an instructor is showing prospective air-gunners at an ordinary gunnery school a Wellington rear-gunner's arc of fire.





AIR CHIEF MARSHAL Sir Charles Frederick Algernon Portal, G.C.B., D.S.O. (and bar), M.C., the present Chief of the Air Staff, has, besides his other eminent distinctions, that of being the first C.A.S. to have risen from the ranks. That he got there by way of Winchester College and Christ Church, Oxford, does not alter the fact—which is as it should be in a democratic country. The late Field Marshal Sir William Robertson, Chief of the Imperial General Staff, rose from the ranks of the Army, after having been a footman in one of the great houses of Suffolk, but no other C.I.G.S. has been a ranker. And no First Sea Lord of the Admiralty has risen from the Lower Deck.

A Suitable Sport

At Winchester he was in the cricket eleven, which is always a Good Thing in anybody's life history. But his individualism showed up in his taking to the uncommon sport of falconry—a singularly appropriate hobby for a fighting pilot, when one comes to think of it. Though at sixteen years of age in 1909 he can hardly have studied the falcon's methods of attack from that point of view, he may have picked up some tips unconsciously. Anyhow, he wrote articles on falconry in that year.

Also, he was a first-class shot, another accomplishment which came in useful in the Royal Flying Corps. And he was a keen fisherman, an occupation which trains one in skill, patience and optimism, whether one practises the highbrow dry-fly science or the illegal sport of tickling trout or the lowdown game of bobbing for eels.

At Oxford he took to motor-cycling, and won rather a big race, for by his time at the University motor-cycling was the "done thing," whereas in the earlier generation it was simply not done. So you see how the sport or hobbies of one's youth may affect one's career.

Corporal

When war began young Charles Portal joined the Royal Engineers as a despatch rider; and so early as September 1914, when a corporal, he was mentioned in Sir John French's first Despatches. He was given a temporary commission in the Sappers in that month.

Lieutenant

In November 1915 he was seconded to the Royal Flying Corps as an observer, and in that grade, before aircraft carried proper armament, he was credited with having hit, with a Winchester Repeater (we should now call it an "automatic rifle") the machine of the great German pilot Immelmann. Thereafter Lieutenant Portal took to artillery observation—where, I imagine, the patience and the discerning eye of the fisherman came in useful.



The Chief of the Air Staff inspecting cadets of No. 48 (Hampstead) Squadron.

Major

He became a pilot in 1916, and a captain (flight commander) in July of that year. By June 1917 he was a temporary major commanding a squadron. And in that year he won the Military Cross and was appointed a Companion of the Distinguished Service Order. He then commanded 16 Squadron.

An interesting point, as showing how people had dual personalities in those days, is that in November 1917, when he was a much-decorated young major, R.F.C., he was appointed to a regular commission as a subaltern in the Sappers with seniority of December 1915.

Lieutenant-Colonel

When the Royal Air Force came into being on April 1st, 1918, he was entered as "Major (A)," which stood for aeroplanes—the R.A.F. started with good intentions about distinguishing between airborne and chairborne officers. In June 1918 he was promoted to temporary lieutenant-colonel—at 25 years of age—and in July he was given a bar to the D.S.O. for "gallantry, devotion to duty and leadership." And that was at a time when even squadron commanders were thought to be too valuable to risk themselves in the air. He was also mentioned in despatches in 1917 and 1918.

Queer though it may seem, some of the best fighter squadrons were commanded by officers who never flew at all, even as passengers. But certainly the best of all squadrons and wings were led into the air by their own C.O.s

Squadron Leader

After the war, when permanent ranks with new titles were given in the R.A.F., which had been cut down from 330,000 officers and men to less than 33,000, Charles Portal appeared with a permanent commission as "Squadron Leader 'A.'" And in 1919 he went to the new R.A.F. Cadet College at Cranwell as an instructor in the Flying Training Wing.

After three years there he went to the



Sir Charles Portal looking over the controls of one of the first Tomahawks to arrive in this country.

R.A.F. Staff College at Andover—the Cadet College, one of the new creations of Air Marshal Sir Hugh Trenchard. And in 1923 he joined Sir Hugh's staff at the Air Ministry in the Directorate of Organisation and Intelligence. The letters *p.s.a.* after his name in official lists mean "passed staff Andover."

Wing Commander

Thence, as a wing commander, he went in 1926 to the Royal Naval College at Greenwich. And only in March 1927, eight years after the war, was he able to come back to flying. He took command of No. 7 Squadron, heavy bombers, at Bircham Newton, and while there he won the Lawrence Minot Bombing Trophy for the squadron, doing the aiming himself. Then, having shown that he could still fly, he went to the Imperial Defence College, where officers of the rank of Commander, R.N., Lieutenant-Colonel in the Army, Wing Commander, R.A.F. and upwards, all go to school together to learn how to plan combined operations and to understand the language of one another's Services. That put the letters *i.d.c.* after his name. And then, after a short while with the C.A.S. at the Air Ministry, he went on special duty to India.

Air Commodore

Wing Commander Portal came back to the Air Ministry to Air Staff Duties in 1931, and after three years there he went as a group captain to command at Aden, where, for the first time, all H.M. Forces were put under an R.A.F. officer, and was promoted air commodore. He came back late in 1936, and was appointed an instructor at the Imperial Defence College—you may imagine that an officer who instructs senior officers of Services other than his own must stand highly in the esteem of his own Chief of Staff.

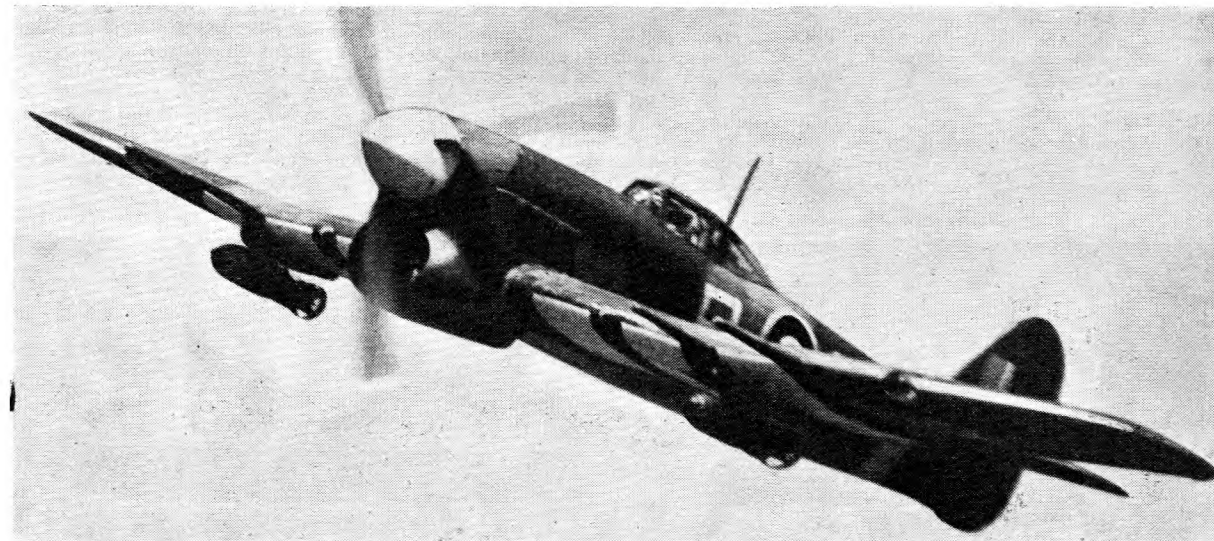
In 1937, as air vice-marshal, he was made Director of Organisation at the Air Ministry. Early in 1939 he became Air Member for Personnel on the Air Council and acting air marshal, and was made a Companion of the Bath.

Air Marshal

On April 4th, 1940, he was appointed Air Officer Commanding-in-Chief Bomber Command, and temporary air marshal. That was when the British Empire as a whole began to hear of him, for that was when the war really began. All the experience of his years of service was put into our bombing offensive, and what he did with the pitifully small and poorly armed bomber force which we had was astonishing.

The confidence and affection which he inspired in his staff had much to do with his success. I was lunching with some of them at his H.Q. one day just when the break-through in France was beginning. The A.O.C.-in-C. came into the mess, looked round for a vacant place and took it. They told me that he made a habit of that. He almost always lunched in mess, and just sat down next to any of the staff and chatted in a friendly way on things in general. Sometimes junior officers who had only seen him from afar off were paralysed into speechlessness by respect for their chief. But he had the

The Typhoon fighter-bomber with its 500-pounders.



knack of pulling them out of themselves and of making them forget their shyness. It is a great gift.

Air Chief Marshal

On October 25th, 1940, Air Chief Marshal Sir Charles Portal, who had been made a K.C.B. on July 11th, was made Chief of the Air Staff. Since then he has helped publicly to make history, and has been promoted to G.C.B. There is no need for me to describe him. You have all seen his photograph, along with Mr. Churchill and Mr. Roosevelt and all the Big Chiefs of the Allied fighting forces and the prominent politicians of all friendly nations. His job puts him there. But I fancy that he would rather be with his Air Force or in his office getting on with the war, or consulting with the other chiefs of staff about Allied action.

A.T.C. Achievements

A SQUADRON recently claimed to have set something of a record by having sent into the R.A.F. some 150 cadets, 100 of them gaining wings and one of them a medal. It occurs to us that some other squadrons must have done better in some respects, if not in all, and although it would not be possible for us to publish a complete list here we should be glad to publish details of any squadrons which have outstanding records.

Not all ex-cadets keep in touch with their old squadrons, but many still read the *Gazette*. Any such readers are reminded that their old A.T.C. squadrons are always glad to have news of their progress. Some squadrons indeed—Purley, for instance—are starting up "Old Boys' Associations," which most of their ex-cadets will probably join.

OIL SYSTEMS

by Harold P. Lees

IF two dry metal surfaces slide up and down on each other, the friction between the two generates heat. The quicker the movement the greater the heat, until eventually the surfaces "seize" and cannot move. If the surfaces are oiled, the oil forms a thin film between the metals, and as they do not touch, friction is cut down to a minimum.

There are many metal surfaces in contact in an aero-engine—the piston sliding up and down the cylinder, the connecting rod and the gudgeon pins, etc.—and all must be kept well supplied with oil. The diagram shows a lubrication system suitable for an in-line engine. Those familiar with motor-cars will notice that the method of storing the oil is different. A motor-car uses a wet sump; that is to say, the full load of oil necessary for the engine is carried in the sump, and from there pressure circulated to the working parts. An aero-engine has a dry sump, and stores the oil in a separate oil tank, because it would not be possible to carry the large quantity of oil needed in the sump, and also because when the aeroplane manoeuvred any oil in the sump would be thrown about and might get on to the cylinder and cause over-oiling.

From the tank the oil is pressure-circulated to the necessary parts of the engine, and as it drains back into the sump it is drawn out by a scavenge pump and returned to the oil tank; so that the sump cannot collect a quantity of oil, the scavenge pump is made to pump a greater capacity than the pressure pump.

In addition to lubrication, oil also provides an internal cooling system. As the cool oil is forced through the engine a great amount of the heat generated is absorbed by it. The hot oil drawn away by the scavenge pump passes through a cooler on its return to the tank.

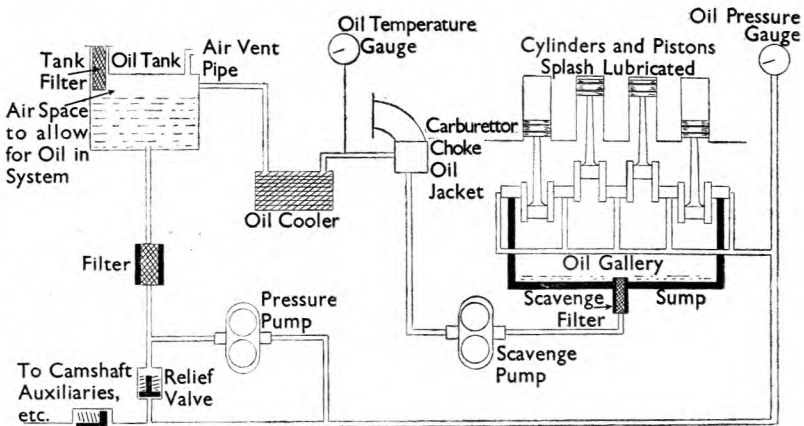
Relief Valve

The oil pumps are operated by the aero-engine, so that as the engine "revs" up the gears in the pumps revolve faster,

and consequently the oil delivery is greater and the pressure becomes higher. To prevent an excess pressure being built up, a relief valve opens at a certain set figure and bypasses the oil back to the inlet side of the pump.

Filters

In addition to the filter in the oil tank, there are always at least two others. One filters the oil as it passes from the tank to the pressure pump, and the other as the oil is drawn out of the sump by the



scavenge pump. This scavenge filter is particularly valuable in diagnosing a faulty engine. Any small pieces of metal from the inside of the engine will be collected in the filter. It is usually possible to tell from the nature of the metal just what part of the engine is suspect.

Oil Cooler

As the temperature of oil increases, it becomes thin and non-effective as a lubricant, so to keep it within a working temperature it is passed through an oil cooler, similar in appearance to a motor-car radiator. In order to control the limit of cooling, a shutter is fitted to the airflow

duct which can be opened and closed by the pilot.

Lubrication

Oil from the pressure pump is fed to the distributing gallery, which passes it to the main bearings. In addition, the oil enters the interior of the crankshaft, and through holes provided for the purpose escapes to the big-end bearings. Oil from the bearings and big ends is "splashed" on to the cylinder walls, connecting rods, small ends, gudgeon pins, etc.

The camshaft and auxiliary drives are supplied with oil through a relief valve, which draws off a quantity from the main supply at a lower pressure.

Oil Consumption

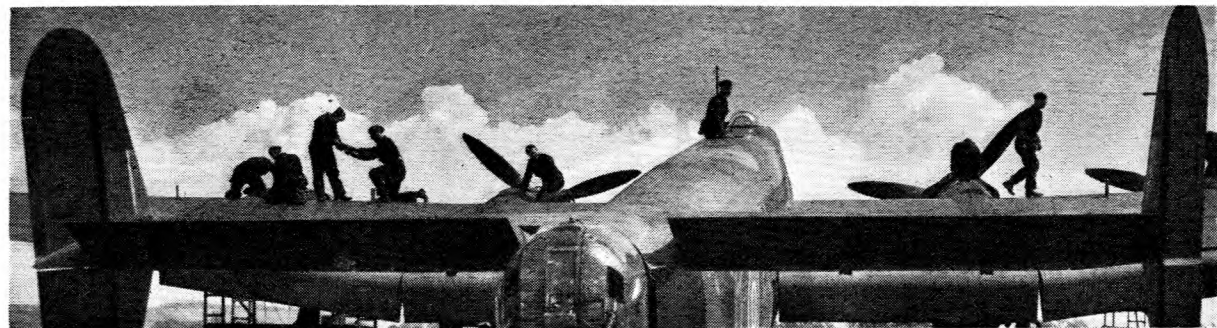
As the oil circulates through the system it is impossible to prevent a small quantity passing the top ring of the piston and being burnt up in the combustion chamber. The oil system has therefore

to be replenished daily, the oil tank being filled up to a set level.

Carburettor Heating

Due to the atomisation of the petrol in the choke there is a lowering of the temperature in the vicinity, and the choke becomes very cold. If this was allowed to continue the petrol would condense and be deposited on the walls of the induction passage. This would alter the uniformity of the mixture. To avoid it, the choke is heated; and one method of doing this is to provide an oil jacket through which the hot oil passes on its way to the cooler.

Ground crew at work on a Halifax. The oil system, of course, comes in for some attention.

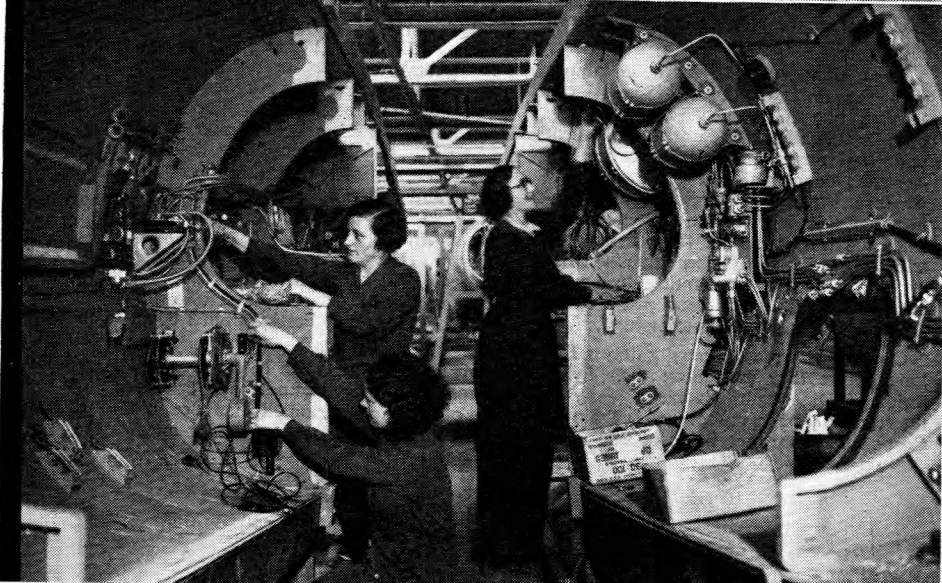
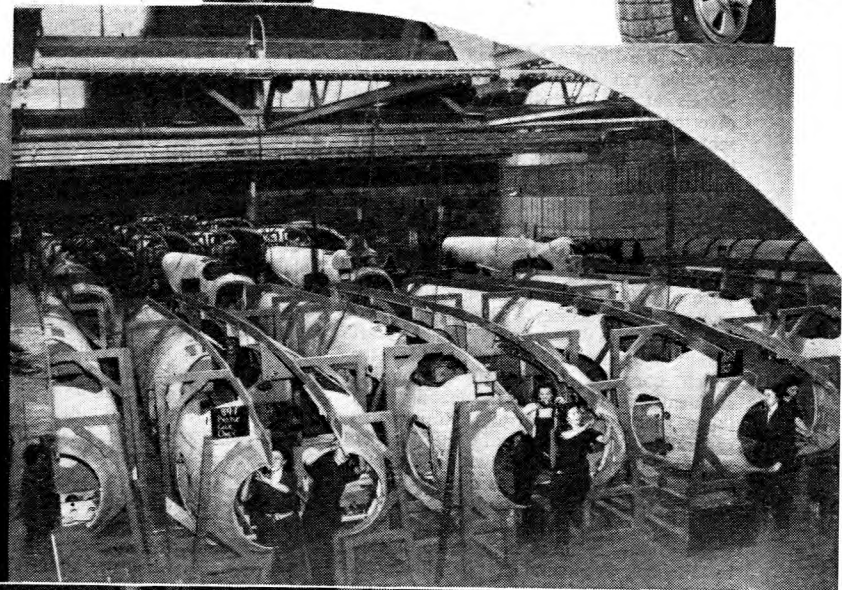


Mosquito Anatomy



Designed in 22 months, using 40 per cent. female labour and constructed mainly of wood, the Mosquito has set a new standard in British aircraft construction, as well as in performance. Construction is dispersed over a large area, the fuselage being built in two sections as illustrated here, like the two halves of an easter egg,

enabling fittings to be conveniently installed. When the interior is nearly complete the two halves are joined together in a strong clean joint, a plywood strip being placed over the joint inside and a ply inset outside. The two halves are clamped together while the joint sets hard. The whole is then covered with fabric and doped. The result is a fuselage of extreme smoothness reducing skin friction to a minimum.



AIRSEA Rescue

by A. E. Irwin

MOST pictures of Air/Sea Rescue show a clear sky and a calm sea, but most of the real work is done in dirty weather with high seas and low cloud. In calm waters with good visibility the search is fairly easy and the rescue simple. In bad weather the search is long and arduous and the rescue difficult.

Yet the worse the weather the more important it is that the rescue should be quick. The greatest danger to the ditched crew is not hunger or thirst, or even German bullets. Hunger and thirst may be borne for some time, and the bullets may miss. But exposure to sea, cold and sun never fails in time to bring about collapse. Therefore the worse the weather the more energy and skill the Air/Sea Rescue Service must put into its work.

The Service makes use of anybody or anything that may be useful. Aircraft of any of the Commands may be used in searches and to drop supplies. Naval vessels at sea on other duties may be diverted to the scene or vessels may be sent out from shore. The same applies to people. Coastguards, Observer Corps men or anybody may be the first to spot a descending parachute or a crashed aircraft.

But all the willing helpers in the world would be of small use unless their efforts were organised by a capable staff and a nucleus of specialists. The organisation exists in the Directorate of Aircraft Safety, a department of the Air Ministry which concerns itself with preventing accidents as well as with dealing with those that have occurred. Responsible generally to this Directorate, the Air/Sea Rescue Service operates within Coastal Command. All its surface craft, whether naval or R.A.F., are under the direct operational control of the Royal Navy, while the air searches may be conducted by Fighter Command if the dinghy is near shore or by aircraft of Coastal Command if the aircraft has come down farther out.

Even after only a slight acquaintance with the work of the Air/Sea Rescue Service, one is impressed by the skilful organisation, the well-planned equipment and the unshakable determination of everyone concerned to "get their man" whatever the cost to themselves. Remember that this organisation has grown up since the war, and that those concerned with it have had to learn quickly from experience, and also to anticipate experience quickly so that plans prepared in advance may turn out successfully.

Concern for the aircrews' safety starts long before they even start their flying training. Dinghy drill is taught early in the recruit's career, and even Air Training Corps cadets are now being instructed in

it, and are being encouraged to learn to swim. The reason for this is that the task of rescue is made considerably easier if the crews carry out the emergency drill efficiently.

Consider first of all the actual ditching. The shock when a bomber or fighter strikes the water is tremendous, even though it is landed at the lowest possible speed and tail down. The crew of a bomber take up special crash positions which will minimise the shock to themselves. This drill is constantly practised until it can be done under all conditions.

The ditching characteristics of a single-seat fighter are so poor that the pilot is advised to bale out. At about 100 feet from the water he rotates the quick-release button on his parachute harness, then, when a few feet from the surface, he straightens his body, pulling the elbows well in, puts his feet together, holds his nose, and on reaching the water strikes the button releasing the parachute harness. Once in the water he can remain afloat by means of his "Mae West" and the rubber dinghy which forms part of the parachute pack. A lanyard attached to his "Mae West" retains the dinghy after the parachute is jettisoned.

This type of dinghy is large enough to hold one man and carries a waterproof sheet which can be pulled up to the chin. A hood covering the head and shoulders greatly lessens the risk of exposure. The dinghy is fitted with a cylinder of carbon dioxide for inflation, collapsible mast, sail, distress signals, paddles, sea-anchor, compass, leak stoppers, heliograph and instructions for sailing. If dinghy drill is not carried out properly all this equipment may be lost.

Bomber dinghies vary in size. Usually they are carried in the wings, and are shot out and automatically inflated by carbon dioxide when the aircraft hits the sea. More than one dinghy is carried in large bombers or flying-boats.

Before ditching, the aircraft will, if possible, have sent out an S.O.S. Immediately this is received the Air/Sea Rescue Service will go into action. Aircraft of Coastal Command or of Fighter Command will be despatched to the last known or estimated position of the dinghy and will drop emergency supplies and direct the surface craft. If the sea is calm a Walrus may land to pick up the survivors. Usually surface craft have to be used. There are a wide variety of these, as illustrated on the following pages, the latest and best equipped being that shown opposite.

This launch, fitted with Napier engines, is capable of over 30 knots and can remain out for long periods. It has a couple of gun turrets to discourage enemy inter-

ference, and is well fitted with bunks for the rescued, good accommodation for the crew, a smart control room as illustrated opposite, and a separate cabin for the wireless operator.

It is of interest to note that at one R.A.F. station, where there is a happy liaison between the A.T.C. and the R.A.F., some cadets of the local squadron are given the benefit of instruction by the crews and are even taken out on practice runs. In return the cadets give some assistance with the work and seem to enjoy themselves. There is much to be done, for the launches are kept spotlessly clean and in perfect condition.

Former cadets are to be found among the regular crews. One of them is a wireless operator from a Durham A.T.C. squadron. He is full of enthusiasm for his job. Encased in his little cabin, with the earphones over his head, he sees and hears little of what is going on, but feels nevertheless that the useful work he is doing makes up for his inability to see the spray or to be the first to spot the dinghy. The habit of training acquired in his A.T.C. days still persists. If you enter his cabin you will find on his table a practice key and buzzer which he uses to keep his hand in during the periods where there are no messages to be sent or received.

Floats and buoys are used as further rescue aids. The float, about 30 feet long, painted in bright colours, is fitted with grids and bars extending below the water-line to act as foot-and hand-holds. The stern of the float is cut away at an angle, the ladder over it hanging straight down to improve its accessibility. The sides are raised to give protection to anyone who is too exhausted to enter the cabin at once. These floats, equipped with signalling apparatus, first aid, food, clothing and amusements, are moored at intervals round our coast. Many of the navigational buoys outside our harbours and estuaries have been equipped with ropes and ladders leading to the light-cage. Inside the cage is a chest containing the usual kit of emergency supplies.

New ideas to assist rescuers and rescued are introduced from time to time, such as fluorescine packs which, when immersed, colour the surrounding sea. Tins of food dropped from the air are automatically heated by chemical action on coming in contact with the water.

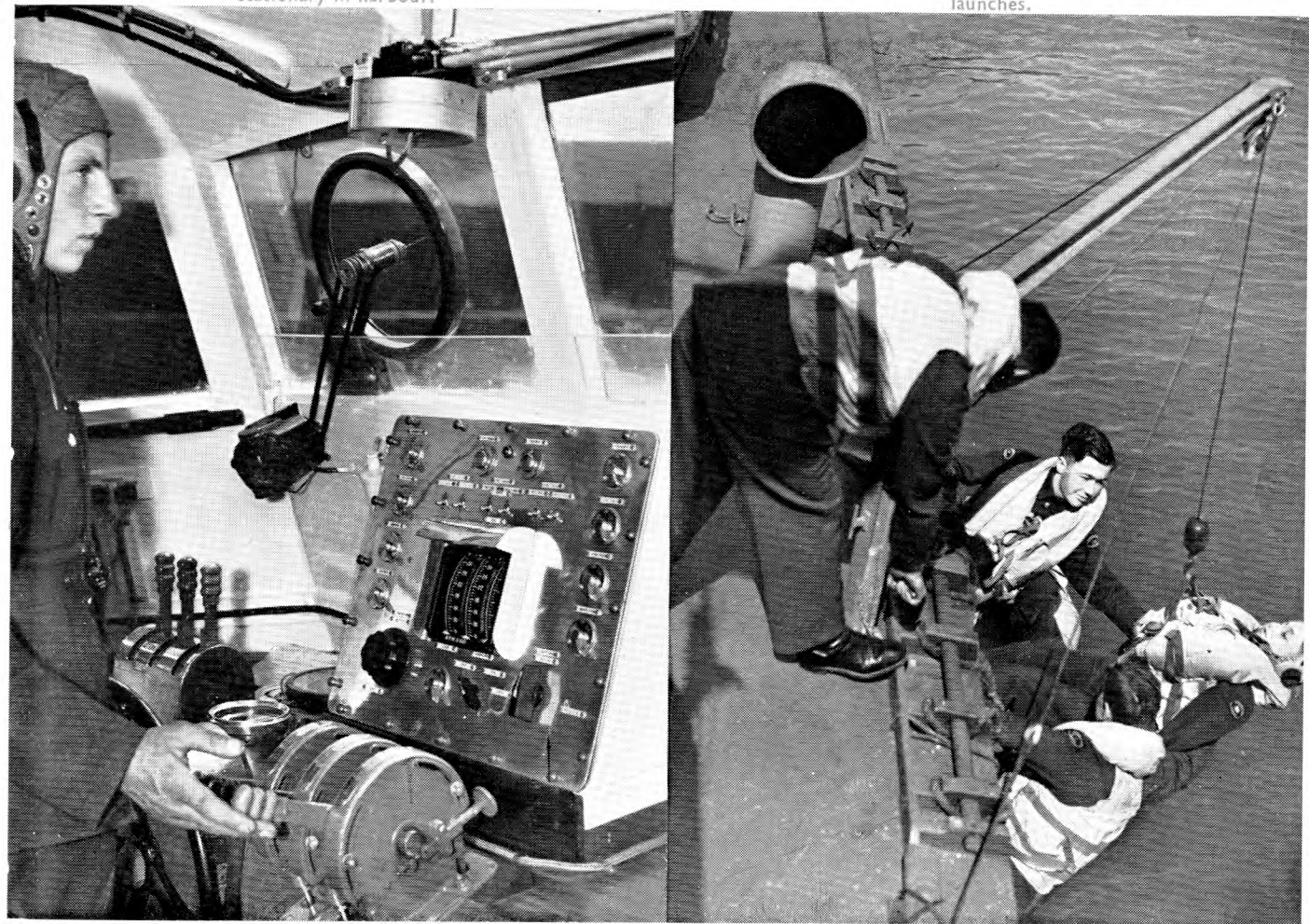
There are many cadets who for some reason or other may not be able to enter the R.A.F. as aircrews. To be on a high-speed launch of the Air/Sea Rescue Service is about the next best thing. Those who do manage it will find that they have joined up with a good bunch of fellows and under a well-run Command. They will have their tough times and dangerous moments, for most of the rescues are carried out in rough seas, and there will be periods of monotonous waiting. But they will be doing most valuable jobs, and will have some thing to talk about after the war.



The new Air Sea Rescue Launch has a speed of over 30 knots.

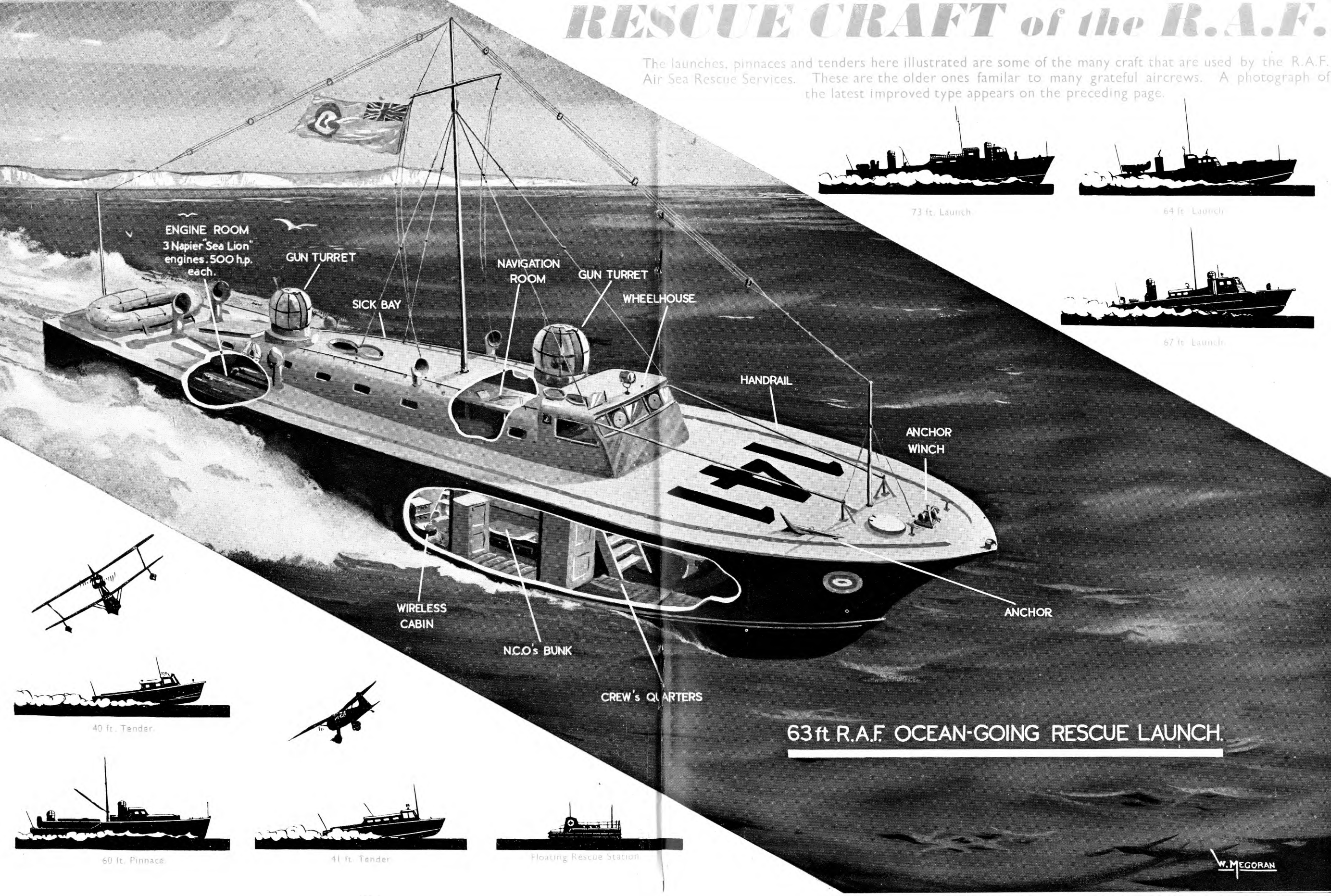
A cadet at the controls of the launch while it is stationary in harbour.

Cadets practising a rescue on one of the new launches.



RESCUE CRAFT of the R.A.F.

The launches, pinnaces and tenders here illustrated are some of the many craft that are used by the R.A.F. Air Sea Rescue Services. These are the older ones familiar to many grateful aircrews. A photograph of the latest improved type appears on the preceding page.



ENGINE ROOM
3 Napier "Sea Lion"
engines, 500 h.p.
each.

GUN TURRET

SICK BAY

NAVIGATION
ROOM

GUN TURRET

WHEELHOUSE

HANDRAIL

ANCHOR
WINCH

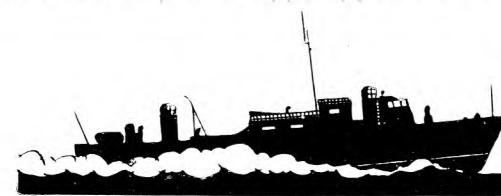
ANCHOR

WIRELESS
CABIN

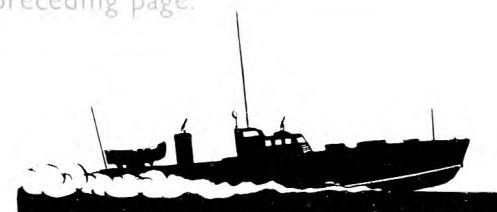
N.C.O.'s BUNK

CREW'S QUARTERS

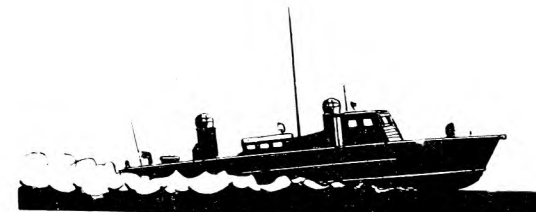
63 ft R.A.F. OCEAN-GOING RESCUE LAUNCH.



73 ft. Launch



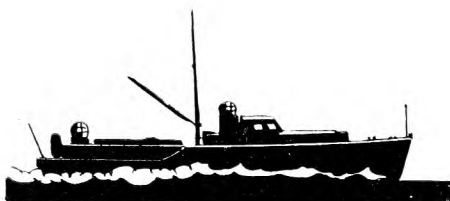
64 ft. Launch



67 ft. Launch



40 ft. Tender



60 ft. Pinnace



41 ft. Tender



Floating Rescue Station



Engine Speed INDICATORS by ASTRO

ENGINE speed is engine power. The faster an engine turns the greater its power output. Modern aero-engines have great reserves of power stored up in their revolutions. This is clearly understood if we look at any modern aero-engine specification. For instance, an engine might develop 1,100 h.p. at, say, 2,000 revs. and 1,300 h.p. at 2,500 revs. per minute. Study all the engine specifications you can, and this relation of engine power to engine speed will become much clearer. The function of the engine-speed indicator will present no difficulties if we bear in mind that power is the rate of doing work.

Maximum permissible engine revolutions are usually about 2,500 to 3,000 per minute, and these revolutions always give maximum power either for take-off or for cases of emergency during attack or evasion where extra power is essential. Cruising revs. are always less than maximum for fuel economy. The instrument which records crankshaft revolutions, and therefore the power output of any aero-engine is called a revolution counter, or tachometer, or engine-speed indicator.

This instrument is one of the most important on any instrument panel, and its indications must be thoroughly understood by all pilots and flight engineers. It will also indicate a faulty engine. No pilot should leave the ground before checking up on the engine-speed indicator for adequate engine power and revs.

The engine-speed indicator is also used for ground-testing the engine's power output. It also has another important use in the air, namely, that of synchronising engine revolutions on multi-engined aircraft. This balancing of revolutions by the engine-speed indicator reduces engine noise and vibration to a minimum. In multi-engined aircraft the engine-speed indicators are incorporated into one instrument, as shown in Fig. 3. This makes synchronising a simple matter. All engine-speed indicators are clearly marked with the letters "RPM" on the dials. The letters, of course, mean "revolutions per minute."

The picture on the left is of Douglas Dauntlesses over Midway Island.

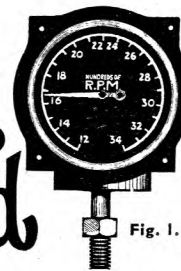


Fig. 1.

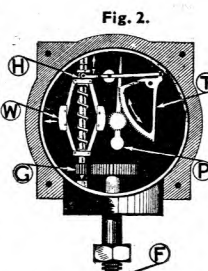


Fig. 2.

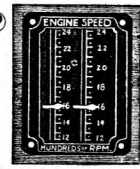


Fig. 3.

mechanically driven instrument. The dial is calibrated for engine speeds between 1,200 and 3,400 per minute. Fig. 2 shows the inside of this indicator. The flexible drive from the engine enters the instrument at F. This flexible coupling drives the gears, G, which in turn rotate the flyweights, W, in exactly the same way as the governors on a steam engine. As engine speed increases so the weights fly outwards centrifugally, lifting the head, H, which movement is transferred to the pointer and its toothed driving sprocket, P, by the quadrant, T. By this means the engine-driven governor weights record engine speeds on the dial.

Fig. 1 is recording an engine speed of

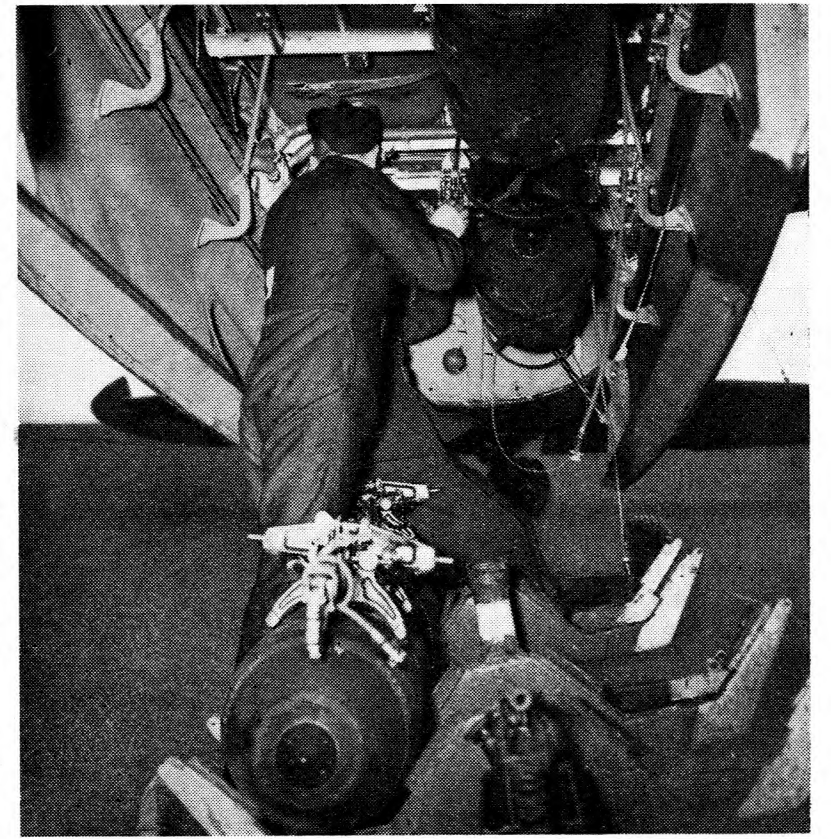
approximately 1,670 r.p.m. At Fig. 2 the flyweights are extended to about half maximum revs.

Electrical Types

Fig. 3 shows the dial of an electrically operated engine-speed indicator designed for two engines. This is a more compact instrument than is possible with a duplication of mechanical instruments for more than one engine. Using separate instrument dials would not only be a useless duplication taking up valuable panel space, but would be tiring and confusing on long operational trips. With the electrical type quite a compact arrangement is possible even for four engines. Another advantage of the electrical type is the lighter connections and the more simplified coupling. The advantage of this for big aeroplanes where the engines are some distance from the cockpit is obvious.

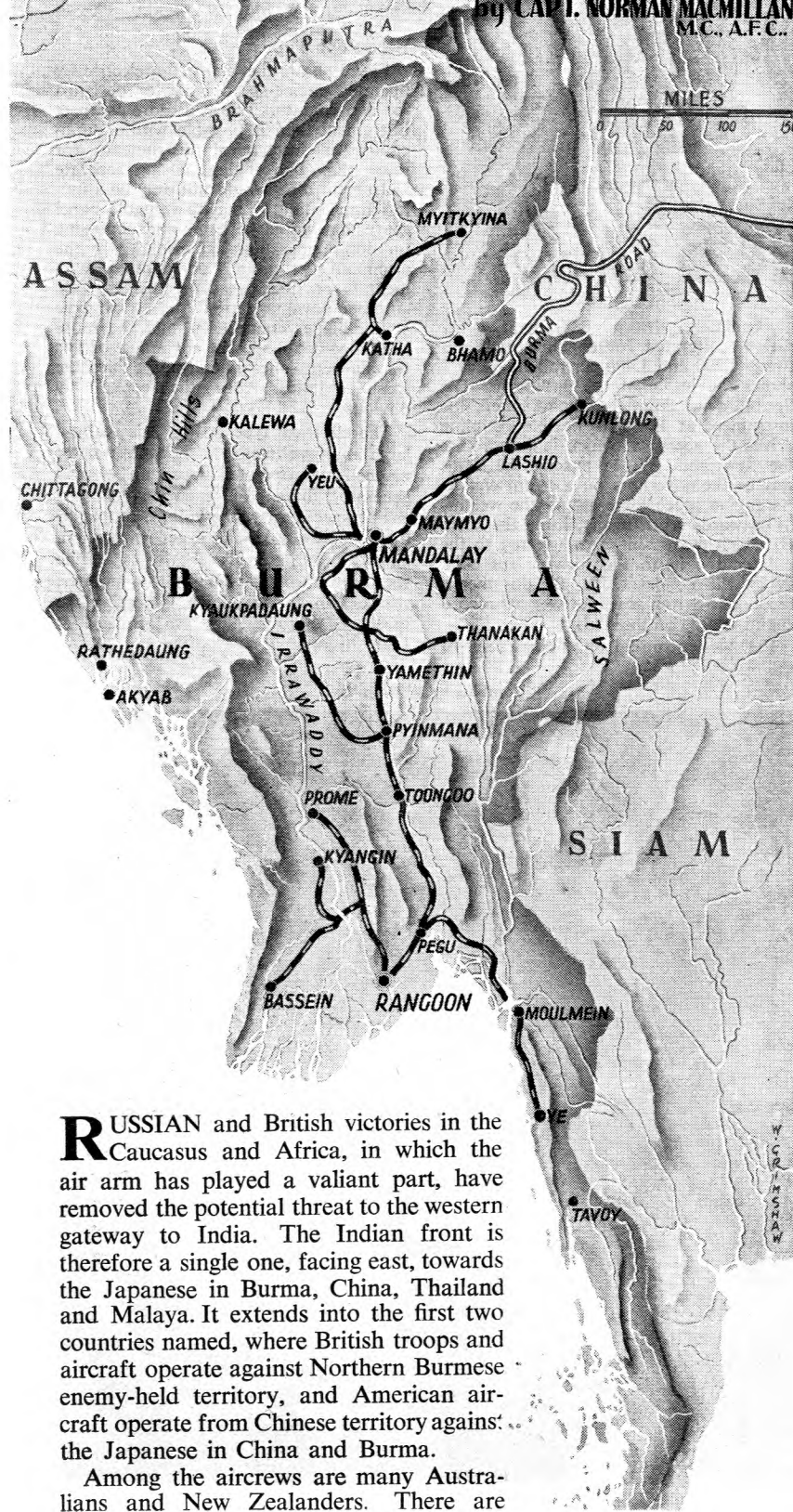
The electrical type at Fig. 3 is really a large multi-voltmeter with each pointer magnetically operated from an electric generator driven off each engine. As engine speeds vary, the voltage output of the generator varies in exact proportion, and this variation is shown as engine speed on the indicator by the pointer, two of which are shown indicating the speeds of both engines synchronised at 1,600 r.p.m.

Bombing-up a Mosquito.



If you fly over BURMA

By CAPT. NORMAN MACMILLAN
M.C., A.F.C.



RUSSIAN and British victories in the Caucasus and Africa, in which the air arm has played a valiant part, have removed the potential threat to the western gateway to India. The Indian front is therefore a single one, facing east, towards the Japanese in Burma, China, Thailand and Malaya. It extends into the first two countries named, where British troops and aircraft operate against Northern Burmese enemy-held territory, and American aircraft operate from Chinese territory against the Japanese in China and Burma.

Among the aircrews are many Australians and New Zealanders. There are

fighter pilots from the Durham and Surrey squadrons of the R.A.F., squadrons which before the war were territorial Auxiliary Air Force units, but have now become as "regular" as any unit in the air service. In the field the only difference between an Auxiliary squadron and an R.A.F. squadron is the name.

The British aircraft employed in most of the Burmese operations on the Indian front have been Blenheims, Wellingtons and Hurricanes. All have been more than a match for the opposing Japanese aircraft.

Burma was one of the Provinces of British India until 1937. On April 1st that year it was separated from India. Its area is 261,610 square miles. The total population is a little under 15 millions. The population of Rangoon is 400,500 and of Mandalay, the next largest city, 148,000. During the hot weather the Government moved from Rangoon to Maymyo. Principal products are petroleum, rice, teak, silver and tin. It is a fairly productive country, and it is probable that the Japanese troops can support themselves in food from the land.

Monsoon Flying

Here is the citation for the Distinguished Flying Cross awarded recently to Acting Flight Lieutenant David Owen Cunliffe, R.A.F.V.R., of No. 5 Squadron: "This officer has completed numerous sorties, involving long flights over wild and mountainous country during the monsoon season. At Kalewa he made numerous attacks in the face of heavy anti-aircraft fire. On one occasion in September, 1942, he dived from 6,000 to 200 feet, in the face of heavy fire from several enemy gun positions, and silenced one of the guns."

How many readers can say without reference where Kalewa is? Why should the citation mention the monsoon season?

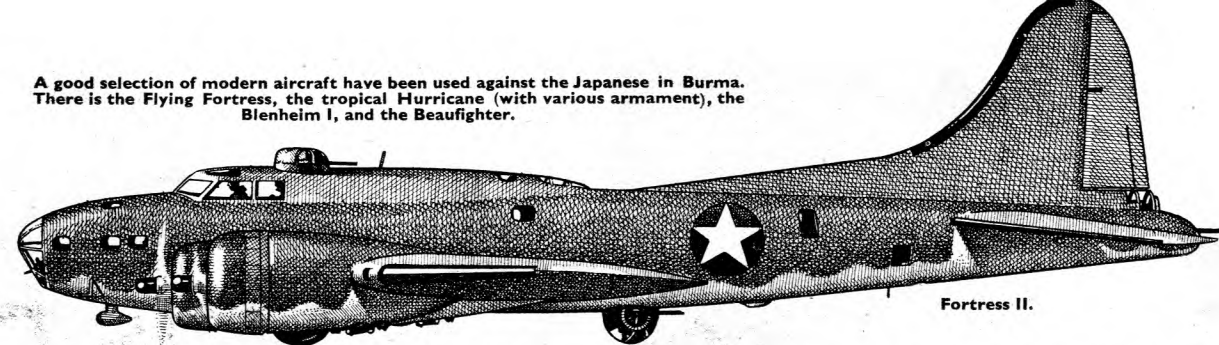
Every day communiqués are issued from India announcing the progress of air operations in Burma. Without knowledge of the geography of the country it is impossible to follow them.

Thus a study of the features of Burma is not time lost. It will prove useful daily now, and if you are posted there in the future it will be invaluable. And while you engage upon the study of the Burmese map you will polish up map-reading, an essential qualification for all pilots, navigators and observers.

The Shape of Burma

Burma is a country shaped almost like a tadpole with its head facing north. Mountain ranges and rivers run mostly north and south. In the north the frontier with Tibet and China is not defined. The north-western frontier joins Assam, Manipur, and the Chittagong Hill Tracts; the western frontier is the Bay of Bengal; the north-east and east touch China, French Indo-China and Thailand. The extreme length is about 1,200 miles, width 575 miles; the geographical situation is

A good selection of modern aircraft have been used against the Japanese in Burma. There is the Flying Fortress, the tropical Hurricane (with various armament), the Blenheim I, and the Beaufighter.



Fortress II.

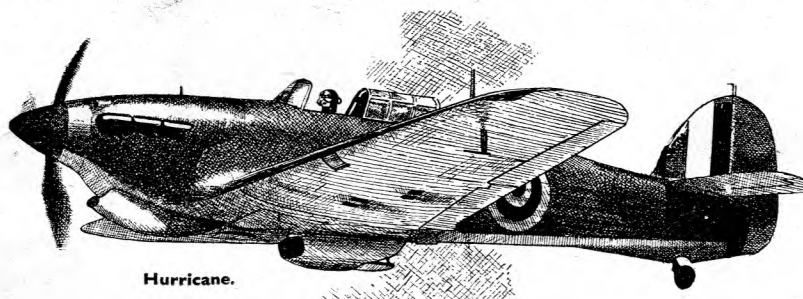
from 9° 58' to 28° North Latitude, and from 92° 11' to 101° 9' East Longitude.

Principal rivers are the Irrawaddy and its tributary the Chindwin. Many R.A.F. strategic targets lie on these important river lines of communication. The Irrawaddy is navigable for 900 miles, to beyond Bhamo, far north of Mandalay. Kalewa, already mentioned, lies on the Chindwin river. Tactical targets are sampans and small vessels on the Kaldan and Mayu rivers, which flow into the Bay of Bengal near Akyab, port towards which British fighting troops face.

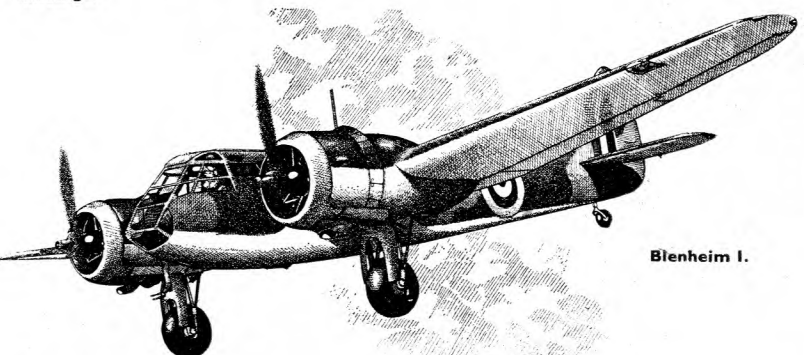
The highest peak between the Bay of Bengal and the Irrawaddy is the Blue Mountain, 7,100 feet. The delta country of Lower Burma is flat, and in summer steamy with heat. The country is heavily forested. It is far from ideal for forced landings.

times they rise much higher. Everest mountaineers have found the monsoon clouds breaking round them at 28,000 feet.

When flying over difficult country you get a thrill never experienced over easier lands. Here is a mosaic picture of an attack against Japanese troops in the



Hurricane.



Blenheim I.

Its Climate

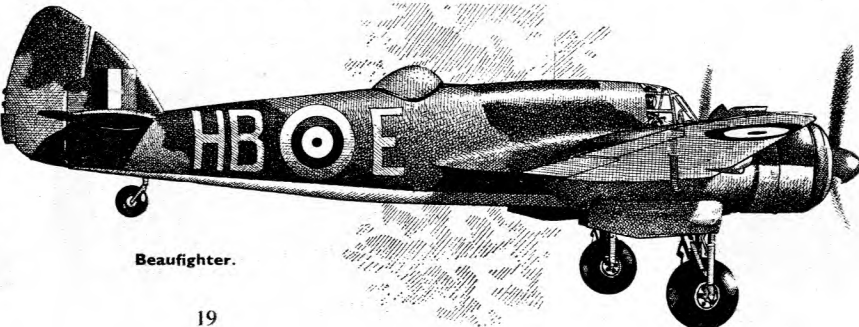
The monsoon, mentioned in the citation I have quoted, is a seasonal wind which blows from the south-east. It begins in May or June (the date of its arrival varies) and lasts until September or October. It brings heavy clouds and torrential rains. Flying through the monsoon, I have seen the water running off the trailing edges of my wings like the solid water of a waterfall. It seems almost incredible that anyone could fly through it. At times it is more like swimming than flying. But aeroplanes stand a lot of punishment, and the chief difficulties about the monsoon are that it makes navigation far more onerous over mountainous country, and it turns ground surfaces in to mud and water, which makes take-off and landing difficult.

I have seen a monsoon storm cloud stretch unbroken for a hundred miles, almost as forbidding-looking as the Himalayas or the Andes. Sometimes you can climb over them at 8,000 feet. Some-

Forced-Landing Dangers

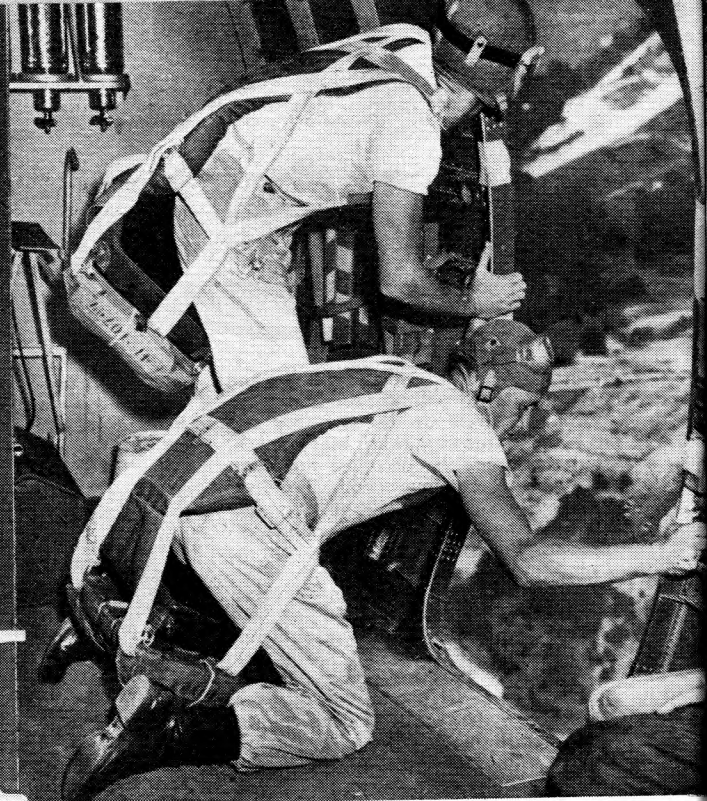
If ever you have a forced landing in the Bay of Bengal, look out for two things—I found them when I was wrecked in a seaplane in those inhospitable waters—sea-snakes and hammerhead sharks. Sea-snakes may look beautiful swimming in the water, multi-coloured like tropical fish, but they are all poisonous. There are, I believe, about 35 different varieties, and most are found in that bay.

Rathedaung area built up from several pilots' reports: "In comparison with flights over the desert, it was a new and refreshing experience. Instead of the vast expanse of blinding yellow sand we flew over dense green jungle, interspersed with paddy fields and tortuous rivers glinting in the sun. We crossed the border into Burma in perfect formation. The Japanese were dug in on a ridge of cone-shaped hills covered with jungle. It was not like Libya, where you can generally see what you are doing against a background of bare, flat sands. We could not see the Jap troops. But we had an excellent landmark in the shape of a building which they were apparently using as an observation post. Our bombs snaked down to the right spots, only a thousand yards from our own troops. As we left I saw our chaps advancing towards the enemy positions. Some of them waved to us as we flew low above them, and we waved back. We must have silenced the Jap mortars. A few hours after we got back to base the Air Liaison Officer waved a piece of paper at us. 'Got a strawberry from advanced H.Q.,' he said. It read: 'Bombs just where we wanted them.'"



Beaufighter.

U.S. PARATROOPS



Looking for clover. Instructors seeking the right spot before ordering the fledglings to step off. Both in training and in operations things will be upset if the landing ground is not selected with care.



A slap on the shoulder from the instructor sends the paratrooper over the side in his final parachute packing exam. After a free fall jump in the parachute packed and inspected by himself, the student is entitled to wear a miniature parachute insignia on his left arm and, naturally, to feel a certain amount of confidence in his ability to pack a parachute.



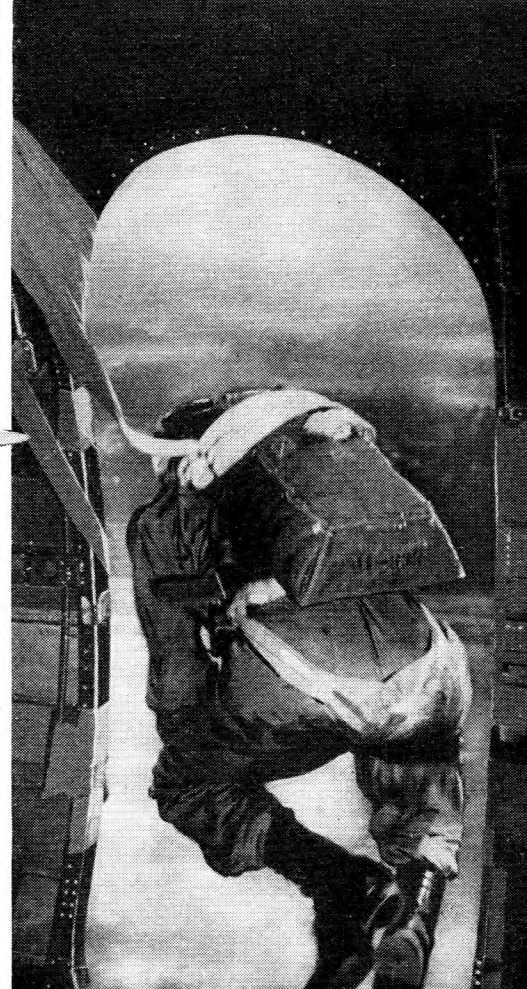
At the count of four the paratrooper pulls his rip-cord. If the parachute fails to open he can try the emergency pack on his chest.

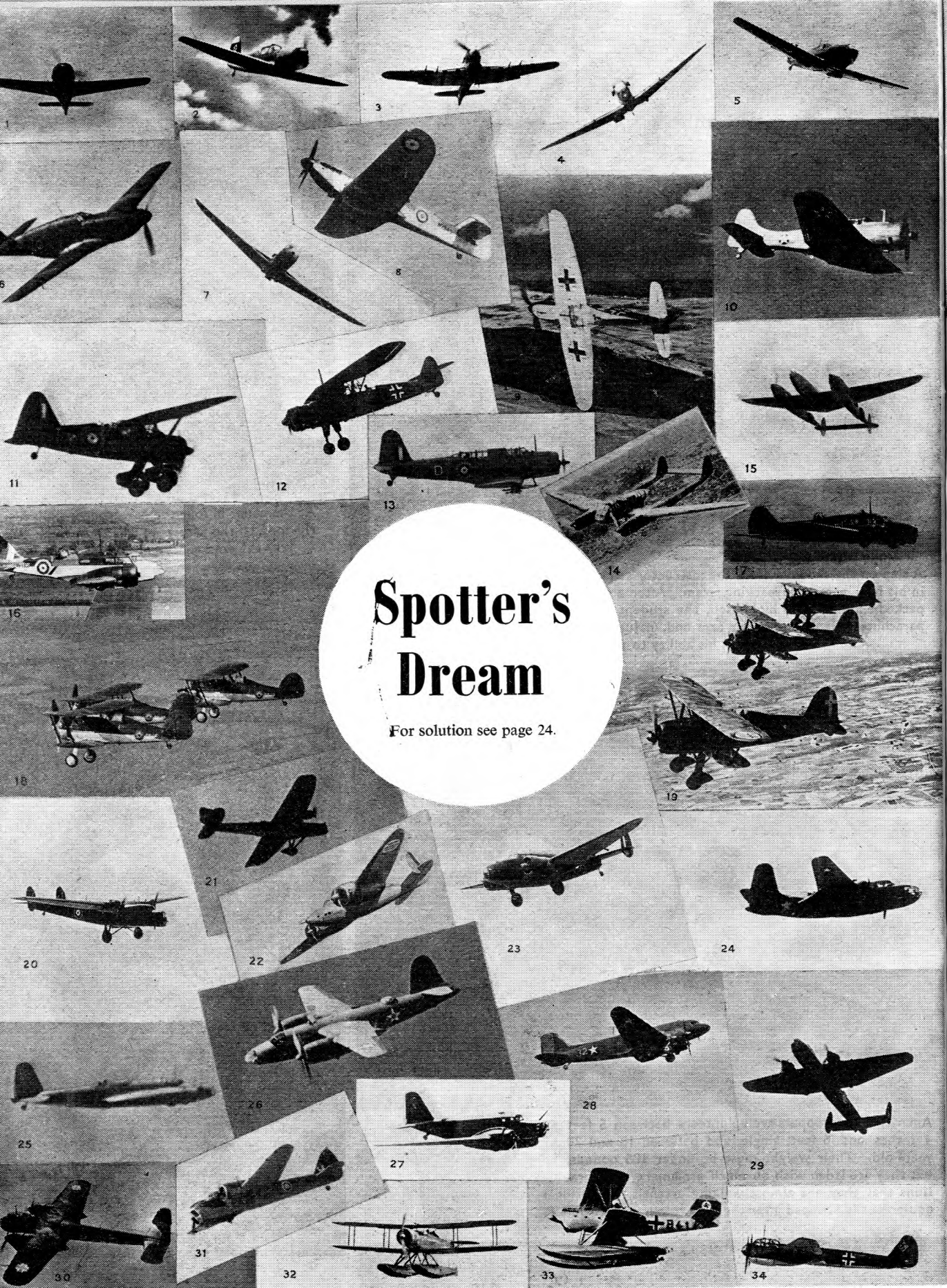


Paratroopers training from a Douglas Troop Transport aircraft. They undergo the same sort of training as their British comrades, falling through the air with the greatest of ease but prepared for tough going on the ground.



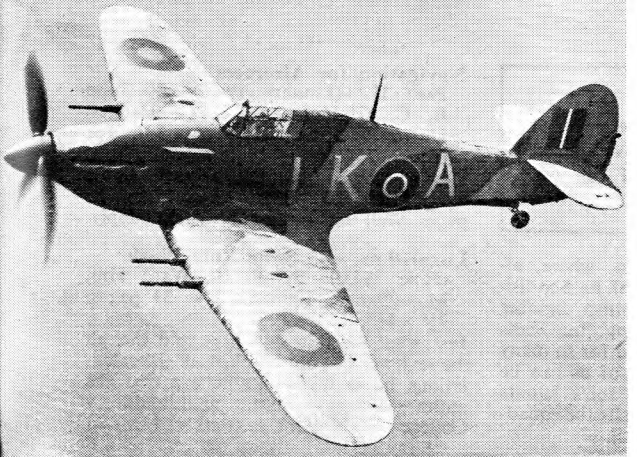
American paratroopers are volunteers between 5 feet 4 inches and 6 feet, single, and between 18 and 30 years old. Their weight must be under 185 pounds, but they are laden with so much armament in operations that they are almost walking arsenals. Additional equipment is dropped after them by coloured parachutes.





Spotter's Dream

For solution see page 24.



The Hurricane IIc, Britain's most versatile aircraft.



The Typhoon Ib. The zebra-like markings on the underside of the wings are to avoid confusion with the Focke-Wulf 190.

A FIGHTING BREED

by David Vine

TEN years ago a silver biplane single-seat fighter with a fixed, lanky undercarriage amazed us at the Hendon Air pageant with its brilliant aerobatics, its speed and grace. It was a real thoroughbred. That aeroplane was called the Hawker Fury. Six years later, during the 1939 Empire Air Day display at the home of a famous London fighter squadron, a dun-coloured monoplane streaked across the aerodrome, then climbed almost vertically, astounding us with its terrific speed, climb and manoeuvrability. That aeroplane was the Hawker Hurricane.

Recently, I was sitting on the Sussex Downs and was fortunate enough to see a couple of Fw 190s given a most uncomfortable few minutes by a single-engined aircraft which tore into them like a hawk into a flock of sparrows. The attacker was the Hawker Typhoon. It is remarkable that of all the aviation impressions which have been crowded into the past ten years, the most vivid should be in the form of a picture history of Hawker single-seat fighters.

Links in a Chain
 Though these three outstanding fighters have in their respective classes made such strides away from each other, they have really been like a family of runners in a relay race handing on the torch of progress, each carrying it faster and further than the other. There seems no doubt that if the war had come some years earlier the Fury would have done to the enemy what the Hurricane accomplished later on. Nor must we forget that the Hurricane would not have been possible but for the Fury, just as the Typhoon could not have been conceived without the Hurricane. Each is a link in a chain of technical achievement. Through them all runs an unmistakable breeding which we call a likeness for want of a better word.

This likeness is not so much in their outward appearance as in their general design and layout. Of course, there are many technical improvements in each succeeding design. For instance, the

Typhoon has a fully stressed skin, even to the ailerons. A hinged door has taken the place of the usual sliding hood. The hood top is hinged for easier access. The track of the Typhoon is wide for a single-seat fighter, and, with its wheel struts set at such a pronounced forward rake, it has obviously been designed to be stable on all sorts of aerodrome surfaces. The wheels and the shock-absorber struts are as big as those fitted to the Boston or Blenheim. The brakes, too, are exceptionally powerful. At close quarters the size of the Typhoon is astonishing and deceptive. When comparing the dimensions of the Typhoon with those of the Hurricane, there seems very little difference, and yet the Typhoon seems to dwarf the Hurricane on the ground.

Sturdiness
 Another likeness which has always characterised all the Hawker breed is their sturdiness. They have all obviously been intended for operations anywhere under any geographical conditions, and indeed very few aircraft have had such a world-wide reputation as Hawker Furies and Hurricanes. The Typhoon, too, is coming along in this respect, and will soon have an international reputation. Yet there is nothing temperamental about any Hawker aeroplane; they are at once packhorse and racehorse, with that touch of good breeding which makes the thoroughbred. Thoroughbreds are supposed to be vicious, but not the Hawker breed, which is now famous for its docility and beautiful handling qualities.

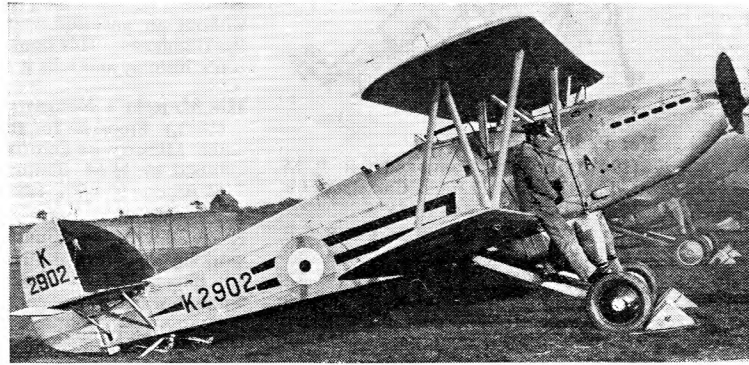
Interior Resemblances
 Another striking Hawker likeness is in their respective cockpits. Climbing into

the cockpit of the Typhoon brings almost nostalgic memories of the Fury. The big hand-wheel for adjusting fore-and-aft trim is in the same place on the same side in all three. The Hawker-type spade-handle control column, with its cycle chain and hinged knuckle just below the handgrip, is a most striking reminder of former days. The general arrangement of the throttles and the neat cockpit layout have that compactness and roominess so reminiscent of all Hawker fighters.

Both the Hurricane and Typhoon have the same method of inward wheel retraction and the same hydraulic control. A similar wide-chord wing is used, and the inner structure is much alike in both types. It will be noticed that the gull effect of the Typhoon wing is produced by maintaining the dihedral on both top and bottom, whereas on the Hurricane the top is level, so creating a much thinner outer section at the tips. The thicker outer wing sections of the Typhoon house the four cannons, and are no doubt as much a structural as an aerodynamic consideration.

Unrivaled
 Before the last war the famous designer of the Typhoon, the Hurricane and the Fury, Mr. Sydney Camm, was designing aeroplanes of exceptional performance, of which the Typhoon tops them all. To such ancestry no Nazi aeroplane can lay claim; and, in aeroplanes, as in most things, it is the breed that counts.

On such firm foundations has our technical superiority been built, and it was never so clearly exemplified as in the Battle of Britain. The question one asks is to what will the Typhoon hand on the torch.



The Fury, once the pride of the R.A.F.



Not Peace, but a Sword

(1943.) By Wing Commander R. P. M. Gibbs, D.S.O., D.F.C. Cassell & Co. 10/6. 255 pages. 5½"×8½".

By an officer who started in the R.A.F. at Cranwell in 1934, went first to a day-bomber squadron (Harts), then to the Fleet Air Arm (Swordfish), was an instructor, for the first year of the war (Swordfish again), and then went on operations in a Beaufort torpedo squadron. The majority of the book deals with the latter. It contains much technical information regarding the flying qualities of the various aircraft, detailed descriptions of operations—"Rover" patrols over the North Sea, torpedo attacks on shipping and bombing of harbours, and intimate revelations of the thoughts and feelings of the author during those operations. The book finishes in 1942 when the author is on his way to the Mediterranean to carry out similar duties there. The writing is of good quality, improving towards the end, the operations well described, and the enthusiasm for flying, the devotion to duty and the fortitude displayed by men of all ranks are recorded with inspiration.

Unsung Heroes of the Air

(1943.) By A. H. Narracott. Muller. 7/6. 168 pages. 7¼"×4¼". 33 illustrations.

Mr. Narracott here relates some of the deeds of those who fly unarmed aircraft, taking many risks but getting few medals. Some fly the Atlantic and other places on delivery and transport flights, some are test pilots, some are rescue pilots. He also writes about those fighter pilots who are carried on merchant ships who know they must crash or bale out at the end of nearly every flight.

603 City of Edinburgh Fighter Squadron

A RECORD OF SOME OF ITS ACHIEVEMENTS. (In aid of 603 Squadron Benevolent Fund.) H. & J. Pillans & Wilson. 1/6. 63 pages. 7"×9". Illustrated.

No. 603 City of Edinburgh Squadron has a first-class record in peace and war. It hit the headlines of history when it shot down the first raider in the first air raid on this country, but it has done much other good work, though less advertised,

Reviewed by THE EDITOR

The opinions expressed are those of the Editor and do not have official approval or otherwise of the Air Training Corps.

fighting here and in Malta, where, although deprived of much of its Scottish accent it retained its Scottish fighting spirit. This is not surprising, for Scots have been settling in England for so many hundreds of years that few of us can be without an ancestor whose spirit haunts the Highlands. This book tells the squadron's history, and tells it well.

His Majesty's Minesweepers

(1943.) Prepared for the Admiralty by the Ministry of Information and published by H.M. Stationery Office. 9d. 64 pages. 9"×7". Illustrated.

Not aeronautical, but inspiring, because it is a well-written account of how a hard-working section of the Navy gets on with an uncomfortable and dangerous job without which we could not do ours.

Combined Operations

By the Ministry of Information. H.M. Stationery Office. 1/-. 144 pages. 8"×5". Photographs and Maps.

More exciting adventures, but it is difficult to see their whole value in the war strategy, and the writing, though it comes from the same street as that of *His Majesty's Minesweepers*, is not of the same high quality.

Everyman to His Post

By Allan Michie. George Allen & Unwin Ltd. 7/6. 105 pages. 7¼"×5¼". 22 photographs.

Some good writing of great deeds. Third-person descriptions and firsthand accounts of a variety of operations in all parts of the world.

On the Way to Electro-War

(1943.) By Kurt Doberer. John Gifford. 2/6. 205 pages. 7¼"×4¼".

Samson the Biblical giant boasted to having slain a thousand men with the jawbone of an ass, and it is certain that ancient primitive warfare was pretty deadly, often leaving no survivors of the defeated side. In the last war so many were left over that some didn't find jobs till this one. In this war, although the jawbone of that ass Hitler has done some damage, it still takes a couple of hundred men safely on the ground to keep one combat aircraft in the air, and it appears to take about a ton of bombs to kill a couple of women. The electrical devices here suggested for waging future wars, although they may send a preliminary shiver down the spine, may not be so deadly as the author anticipates (provided proper defence measures are taken), and we may look forward to the sort of warfare he describes, confident in the assurance that it will be so complicated and demand so many skilled technicians that no one will be left to get hurt unless some lunatic breaks loose with the jawbone of an ass.

Navigation for Aircrews

PART II. (January 1943.) By John E. C. Gliddon and E. C. Hedges. University of London Press. 3/-. 161 pages. 7¼"×4¼". Diagrams and maps. Map-reading and plotting 107 pages, flying instruments 26 pages, meteorology 27 pages. Well illustrated and written simply.

Logarithms and Slide Rule Work

(June 1943.) By T. H. Ward Hill, M.A.(Oxon). Pitman. 2/-. 31 pages. 7¼"×4¼".

Just what the title says it is, and though the reviewer has not checked all the calculations he is willing to believe that the author—a senior master at Llandoverly College—has got the answers right.

Aircraft Identification

(1943.) PART I—British Monoplanes; PART II—German Monoplanes; PART V—Japanese Aeroplanes. Temple Press. 2/- each. 64 pages in each. 5½"×8".

The new editions of these booklets maintain the accuracy of the earlier ones and include more aircraft. The quality of the photographs appears to have improved.

German Aircraft and How to Know Them

(1943.) By C. H. Gibbs-Smith. Geo. Newnes. 5/-. 48 pages. 8¾"×12".

Large photographs and silhouettes of 18 German aircraft, and silhouettes only of 6 others. The illustrations are of Woodason models, reproduced large enough to be memorable, and the silhouettes, also of a large size, are amply annotated with notes drawing attention to recognition features.

Testing of Aero Engines

By R. A. Beaumont, A.F.R.Ae.S. Sir Isaac Pitman & Sons Ltd. 7/6. 120 pages. 5½"×8½".

Hardly a book for the majority of cadets, but a few readers who are employed on such work may be glad to hear about it, and we must leave these highly technical men to judge its merits for themselves.

Key to Spotter's Dream

(See page 22)

1, Focke-Wulf 190; 2, Gotha Go 149; 3, Hawker Typhoon Ib; 4, Supermarine Spitfire Vb; 5, Messerschmitt 109 E; 6, North American Mustang I; 7, Bell Airacobra I; 8, Miles Master I; 9, Heinkel 113; 10, Douglas Dauntless; 11, Westland Lysander; Henschel Hs 126; 13, Vought-Sikorsky Chesapeake; 14, Focke-Wulf Fw 189; 15, Lockheed Lightning; 16, Airspeed Oxford I; 17, Avro Anson; 18, Gloster Gladiator; 19, Fiat C.R. 42; 20, Bristol Bombay I; 21, Dornier Do 23; 22, Breda 88; 23, Lockheed Hudson; 24, Douglas Boston III; 25, Mitsubishi OB-97; 26, Martin Marauder I; 27, Douglas Digby; 28, Douglas C-53 Dakota; 29, Avro Manchester IA; 30, Dornier Do 215; 31, Bristol Blenheim IV; 32, Fairey Seal; 33, Heinkel He 60; 34, Junkers 88 A6.

N.B.—In last month's "As You See Them," No. 8 was the Harvard II. The Editor thanks all those who wrote to point this out.

R.A.F. thanks . . .



Thank you War Savers ;
You who have formed Groups—in your street in your works in your offices. You who have taught the thoughtless ones to save. You who have kept accounts and organised and seen to things in Savings Centres and elsewhere. Thank you Teachers and Children for the pennies and the odd-shaped three-penny pieces. Thank you Teapots on the mantelpiece who have given up your little hoards to War Savings. Thank you Old Stockings and secret places. Thank you Shopping Baskets who have spent less. Thank you all—For in saving small sums you are saving a great treasure—Freedom.

* * * *

These have been great weeks—these Wings for Victory Weeks. They have been a sterling success because everybody has worked with a will. The R.A.F. busy though it is with its arduous task of fighting and bombing the enemy has spared time to co-operate. To all—thanks! But we must remember; the job is not yet finished—SAVE MORE—KEEP 'EM FLYING!

. . . — Wings for Victory

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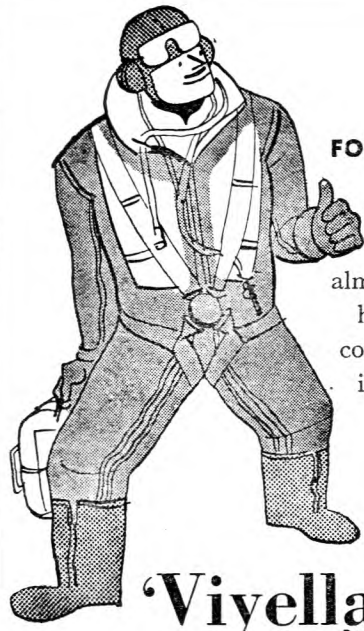
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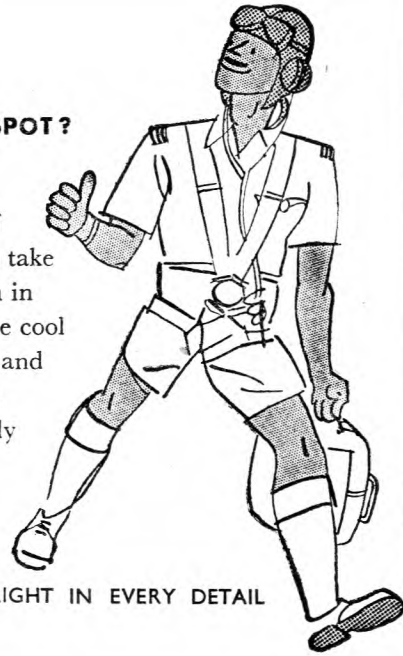
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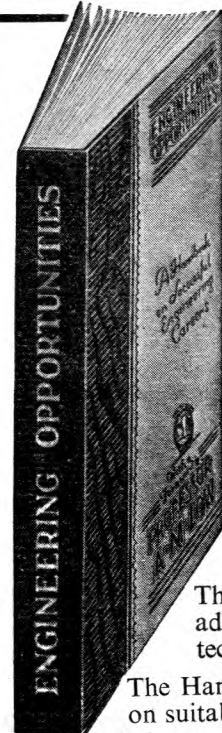
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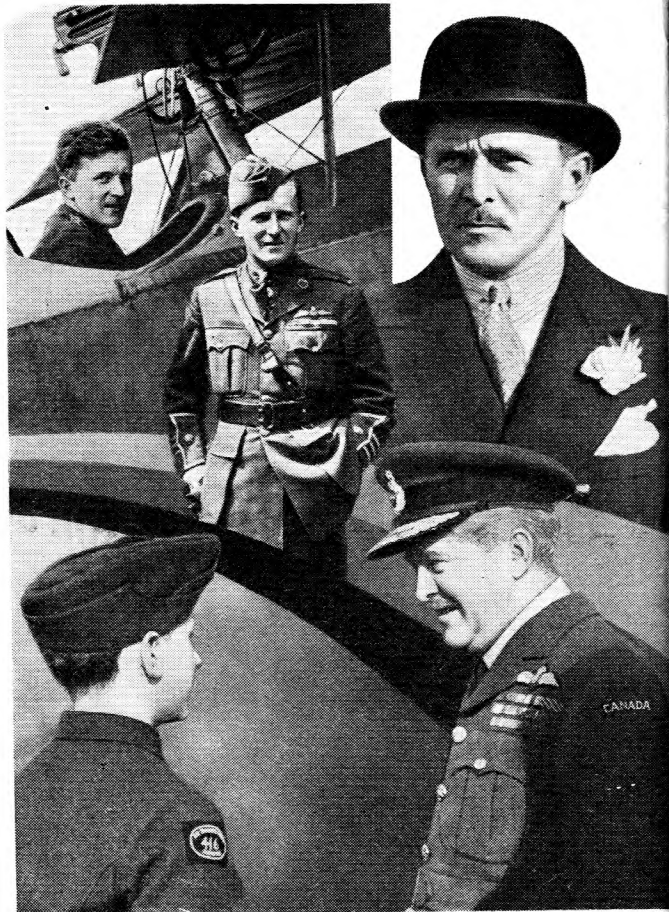
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He went to France with the Canadian Expeditionary Force, and transferred to the R.F.C. in 1915. Between then and 1918 he took part in over 170 air battles and was officially credited with bringing down 72 German aircraft.

After the war he left the Service and became a successful business-man, holding directorships in an oil company, an electrical company and an air-transport company. His books *Winged Warfare*, *Hunting the Huns in the Air* and *The Flying Squad* have all been widely read. Coming back to active service during the war, he became Director of Recruiting for the Royal Canadian Air Force, and his success in that job can be judged by the number of Canadian pilots one sees and hears about in every part of the world. One of them is Air Marshal Bishop's own son.

These photographs show Air Marshal Bishop as a Captain seated in the Nieuport in which he achieved so many victories, as a Major dressed as smartly as any staff officer, as a bowler-hatted business-man, and as an Air Marshal inspecting A.T.C. cadets.

Of late years Air Marshal Bishop has broadened, but his deep-set blue eyes still seem capable of searching for Huns. In uniform or civvies, his turn-out is immaculate. He can deal with big business matters in a few words, but has plenty of conversation for social occasions. A genial man with many friends, and no enemies except his country's enemies, Air Marshal Bishop typifies success in war and peace.

The new Spitfire with clipped wings and Lockheed Lightning fighters.

