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COASTAL COMMAND REVIEW

June, 1943

Vol. II, No. 2

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COASTAL COMMAND
ROYAL AIR FORCE

COASTAL COMMAND REVIEW

Vol. II, No. 2—June, 1943

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"While this book is, of necessity, issued as secret, and no part of it must be communicated to anyone outside the Services, it is intended for the information of all officers but principally of all members of aircrews, under conditions of security approved by the Commanding Officer. The whole purpose of producing it would be frustrated if it were relegated to the interior of an official safe."

*The Air Officer Commanding-in-Chief,
Coastal Command.*

PLATE 1. *Frontispiece.*



Attack on 740-ton U-Boat by H/120. Entry of depth-charges. (See Summary of the Months' Work.)



Depth-charges exploding aft of conning tower and forcing bows under water.



Crew of U-Boat after the kill.

Summary of the Month's Work

JUNE, 1943

1. Since the summary of the month of May was written it has become apparent that the results of that month were even more successful than we then knew for certain; the Prime Minister in his speech at the Guildhall on June 30 has announced that more than 30 U-Boats were sunk in May. Coastal Command's total amounted to seventeen known or probably sunk. It is clear from events in June that this was a staggering blow to the German High Command and indeed to the morale of the U-Boat crews. But this must not be allowed to result in any slacking off of our effort against the U-Boat—indeed it must be intensified, to give the enemy no time to recover. The Hun is a resourceful animal and the U-Boat represents his last hope of avoiding decisive defeat. Everything possible is being done at Headquarters Coastal Command to retain the initiative and keep at least one jump ahead of him; for instance, radio counter-measures, nose armament and re-equipment of squadrons is being pressed as hard as can be. Any suggestions from squadrons for improvement in tactics, technique, or equipment are always welcome. But it is up to the squadrons themselves, and indeed to each individual crew, to ensure that the lead we have won over the U-Boat is retained and that the good equipment we have got is used to the best advantage. We have won one important battle; but nothing could be more dangerous than to assume that we have yet defeated the U-Boat, and June has proved that it will need all our courage and resource to retain the lead we have won.

2. It was not to be expected that June could produce results similar to May in the form of sightings and attacks. There were many fewer U-Boats at sea, for the best of all possible reasons—namely that between 30 and 40 had gone to the bottom during May, and many more had limped home damaged into port. No service could stand a continued rate of loss such as that suffered by the U-Boat fleet in May; and the measures they have taken to prevent the continuance of that rate of loss have certainly meant that fewer U-Boats have been sunk; but they have also meant that fewer Allied ships have been sunk than in any month since November, 1941—and that, after all, is the object of the exercise. The anti-submarine squadrons of Coastal Command exist, in the final analysis, to save Allied ships from being sunk; and that they have succeeded in doing in June. We had 91 sightings by anti-submarine aircraft (plus 33 by others) and 55 attacks during the month, resulting so far in 7 known or probably sunk. But, as the Prime Minister said in the Guildhall speech, hardly a single Allied ship was sunk in the North Atlantic between May 17 and the end of June; this resulted in a vast increase during the period in the volume of shipping available to the Allies for use in offensive operations, and in a huge volume of supplies reaching British ports.

3. But the Hun has not been slow to adapt his methods to make things more difficult for us. June was notable for a complete and not unexpected change of tactics on the part of the U-Boats. Past history in this war has shown that when any particular area gets too hot for him, the U-Boat clears out to pastures new where the going is not so hot. In June he ran true to form and the northerly convoy routes enjoyed virtual immunity. The areas where he can get such immunity are rapidly shrinking; but the one place where he can never get immunity is also where he must come within our range—the Bay of Biscay. His tactics in the Bay underwent a particularly drastic change in June. For the first 10 days we had only 7 sightings in the Bay; then on the 12th we got the first sighting of a pack of five outward bound. We had anticipated that he might adopt this method of running through this unhealthy area, as fast as possible on the surface, in small packs; it reduces our chances of sighting; gives him a better chance of seeing the aircraft before he is seen; gives him valuable A/A fire support, and makes it easier for him to afford fighter protection. We immediately introduced a new system of A/S patrols designed to deal with the new tactics, and the Admiralty took the important step of providing a surface hunting group to co-operate with the Bay patrols—a step which has proved its worth by producing two kills during the last fortnight of the month.

4. When these small packs are sighted they usually break formation and begin zigzagging, and their A/A fire is commonly more determined and accurate than that of single U-Boats. Even these packs, however, finally dive—especially when additional aircraft arrive on the scene. And there has been evidence that U-Boat commanders are now allowed more tactical freedom of action in the matter of diving or fighting back than they were during May. It has again been proved in June that a determined and steady low-level attack, especially when accurate front-gun fire can be maintained, will kill U-Boats even when they are taking violent evasive action. This is a critical and decisive battle, and on no account must we allow the U-Boat to get away with it by defensive fire or evasive action. C.C.T.I. No. 41 says that a captain of aircraft "must remember that the primary reason for his existence is, for the time being, to kill U-Boats, and that a U-Boat on the surface presents a much better chance of a kill than one submerged." In the month of May we killed nine U-Boats that stayed up and fought back; we lost only four aircraft that we cannot account for, and of those we can account for, none was lost by U-Boat's flak. So even if all four unaccounted losses were due to U-Boat's flak—which is by no means certain—nine U-Boats for four aircraft is no bad rate of exchange. In this connection it must be realized that accurate fire, even with '303, can be lethal, and is certainly most disturbing to a U-Boat gunner's aim, at ranges up to 1,000 yards.

5. A good example of a gallant and successful attack at low level against a determined and aggressive U-Boat was that of H/120, Captain—F/Lt. A. W. Fraser, R.A.A.F., on June 24, of which three photographs appear as the frontispiece to this number of the *Review*.

While en route to carry out anti-submarine escort to Convoy ONS 11, a fully surfaced 740-ton U-Boat was sighted 75 miles north of the convoy. The U-Boat and aircraft must have seen each other

simultaneously for the enemy began to take violent evasive action. The captain dived straight in to attack and opened fire. The U-Boat was then putting up considerable opposition and as the captain released the depth-charges, a cannon shell entered the starboard side of the nose wheel compartment and rendered all the hydraulics useless. This caused the bomb doors to "creep" so that only two depth-charges were released. These straddled the U-Boat just forward of the conning-tower and it is estimated that No. 1 exploded almost underneath, just aft of the conning-tower. The U-Boat was not visible after the explosion subsided, but about 20 seconds later, 15 ft. of the bows appeared at a very steep angle and then slid under again. The captain did not realize that the hydraulics were out of action and he attempted to attack with one depth-charge which did not release. On tracking over the position, air bubbles and oil were seen coming to the surface, and from twelve to fifteen survivors had appeared, clinging to a long cylindrical object.

In addition to the shell which put the hydraulics out of action, a second shell entered and exploded in the port wing, outside the outer port engine. A serious petrol leak was also started in the starboard tanks, by machine gun bullets. The remaining depth-charge load was jettisoned and the aircraft set course for base. A considerable amount of petrol flooded the interior, but the leak stopped when the petrol reached the level of the hole.

On arrival at base the undercarriage and flaps were lowered by emergency methods and for three-quarters of an hour the crew tried to repair the brake hydraulic pipe lines. This was impossible and the captain then decided to land in tail down attitude. The whole crew, except the flight engineer, took up station in the rear of the aircraft together with all ammunition and movable gear. The mirror camera was removed from its mounting to prevent damage.

A perfect approach was made at very slow speed and a three-point landing made, touching down within a few feet of the end of the runway. Immediately the aircraft touched, the two inboard engines were cut, the two outer ones being kept in case a swing developed. After running 1,000 yards, most of the speed had been lost, but a swing to port had begun. The outer port engine was opened up and the aircraft was kept turning in circles to starboard at the intersection of the runways until a landing party arrived and brought the aircraft to rest. The damage from landing was confined to slight buckling of the underskin of the fuselage. The only member of the crew injured was the flight engineer whose neck, back and legs were struck by pieces of shrapnel.

This is a perfect example, not only of how an attack should be driven home, but also of the type of initiative and resourcefulness which should be a standard for all captains of aircraft. Flight Lieutenant Fraser was awarded a well-deserved immediate bar to his D.F.C. for this sortie.

6. A word about squadron training. There can be no more dangerous fallacy than for any member of an aircrew to imagine either that he is a fully trained man when he leaves an O.T.U. or that he can possibly expect to retain what skill he has without constant training in the squadron. We have done very well recently, so we can afford to admit that we could have done better if more attention had been paid to individual and crew training. We are not seeing all the U-Boats that there are to be seen—which means we could improve training in visual look-out; we are not getting anything like the results we could get from our S.E.—that is a direction in which there is particularly ample room for improvement; and the proportion of attacks which prove lethal can still be largely increased by more and better bombing training. The standard varies widely between different squadrons, and the gap between the best and the average crews is still too wide. The new planned flying instructions make due provision for training hours, and it is up to all squadron commanders to see that the best use is made of them.

7. It was expected that the new U-Boat tactics in the Bay would be accompanied by increased fighter interference with the Bay patrols. The fact that this expectation has not been fulfilled* is no doubt in part due to the valuable co-operation of the Mosquito squadrons of Fighter Command, whose intervention early in June provided several surprises for the German long range fighters in the Bay. The magnificent action in which Flight Lieutenant Walker and his crew of N/461 shot down three and damaged several others of the eight Ju.88s who were so unwise as to attack them on June 2, has no doubt increased the awe in which the old Sunderland is already held by the German fighter. The fact remains that the enemy fighter activity in the Bay in June was considerably less than May and has not proved a serious interference with the Bay patrols. The outer patrol area is, of course, well beyond the range at which anything but a chance interception can reasonably be expected.

8. All squadrons have done well recently, but no one will grudge a special mention to No. 84 Squadron U.S. Navy (PBY 5a) who co-operate with us so splendidly in Iceland. This squadron, in the months of May and June, had 21 sightings and 18 attacks, resulting in 3 probable kills. The many officers of Coastal Command who have served in Iceland will be sorry to hear that Captain Dan Gallery has completed his tour of duty in Iceland, and will wish him luck in his new appointment.

9. There have been some welcome additions to the strength of the air anti-submarine forces on this side of the Atlantic in the latter part of June. No. 84 Squadron has been joined in Iceland by No. 63 (Catalina) Squadron of the U.S. Navy; and at the end of June, advanced elements of Nos. 4 and 19 anti-submarine squadrons (Liberator) of the U.S.A.A.F., under Colonel Howard Moore, arrived in this country to operate in the Bay.

10. The R.A.F. station at Benson, the P.R. Squadrons and the P.R.O.T.U. at Dyce have been amalgamated to form No. 106 P.R. Wing, under the command of Air Commodore J. N. Boothman, A.F.C.

P.R. aircraft have flown a series of important and valuable sorties during the month of June, some in the face of heavy flak. On June 25 a Mosquito aircraft from Benson took some photographs of Spezia and the harbour from 25,000 ft., revealing two Littorio class battleships, also the cruiser *Boizano*, two Condottieri class cruisers and many other units of the Italian navy. The pilot

experienced considerable flak, three salvos of about thirty bursts, when making his first run over Spezia. On return to base the undercarriage failed to operate and after using emergency gear, the main wheels came down, but the tail wheel and flaps failed to operate. The aircraft and crew landed without damage.

The full value of the speed with which P.R.U. photographs are delivered was shown by the sortie carried out on June 21. Lancasters of Bomber Command had attacked Friederichshaven and had then flown on to North Africa. The photographs showing the bomb damage, taken by P.R. aircraft, were on the table of the C-in-C., Bomber Command, enabling him to assess the damage done, before the bombers were all known to have landed safely in N. Africa.

11. For the shipping strike squadrons the month of June has seen the introduction of our latest anti-shipping weapon, the rocket projectile, fitted with the 60-lb. explosive head. This weapon has already been successfully used with the 25-lb. solid head against enemy submarines, and the fitting of the 60-lb. head enabled us to try it out against enemy surface vessels. Two strikes have so far been made, in which 192 and 168 R.P. respectively were released. Twenty-five torpedoes were also dropped in June, which resulted in four merchant vessels, totalling 11,680 tons, being sunk or seriously damaged. The North Coates Wing carried out three strikes, one with torpedoes and cannon, one with torpedoes and R.P. and one with R.P. alone.

12. Up to the time of writing, the weapon has not been as successful as no doubt it will be with further experience. It is clear that much more practice in aiming against a moving target is needed. Pilots should practise firing the 60-lb. practice head whilst flying in battle sections and thus improve their ability to manoeuvre their aircraft in the shortest possible time. Firing at much closer range will also increase the chances of hitting, and the intention now is for two or more aircraft to attack one target simultaneously, the first one or two concentrating on keeping the gunners' heads down by firing machine guns and cannon, thus enabling the other to close the target with his R.P.

Photographs of the attacks are excellent; the F.46 results especially show us that pilots of the torpedo attack squadrons are getting much better at range estimation. There was, however, still a tendency to allow too little aim-off, and nearly all the torpedo misses were astern.

13. There is no doubt that the anti-shipping operations appear to have been largely responsible for a curtailment in the enemy's shipping programme, and there has been a substantial transfer of traffic from Rotterdam to Emden within the last two months. There is, however, little likelihood that Rotterdam will cease entirely to be used as a port; but it is possible that for the time-being the number of convoys west of Borkum will show some reduction. The increase in the escort forces has made quite clear the value the enemy places on these convoys, and this increase as mentioned in last month's *Review* has again been noted, together with the more common use of balloons. On the whole this is a considerable compliment to the effectiveness of our attacks.

14. As the scale of the United Nations air offensive from Britain mounts, the Air/Sea Rescue service of surface craft and aircraft inevitably has a growing commitment to meet. Coastal Command naturally has a close concern in maritime rescue operations, and in addition to our own two Air/Sea Rescue Squadrons, the organization for all concerned is centred in the Area Combined Headquarters from which *any* aircraft or surface craft can be controlled. Such an organization is not likely to lose its value with the end of the war.

15. In June, 160 members of aircrews were saved by the Air/Sea Rescue Service round these islands. Two outstanding achievements were the rescue of the crew of R/206, and of a total of 45 aircrew saved in the twenty-four hours ending at dusk on June 21. In this period a U.S.A.A.F. Fortress crew were located by the use of their dinghy radio, transmissions being heard and bearings taken from a station nearly 300 miles away, which enabled a fix to be obtained. Finally the dinghy radio homed the launch by which the rescue was made. (See Plate 9.)

R/206, damaged in action, came down in the middle of a minefield shortly after leaving survivors in the water from a U-Boat which had fought back to some purpose before being killed. Attempts were made by various flying-boats between June 12 and 16 to land and pick up the crew, in the course of which the gallant effort of a Catalina of 84 U.S.N. Squadron led to a crash, with the subsequent loss of all but one of its crew. Eventually the 206 crew were rescued by a skeleton volunteer crew, in a specially lightened Catalina which made a successful landing and take-off along the Atlantic swell. These operations are a striking example of the hazards attendant on what may seem to be a perfectly simple landing on the open sea. Hazard is in the nature of war and far be it from Coastal Command to reject the acceptance of all risks; but flying-boat captains should study and follow the instructions relating to this kind of operation, which have recently been brought up to date in *Operational Procedure Instruction No. 12*.

16. Month in month out, the Met. flights and squadrons of Coastal Command continue their un-spectacular and invaluable operations. On their good work and also on the weather observations which it is the responsibility of all G.R. crews to make, depend much of the meteorological information upon which Bomber Command rely to time each round in their offensive, let alone its importance for Coastal operations. Thus reconnaissance loses none of its traditional importance in modern air war; but for the Met. flights it takes an apparently indirect form, usually remote from the battle itself.

Responsibility of this kind calls for the highest discipline and training on the part of unit commanders and aircrew. Also it calls for a decent supply of good aircraft. Units will shortly begin to see the results of a re-equipment policy which will give them good workable aircraft. Ideal equipment always remains "just round the corner," especially in war time. But all Met. air-crews should know that their problems are very much to the fore at Command and that their work constitutes another fraction of the whole, which is the enemy's total defeat in the shortest possible time.

I. ANTI-SUBMARINE

Attacks on U-Boats

NOTE ON TABLE INSERTED OPPOSITE THIS PAGE SHOWING SQUADRON RESULTS DURING YEAR 1942-43 AND FROM JANUARY, 1943 TO APRIL, 1943

The table printed as an insert opposite this page is based on the Admiralty assessments of all attacks by squadrons. Attacks are divided into the following categories:—

(1) Misses. (2) Insufficient evidence of damage. (3) Damage.

The assessment Damage includes: **Known sunk, Probably sunk, Damage A, Damage B, Slight damage.** For the purpose of arriving at the result, the following system has been adopted:—

For each attack assessed as **No damage** 0
 For each attack assessed as **Insufficient evidence of damage** 3
 For each attack assessed as **Damaged** 10

It is felt that it will be of interest to the Squadrons in the Command as a whole to see the work of the various Squadrons and in future the results will be published each month, as in the table below for May, in order that the 1942-43 chart may be kept up to date. These future results will be accompanied by brief remarks from Coastal Command Headquarters on any special aspect of the operations or outstanding results of any particular unit.

All types of damage have been awarded 10, because a pilot who has placed his stick close enough to inflict even slight damage has obviously done a very good attack.

ANTI-SUBMARINE SCORES—MAY, 1943.

PERCENTAGE FIGURES OF MERIT IN BIG NUMERALS.

| 10 O.T.U. | 10 Sq. | 48 Sq. | 53 Sq. | 58 Sq. | 59 Sq. | 86 Sq. | 120 Sq. |
|---|---|---------------------------|--|--|--|---|--|
| 0 0 0 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 3 0 3 3 3 0 0 10 3 0 3 0 3 0 3 10 3 0 3 0 3 10 0 ONE NOT 0 YET ASSESSED | | RE-ARMING | 3 3 3 0 10 10 10 10 10 0 0 0 10 0 3 | 3 3 0 0 10 10 10 10 0 0 0 0 0 0 3 | 10 10 10 3 3 3 3 0 0 3 3 3 3 3 3 3 | 10 3 3 3 3 3 0 10 3 3 3 3 3 3 3 3 |
| 14½ | 33 | | | 51 | 43 | 42½ | 51 |
| 172 Sq. | 179 Sq. | 190 Sq. | 201 Sq. | 202 Sq. | 206 Sq. | 210 Sq. | 220 Sq. |
| 10 3 | 10 | 10 3 3 3 | 10 | 3 | 0 3 | ONE NOT YET ASSESSED | |
| 65 | 100 | 53 | 100 | 30 | 15 | | |
| 224 Sq. | 228 Sq. | 233 Sq. | 269 Sq. | 304 Sq. | 311 Sq. | 330 Sq. | 333 Sq. |
| 3 3 0 10 0 0 0 0 3 0 3 0 0 0 0 0 0 0 | 3 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 0 0 10 3 3 3 3 3 | 10 3 0 10 0 0 0 0 3 3 3 10 10 3 3 3 | | 10 | | |
| 8 | 100 | 40 | 41½ | | 100 | | |
| 407 Sq. | 423 Sq. | 461 Sq. | 502 Sq. | 547 Sq. | 612 Sq. | 236 (R.P.). | |
| 3 | 0 3 | 0 10 3 3 | 3 3 0 10 10 0 0 0 0 0 3 3 | | 10 0 0 10 10 0 0 0 0 0 | 0 | |
| 30 | 15 | 43 | 26½ | | 40 | 0 | |

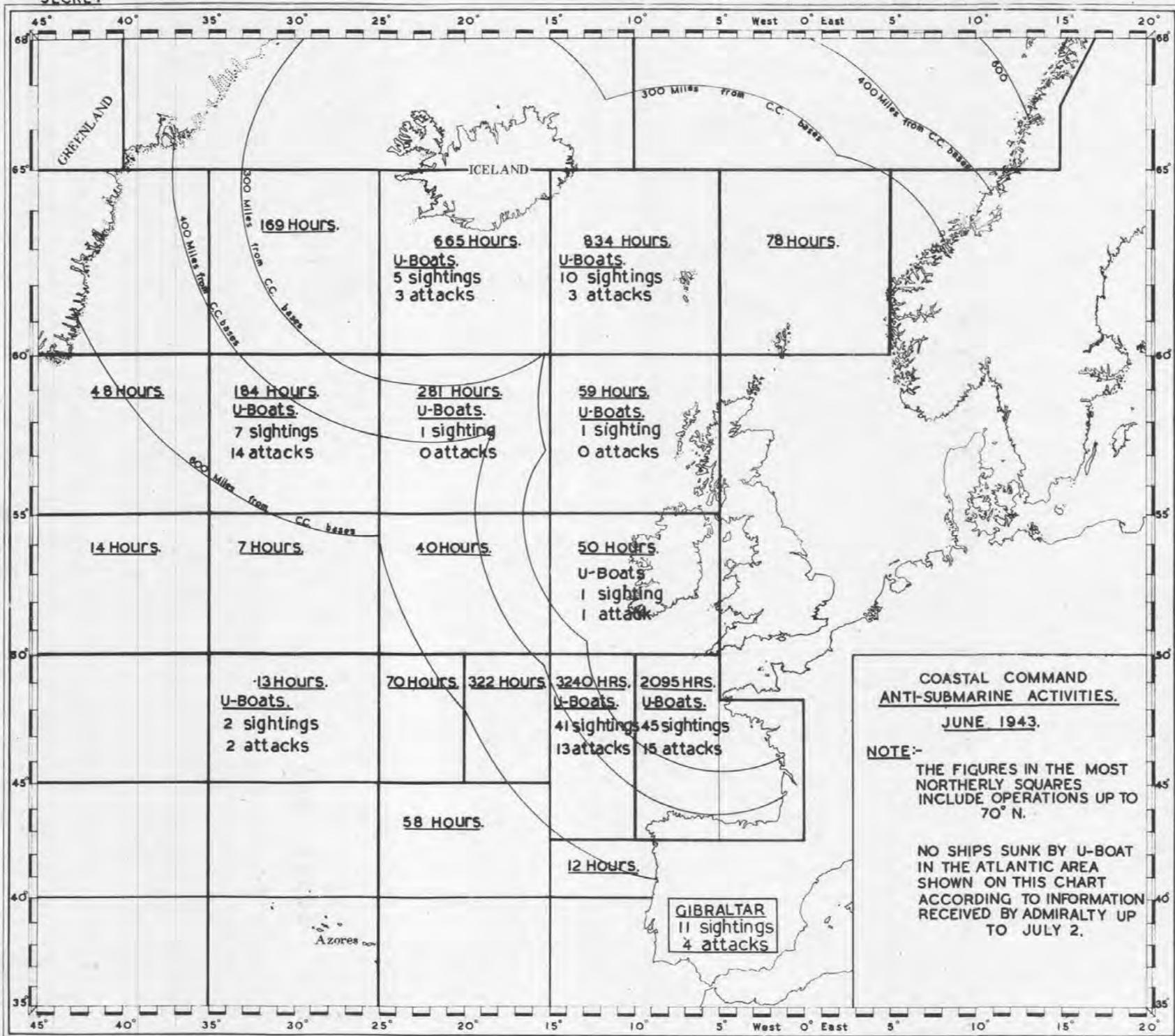
Note.—For a full appreciation of the above scores the percentages, in big numerals, should be read in conjunction with the numbers of attacks, in small numerals, from which they are compiled. It will be seen that certain squadrons have carried out attacks not yet assessed. This is due to failure on their part to submit forms U-BAT promptly. It is essential that these forms should be rendered immediately in order that these and other statistics may be prepared.

Percentage figures of Merit in large figures A/S SQUADRON SCORES 1942

| | 10 | 48 | 53 | 58 | 59 | 86 | 120 | 172 | 179 | 190 | 201 | 202 | 206 | 210 | 220 | 224 | 228 | 233 | 269 | 304 | 311 | 330 | 333 | 407 | 423 | 461 | 502 | 547 | 612 | 500 | 608 |
|---------------|-----------------|-----------------|-------------|-----------------|-----------------|----------|----------------|------------------|-----------------|-----|-----------|-------------|-----------------|------------|-----|-------------|------------|----------------|-------------|-----------------|-----------------|-----------------|---------------|-----|-----|----------------|-------------|----------------|------------------|------------------|-----|
| Jan | | | | | | | 0 | | | | | | 0 | | | | | 30 | | | | | | | | | | | | | |
| Feb | | | | | | | | | | | | | 0 | | | | | | | | | | | | | | | | 50 | | |
| Mar | | | | | | | | | | | | 30 | | | | 66 | 100 | | | | | 30 | | | | | 0 | | 30 | | |
| April | 30 | | | | | | 30 | | | | 15 | 100 | | | | | 30 | | | | | | | | | 48 | | | 65 | | |
| May | 32 1/2 | 30 | 30 | 66 | | | 100 | | | | 15 | 0 | | | | 0 | 33 | 43 | | 0 | | | | | | | | | | 30 | |
| June | 86 | 50 | 30 | 65 | | | 30 | 57 1/2 | | | | 100 | | | | | | | | 0 | | | | | | | | | | 66 | |
| July | 30 | 0 | | 53 | | | 30 | 66 | | | | | RE-ARMING | 30 | | | | | 75 | 6 | 100 | 0 | | | | | 65 | 30 | 15 | 0 | |
| Aug | 0 | 15 | 0 | 51 | 0 | | 60 | 0 | | | 30 | RE-ARMING | 0 | | | RE-ARMING | | | 20 | 50 | 71 | 30 | | | | 100 | 15 | 0 | 65 | | |
| Sept | 43 | 26 | 28 | 66 | 100 | | 22 1/2 | 65 | | | | 100 | 100 | | | RE-ARMING | | | 0 | 12 | 100 | 100 | 30 | | | 30 | 32 1/2 | 30 | 65 | | |
| Oct | 32 | 0 | 0 | 15 | | | 27 | 100 | 65 | | | 100 | 38 | | | 100 | | | 65 | 0 | 30 | | | | | | 65 | 30 | | | |
| Nov | 0 | | 0 | | | 25 | 65 | 100 | 15 | | | | 0 | 7 1/2 | 0 | 30 | | | 37 | | | | | | | | 33 1/3 | | | 66 | |
| Dec | 10 | | | | | | 26 | 100 | 31 | | | | 20 | 0 | 0 | 0 | | | 50 | 100 | | | | | | | 30 | 100 | 32 | | |
| YEARS RESULTS | 45/170 = 26 1/2 | 81/210 = 38 1/2 | 38/150 = 25 | 88/180 = 48 2/3 | 89/110 = 80 1/2 | 810 = 25 | 22/360 = 6 1/3 | 106/150 = 70 2/3 | 83/190 = 43 1/2 | | 3/20 = 15 | 82/100 = 82 | 23/180 = 12 1/2 | 16/80 = 20 | 0 | 43/100 = 43 | 23/50 = 46 | 18/240 = 7 1/2 | 33/220 = 15 | 33/180 = 18 1/3 | 31/150 = 20 2/3 | 83/120 = 69 1/3 | 9/40 = 22 1/2 | | | 13/20 = 65 1/2 | 84/210 = 40 | 35/90 = 38 1/3 | 232/460 = 50 1/2 | 102/180 = 56 2/3 | |

Percentage figures of Merit in large figures A/S SQUADRON SCORES 1943

| | 10 | 48 | 53 | 58 | 59 | 86 | 120 | 172 | 179 | 190 | 201 | 202 | 206 | 210 | 220 | 224 | 228 | 233 | 269 | 304 | 311 | 330 | 333 | 407 | 423 | 461 | 502 | 547 | 612 | 500 | 608 |
|---------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|-----------------|-------------|---------------|----------------|-----------------|------------|-----------------|-----------------|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------|-----|-----|-----------------|----------------|-----------------|------------------|------------------|-----|
| Jan | | 30 | | | | | | 30 | 26 | | | | 30 | | | | | 30 | 10 | 15 | | | | | | | 30 | | | | |
| Feb | 15 | 0 | 44 | | | | 83 | 65 | 0 | | | 50 | 100 | | 65 | 50 | | 32 | | | | | | | | 0 | | 30 | | | |
| Mar | 18 | 57 | | | 30 | 30 | 4 | 56 | | 100 | 30 | | 65 | | 100 | 100 | 46 | | | 65 | 30 | | | | 77 | | 10 | | 10 | | |
| Apr | 7 1/2 | 26 | 0 | | 77 | 15 | 37 | 41 | | 31 | | 0 | 32 | 30 | 10 | 33 | | 66 | 30 | 30 | | | | | 15 | 50 | 100 | | | | |
| 1943 up to Apr 30th | 34/110 = 30 1/2 | 81/115 = 70 1/2 | 115/115 = 100 | 82/115 = 71 1/2 | 30/30 = 100 | 37/150 = 24 2/3 | 102/310 = 32 2/3 | 102/230 = 44 1/2 | 88/110 = 80 | 22/22 = 100 | 82/82 = 100 | 12/40 = 30 | 82/80 = 102 1/2 | 1/10 = 10 | 34/115 = 29 1/2 | 20/80 = 25 | 10/100 = 10 | 88/150 = 58 2/3 | 12/80 = 15 | 18/90 = 20 | 8/30 = 26 2/3 | 8/30 = 26 2/3 | | | | 26/15 = 173 1/3 | 33/90 = 36 2/3 | 10/50 = 20 | 8/50 = 16 | 8/40 = 20 | |
| 1942 | 45/170 = 26 1/2 | 81/210 = 38 1/2 | 38/150 = 25 | 88/180 = 48 2/3 | 89/110 = 80 1/2 | 810 = 25 | 22/360 = 6 1/3 | 106/150 = 70 2/3 | 83/190 = 43 1/2 | | 3/20 = 15 | 82/100 = 82 | 23/180 = 12 1/2 | 16/80 = 20 | 0 | 43/100 = 43 | 23/50 = 46 | 18/240 = 7 1/2 | 33/220 = 15 | 33/180 = 18 1/3 | 31/150 = 20 2/3 | 93/120 = 77 1/2 | 9/40 = 22 1/2 | | | 13/20 = 65 1/2 | 84/210 = 40 | 35/90 = 38 1/3 | 232/460 = 50 1/2 | 102/180 = 56 2/3 | |
| GRAND TOTAL | 28/330 = 8 1/3 | 84/210 = 40 | 83/260 = 31 1/2 | 38 | 82/50 = 64 | 21/15 = 21 | 27/370 = 7 1/3 | 208/370 = 56 1/3 | 28/170 = 16 1/3 | 40 | 8/15 = 53 1/3 | 82/90 = 91 1/3 | 23/280 = 8 1/4 | 16/80 = 20 | 0 | 43/180 = 23 1/2 | 33/50 = 66 | 18/240 = 7 1/2 | 33/260 = 12 1/2 | 33/200 = 16 1/2 | 31/150 = 20 2/3 | 93/120 = 77 1/2 | 9/40 = 22 1/2 | | 15 | 66 | 23/40 = 57 1/2 | 33/260 = 12 1/2 | 4/130 = 3 1/3 | | |



**COASTAL COMMAND
ANTI-SUBMARINE ACTIVITIES.
JUNE 1943.**

NOTE:-
THE FIGURES IN THE MOST
NORTHERLY SQUARES
INCLUDE OPERATIONS UP TO
70° N.

NO SHIPS SUNK BY U-BOAT
IN THE ATLANTIC AREA
SHOWN ON THIS CHART
ACCORDING TO INFORMATION
RECEIVED BY ADMIRALTY UP
TO JULY 2.

Anti-Submarine Operations, June, 1943

After the record results of May, sightings and attacks by Coastal Command have fallen again to 96 sightings by operational aircraft, leading to 55 attacks with major weapons; a further 28 chance sightings brings the total of sightings to 124.

This fall off has been largely due to the enemy's almost complete disengagement from the North Atlantic convoy routes. During the whole month only 14 sightings leading to 14 attacks were made by aircraft on either escort to or sweeps round convoys (comparable figure for May, 83 sightings and 52 attacks). On June 12, two Liberators, of 86 Squadron escorted TA.48 from 0700 to 1730 and obtained one sighting each; both these sightings were converted to attacks. Again on June 15, continuous cover all day was given by three Liberators of 120 Squadron; one U-Boat was found and attacked. On the 20th, a Catalina of 84 Squadron, U.S.N. found and twice attacked a U-Boat near ON.189. On the 21st, a Liberator of 59 Squadron on escort to XK.7 sighted two U-Boats close together, both of which dived too soon for attack. On the 23rd, a Liberator on escort to XMF.17 in the Bay, sighted two packs of three U-Boats near the convoy and carried out two attacks. These packs, however, were moving away from the convoy.

During the whole month, as far as is known at present, no single ship has been sunk by U-Boats in the Atlantic north of 35°—the enemy's boats, as far as can be seen from their courses in the Bay, have been going further south. Even in other areas their successes have

been very small, and the overall loss of shipping in June has been the lowest for eighteen months.

Coastal Command's sightings have, therefore, been mainly in the passage areas in the Bay and up north. In the Bay only seven sightings were made in the first week of the month; all of single U-Boats. On the 8th and 9th, no flying was possible because of bad weather. On the 11th, another single U-Boat was seen, and on the 12th, a pack of five U-Boats together, were seen by transit aircraft. Since that date the majority of U-Boats have been sighted in such packs of three to five, may have tended to stay on the surface except when able to dive with plenty of time in hand. This new tactic has tended to reduce our number of attacks; 60 sightings led to 28 attacks; *i.e.*, 47 per cent. during the whole month. But these tactics should play into our hands when measures for large-scale follow-ups are completely effective. The U-Boats seen in the Bay area have been further south than before. Between 75 per cent. and 80 per cent. of our sightings were south of 46° N.

In the Northern passage area, and in the Atlantic south-west of it, 17 sightings, leading to six attacks, were made. One of these attacks was by a Fortress of 206 Squadron which sank a U-Boat but was itself shot down. The results of the subsequent A.S.R. operations are discussed elsewhere in this number of the Review. Here again the U-Boats have adopted this tactic of travelling in bunches, the first of which (three U-Boats), was sighted by 269 Squadron on the 20th, when one of the U-Boats was attacked.

U-BOAT SIGHTINGS AND ATTACKS BY SQUADRONS AND STATIONS

Note.—In this table, if several aircraft see what is obviously the same U-Boat, the sighting is given to the first aircraft; if several attacks are made on the same U-Boat, all are counted in the table.

| | | | | Sightings. | Attacks. |
|-----|---|-------|------------------------|------------|-----------|
| 407 | S/Light Wellingtons | .. .. | Chivenor | 1 | 1 |
| 502 | Halifaxes | .. .. | St. Eval | 4 | 2 |
| 58 | Halifaxes | .. .. | St. Eval | 4 | 1 |
| 10 | O.T.U. Whitleys | .. .. | St. Eval | 17 | 7 |
| 10 | (R.A.A.F.) Sunderlands | .. .. | Mt. Batten | 4 | 1 |
| 461 | Sunderlands | .. .. | Hamworthy | 0 | 1 |
| 228 | Sunderlands | .. .. | Pembroke Dock | 0 | 1 |
| 547 | Wellingtons | .. .. | Davidstow Moor | 7 | 3 |
| 59 | Liberators * | .. .. | Aldergrove | 8 | 2 |
| 86 | Liberators | .. .. | Aldergrove | 8 | 5 |
| 224 | Liberators | .. .. | St. Eval | 2 | 1 |
| 120 | Liberators | .. .. | Iceland | 2 | 4 |
| 206 | Fortresses | .. .. | Benbecula and St. Eval | 2 | 3 |
| 220 | Fortresses | .. .. | Benbecula and St. Eval | 2 | 3 |
| 422 | Sunderlands | .. .. | Castle Archdale | 3 | 0 |
| 190 | Catalinas | .. .. | Sullom Voe | 2 | 0 |
| 201 | Sunderlands | .. .. | Castle Archdale | 1 | 2 |
| 53 | Liberators | .. .. | St. Eval | 1 | 1 |
| 84 | (U.S.N.) Catalinas | .. .. | Iceland | 6 | 8 |
| 269 | Hudsons | .. .. | Iceland | 10 | 4 |
| 236 | Beaufighters | .. .. | Predannack | 1 | 1 |
| 248 | Beaufighters | .. .. | Predannack | 1 | 0 |
| | Non A/S Fighters in the Bay | .. .. | .. .. | 3 | 0 |
| | | | | <u>89</u> | <u>51</u> |
| | (ii) From Gibraltar. | | | | |
| 48 | Hudsons | .. .. | .. .. | 5 | 4 |
| 233 | Hudsons | .. .. | .. .. | 1 | 0 |
| 179 | S/Light Wellingtons | .. .. | .. .. | 1 | 0 |
| | | | | <u>7</u> | <u>4</u> |
| | Chance (Four near Gibraltar, three in Atlantic, 21 in the Bay). | | | 28 | 0 |
| | | | | <u>124</u> | <u>55</u> |

Shipping Protection

| Type of Shipping. | Number of Sailings. | Number Protected. |
|----------------------------------|---------------------|-------------------|
| Convoys and Naval Forces | 64 | 50 |
| Independents | 77 | 2 |

This protection was given by 195 sorties, divided as follows :—

| Types of Shipping. | Escorts. | | |
|----------------------------------|----------|-----------------|-----------------------------|
| | Met. | Failed to meet. | Sweeps round convoy tracks. |
| Convoys and Naval Forces | 128 | 28 | — |
| Independents | 3 | 0 | 36 |

Analysis of Operations

The following table analyses U-Boat sightings in terms of the different types of duty engaged in by aircraft and the average duration of sorties in the area of operations (excluding Gibraltar) :—

| | All A/S Escorts. | Offensive Operations. | | | Total on A/S work. |
|--|------------------|-----------------------|----------------|------------|--------------------|
| | | Round C/V tracks. | Bay of Biscay. | Elsewhere. | |
| <i>U-Boats :—</i> | | | | | |
| Sightings | 12 | 2 | 60 | 15 | 89 |
| Attacks | 9 | 5 | 28 | 9 | 51 |
| Sorties | 159 | 36 | 920 | 311 | 1,426 |
| Average number of sorties per sighting | 13 | 18 | 15 | 21 | 16 |
| Hours actually on patrol .. | 707 | 224 | 5,700 | 1,884 | 8,515 |
| Average duration of sorties actually on patrol | 4½ hours | 6 hours | 6¼ hours | 6 hours | 6 hours |

Twenty-five Years Ago

I shall be profoundly disappointed indeed if the tide of victory now rising strongly in our direction ever receives a serious set-back from the efforts of our enemies. . . . I know . . . from watching to the best of my ability the utterances of the German Press, that what they count upon now, and what they have always counted upon, is jealousy and disagreement between their opponents. . . . It is the sort of calculation which has a kind of external plausibility, and unless it is watched, may even have an element of reality in it. . . . While there are, and doubtless always will be, differences of outlook between the English-speaking peoples . . . there is, I believe, such a thing as the English-speaking method of looking at the great affairs of mankind, and that outlook is of infinite value to the freedom of progress of the world.

A. J. BALFOUR, Foreign Secretary.

October 11, 1918.

Set about the re-organization of the world by any plan or by any combination of nations that you will, and you will find that you are obliged to include the British Commonwealth and the United States. The agreement and help of other governments are desirable, but the agreement of these governments is necessary.

DR. WALTER HINES PAGE, American Ambassador to Great Britain.

End of 1918.



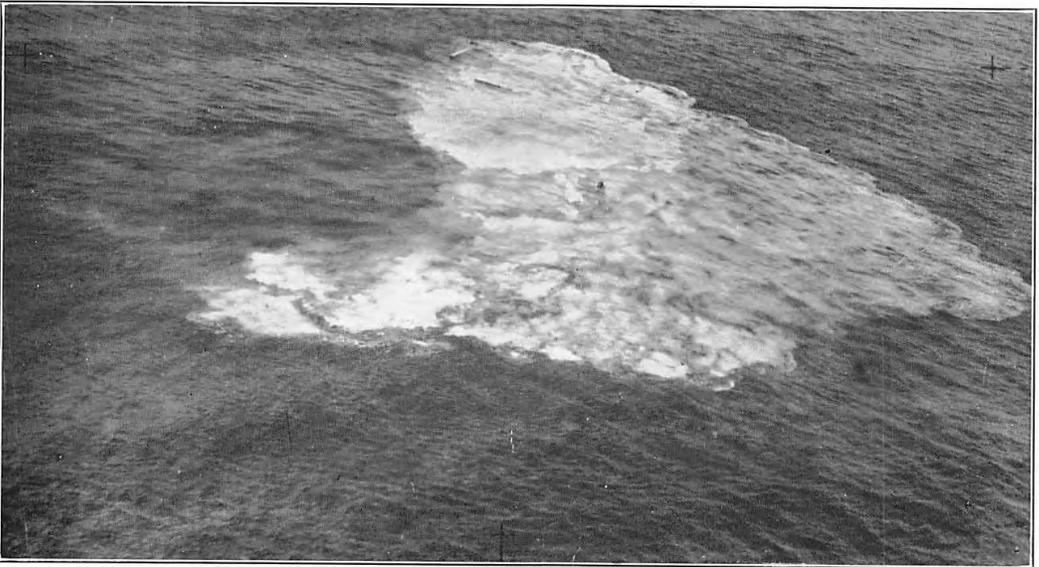
A 500-ton U-Boat, on a south easterly course, about thirty miles south of the Ile de Sein, near Brest. From the measurements of the wave pattern the U-Boat is calculated to have been travelling at $11\frac{1}{4}$ knots. Photographed at 30,000 feet by 543 Squadron.



A 500-ton U-Boat, clearly showing the additional mounting for A/A armament abaft of conning-tower. The tendency to dispense with deck guns (*see* plate of attack on May 4) may be noted.



U-Boats proceeding in a group of three: a development in surface tactics noticed during June. Photographed by 59 Squadron.



Three stages in the destruction of a 740-ton U-Boat by 86 Squadron on May 4. Note in the top photograph the absence of any after gun, as usually found on this type of U-Boat. 7

Recent Attacks on Submarines

The following accounts of attacks on enemy submarines made in May were not assessed in time to be printed in the last number of the "Review." The attacks were so numerous that it is impossible to print more than a selection of the more interesting reports.

The most spectacular combat of the month was on May 31 when two Halifaxes of 58 Squadron and two Sunderlands, one of 10 Squadron and one of 228 Squadron, destroyed a U-Boat, after each aircraft had made two separate attacks. The story, based on the Forms Orange, is told below.

At 1550 hours on May 3 **Halifax R/58** was flying on track 270° at 4,000 ft., in and out of 5/10 cumulus, base 3,000 ft., tops 5,000 ft., visibility 15 miles, sea moderate, wind 260°, 25 knots at surface, when the flight engineer sighted an indistinct wake, bearing 20° Red, distant six miles. Wing Commander Oulton, who had taken over the controls, confirmed the sighting, through binoculars, that the wake was caused by a U-Boat in position 46° 35' N., 10° 40' W., course 270° 12 knots. The aircraft immediately changed course to starboard and began to approach, making use of the cloud and finally breaking through at 3,000 ft., four miles from the U-Boat.

Three members of the crew state that they saw a second U-Boat, dead ahead of the aircraft, which was then on N.W. track at 3,000 ft., four miles distant. This U-Boat submerged a few seconds later.

The pilot then made a rapid approach to the first U-Boat and the navigator opened fire at 1,000 yards, seeing strikes at the base of the conning-tower, and a second burst at 6,000 yards which was seen to enter the conning-tower. The aircraft circled round to starboard of the U-Boat, which was yawing, and finally, a run up was made from the starboard quarter at an angle of 30° to track.

Six Mark XI Torpex depth-charges, shallow setting, were released from 80-100 ft., true spacing 86 ft., while the U-Boat was still fully on the surface. As the U-Boat came into view, the rear gunner opened fire and scored hits. The depth-charges were seen to straddle, two to starboard and four to port. Photographs show splashes straddling the U-Boat midway between the conning-tower and the bow. As the plumes went up, the whole U-Boat disappeared. But as they fell away the bow and stern were both seen again; and then the remainder of the U-Boat wallowing in the depth-charge pool. The pilot circled to port and came in to attack from dead astern, on westerly course. The navigator opened fire, scoring hits, and an officer was seen looking up at the aircraft as he disappeared down the conning-tower.

Three Mark XI Torpex depth-charges, as before, were released from 80/100 ft., spacing 85 ft., and the rear gunner opened fire as the aircraft tracked over. But he did not observe the U-Boat as the depth-charge plumes rose. The pilot flew on and then circled round and made a run of about 300 yards to port of the now stationary U-Boat, firing with mid, upper and rear turrets. The U-Boat was then lying beam on to sea northerly heading, surrounded by a large quantity of oil and a good deal of wreckage.

The pilot repeated this twice, fire being directed at members of the U-Boat's crew who emerged, some of them running along the deck. Some bursts of cannon fire, time fuse, were seen coming from just abaft the conning-tower, but they were very inaccurate. As the Halifax flew by, weaving and varying height, the gunners raked the decks of the U-Boat and after a time, all fire ceased. Bodies were seen lying on the bridge.

At 1610 hours, the pilot climbed to 3,000 ft., having decided to shadow and report. The U-Boat was then moving very slowly in a small circle, with a heavy list to starboard. The Halifax dived twice and raked the U-Boat with machine-gun fire. At 1710 hours, base instructed the aircraft to home.

At 1715 hours, J/58 was seen coming in to attack. R tried to call by R/T to tell J to take his time as the U-Boat was already badly damaged. In J's first attack, the depth-charges were reported to overshoot a good way to starboard and possibly a little ahead on beam attack. J/58 made a second attack which was believed to have been from dead astern. The nearest depth-charge was estimated to burst 20-30 yards astern of the U-Boat. A fresh gout of oil resulted, and white vapour (exhaust or high pressure air). There was a light bluish-green patch around the U-Boat—presumably from escaping air which had been visible since R's attack. Meanwhile, R continued homing. At about 1720 hours, the U-Boat began to steady at approximately S.E. course, then gradually broaching to N.N.W. heading, steering round again on to S.E. course and broaching once more, but nevertheless making definite progress in S.E. direction.

At about 1725 hours, a Sunderland was observed but it did not appear to see the U-Boat. R flew after it and signalled to attack by V/S. A second **Sunderland (X/228)** was also seen, which R also signalled by V/S, endeavouring to home visually on to the U-Boat, then lost sight of in the choppy sea. A few minutes later one of the Sunderlands (E/10) attacked, straddling the U-Boat with a stick of depth-charges from port beam. E/10 attacked again and straddled from the port quarter. X/228 then attacked and straddled from the starboard quarter. As the plumes fell away, the U-Boat appeared to be down by the bow. X/228 then made its second attack, straddling with close stick from starboard quarter. A second after the plumes went up the U-Boat blew up. A dark blue and orange explosion, rising as high as the plume, was observed. When it cleared the U-Boat was no longer visible. A large patch of oil was at once seen and about 30 bodies floating in it. Some were head down; others were alive and waving. At 1805 hours, having reached P.L.E., the captain set course for base.

REPORT OF HALIFAX J/58

Halifax J/58, at 1710 hours, was flying on track 035° at 6,000 ft., above 3/10 cloud, base 3,000 ft., tops 5,500 ft., visibility 25 miles, sea rough, when it sighted the wake of a fully surfaced U-Boat, on course 110°, six miles dead ahead. No S/E was obtained. The pilot turned slightly to port to keep up sun, while getting into position dead astern of the U-Boat. When on track 010, just about to turn to starboard to attack from 2,500 ft., when about a mile from the U-Boat, R/58 was seen on track of about 135°. It also appeared to be attacking. The pilot turned up sun to port, but R/58 held on to its course without turning in to attack. The aircraft therefore completed the circle to port and while making the run up, the U-Boat made a 90° turn to port which brought the aircraft in from the U-Boat's port quarter at an angle of 70° to track. Six Mark XI Torpex depth-charges were released, shallow setting, true spacing 112 ft., from 100 ft. They were seen by the rear gunner and mid-upper gunner under-shooting, with No. 6 about 100 ft. to port of the U-Boat and about midships. (R/58 states that they overshot.)

The U-Boat continued circling to port and the aircraft continued to starboard, circling back to the position from which the original attack was made. This was fine on the port bow of the U-Boat's immediate course. During the run up, the U-Boat turned this time to starboard, through nearly 180°, so that the attack was again delivered from the port quarter, at about 45° to the U-Boat's track.

Three Mark XI Torpex depth-charges were released from 100 ft., true spacing 100 ft., which were observed by the rear gunner to overshoot, No. 1 plume being estimated 100 ft. starboard of the U-Boat amidships. The second pilot fired about 200 rounds from the front turret and estimated hits on the conning-tower, on which five members of the crew were seen. After the first attack, all the crew noticed a streak of oil. On both attacks, the depth-charge explosions were close enough for the plumes to smother the U-Boat. It completed the circle to starboard and then steadied on course of 110°, appearing to be down by the bows.

At 1725 hours, when about five miles to the west of the U-Boat, a Sunderland was sighted, flying at 180°. The pilot of the Halifax realized that it had not seen the U-Boat and so set off in pursuit, flashing visually to attract its attention. After two minutes, the Sunderland was seen to turn towards the U-Boat. Meanwhile, at 1730 hours, another Sunderland was sighted north of the U-Boat, on westerly course. This Sunderland joined the outer orbit of the other aircraft.

E/10 attacked from dead ahead and the U-Boat turned to port, bringing the attack from 60° on starboard bow and the depth-charges were seen to straddle the track, two starboard and four to port (only four depth-charges were dropped) just on the bow or just ahead. The U-Boat steadied on its course and E/10 again attacked from dead ahead. The depth-charges appeared to fall right alongside the U-Boat, which lost all way and settled lower by the bows.

X/228 attacked at 45° on starboard quarter and appeared to straddle and finally, at 1752 hours, X/228 again made an attack from starboard

bow. The aircraft approached on the starboard beam, close enough to observe men in the conning-tower, who now numbered twelve, meaning to attack with machine guns after the Sunderland had passed. But when the plumes had subsided, all that could be seen were thirty men in the water and pieces of dark varnished wood, about 6 ft. long. Further photographs were taken. At 1800 hours the aircraft set course for base.

REPORT OF SUNDERLAND E/10

At 1745 hours, **Sunderland E/10** was flying on track 143° at 2,000 ft., when it sighted a U-Boat on the surface, distant five miles dead ahead, bearing 080°, six knots. The two Halifaxes were seen circling the U-Boat. The Sunderland lost height and circled to get into position for a bow attack. The U-Boat turned to starboard and manoeuvred to avoid. While on course 240°, when the U-Boat was on course 020°, the Sunderland made a bow attack from 40°, on the starboard bow, releasing four depth-charges, shallow setting, spacing 100 ft., from 50 ft., straddling the U-Boat. The third depth-charge burst 20 ft. from the port side, just aft of the conning-tower. The second burst close to the starboard side, forward of the conning-tower. The U-Boat, which had been trailing oil and manoeuvring freely, stopped. The aircraft circled and made its second attack with four depth-charges, two minutes later, from the starboard beam. The first depth-charge landed approximately 30 ft. short of the U-Boat, forward of the conning-tower. The remainder overshot. After the second attack, the U-Boat was down by the bows, with the stern well clear of the water. It appeared to be sinking slowly. E/10 left the scene of the attack at 1753, after X/228's two attacks, satisfied that the U-Boat was destroyed.

REPORT OF SUNDERLAND X/228

Sunderland X/228 was on an operation at 1635 hours when a message was received from base to attack a submarine which had been damaged by air attack. At 1735 hours, it sighted the U-Boat on the surface, zigzagging 15 knots, with the two Halifax and Sunderland E/10 circling. The aircraft saw E/10 make its two attacks with four depth-charges. The U-Boat continued on zigzag and at 1750 hours the aircraft made an attack from the starboard quarter to the port bow, releasing four Torpex depth-charges, shallow setting, spaced 100 ft.

The depth-charges were seen to straddle, two on either side of the U-Boat, which stopped. The aircraft then made a run over, using machine guns. At 1752 hours it made a further attack from the starboard beam, releasing four more depth-charges. The second stick entered the water forward of the conning-tower, close to the side of the U-Boat. It shuddered as these depth-charges exploded. Bodies were thrown into the air and after the spray had subsided, nothing was seen of the U-Boat; only the thirty or forty bodies in the water.

RESULTS

The approach and first attack of **Halifax R/58** was considered to be "very good." Photographs confirm a straddle with the last two depth-charges of the stick widely separated from the rest of the stick. Although not lethal, the U-Boat probably received sufficient damage to make diving impossible. In the second attack, although the position of the stick was not observed, the U-Boat came to a full stop for some 10-15 minutes, leaking oil, before it slowly got under way in a circle to starboard, streaming oil. These two attacks made it virtually certain that any other aircraft which could be homed on, would finish it off in spite of the fact that the U-Boat regained full use of engines and helm. For the rest of the action it was streaming oil fuel and probably had a fractured pressure hull. General credit is due to R/58 for directing the combined operation after having, together with J/58, guided the two Sunderlands to the scene.

The pilot of **Halifax J/58** appears to have been hurried and over-eager in both attacks, overshooting out of damaging range in the first, and undershooting in the second attack. This was probably due not only to the violent evasive use of the helm of the U-Boat but also through the belief that the U-Boat might dive at any moment.

Two very good attacks were made by **Sunderland E/10** which again brought the U-Boat to a full stop and inflicted further damage, rendering it unmanageable for a time and probably administering mortal damage, although it succeeded once more in getting under way on both engines. However, these two attacks demonstrate that a beam attack with a straddle is not fully lethal and where possible, a quarter shot or finer is preferable.

Two very good attacks were made by **Sunderland X/228**. The first of these brought the U-Boat to a stop for the final time, and the second one destroyed it.

Other Attacks

"Two Excellent Attacks"

At 1919 hours on May 2, **Sunderland 111, M/461**, was on an operation, flying on track 090° at 2,500 ft., in 6/10 broken cloud, base 2,500 ft., sea rough, visibility 10-12 miles, wind 010° 26 knots, when it sighted a U-Boat on the surface bearing Red 45°, distant 10 miles, in position 44° 48' N., 08° 58' W., course 270°, 10-12 knots. The conning-tower of the U-Boat was not stepped and the periscope was not up. There was a heavy calibre gun in front of the conning-tower. The aircraft turned and climbed into cloud and approached the U-Boat in cloud-cover, emerging from cloud 4 miles from the U-Boat which opened fire with the forward and aft guns, firing considerable light flak and machine-gun fire. When the aircraft was ½ mile distant and at 300 ft., the U-Boat altered course to port. The aircraft attacked from the U-Boat's port beam at 90° to track, releasing from 50-70 ft., four Mark XI Torpex depth-charges, Mark XVI pistol, set to shallow depth, spaced 100 ft., while the U-Boat was still fully surfaced. Evidence states that the depth-charges straddled the U-Boat just aft of the conning-tower. The U-Boat circled to port, apparently out of control, for approximately two minutes and then gradually stopped. It then appeared to have a bad list to port. Brown vapour blew out of the near stern of the U-Boat in considerable volume and a whitish vapour plume blew out, 3 ft. high, from the port quarter. A heavy flow of oil was observed coming from the port side.

The aircraft climbed to 500 ft. and made a second attack from the U-Boat's starboard bow, at 15° to track, releasing from 75 ft. the remaining four Mark XI Torpex depth-charges, same setting, spaced 80 ft., while the U-Boat was still on the surface but down by its stern and stationary. Evidence states that the depth-charges straddled the U-Boat across the conning-tower. The U-Boat settled by its stern, still listing to port. The oil patch grew to 300 yards diameter, the vapour subsiding as the U-Boat

settled. The crew were seen to jump overboard and, at 1940 hours, the U-Boat sank stern first, its bow reappearing twice, several feet above the surface, at an angle of 30°. During each attack the aircraft machine-gunned the conning-tower and gun positions, firing 3,000 rounds. During the first attack at least three men were seen on the deck and during the second attack, two men were seen. After the U-Boat sank, at least 15 men were counted in the sea. Air from the disappearing conning-tower hatch, and wreckage were observed. The aircraft remained in the area for 30 minutes and then, owing to P.L.E., it set course for base.

Result

Very good approach and two excellent attacks. The U-Boat destroyed.

A Perfect Attack

At 1836 hours on May 4, **Liberator V, P/86**, was on anti-submarine escort to HX236, on passage to convoy, flying on track 240° at 2,000 ft., just below 10/10 cloud, with sea calm, visibility 15 miles, wind 025°, 12 knots, when it obtained S/E contact bearing Red 010°, range 3 miles. The Captain altered course and immediately afterwards, sighted a U-Boat on the surface, bearing Red 5°, distant 3 miles, in position 47° 10' N., 22° 57' W., course 330°, 10-15 knots. This position was 049°, 35 miles from the convoy. The U-Boat was light grey in colour. No gun was noticed aft of the conning-tower. The aircraft dived to attack, making a slight turn to port, from the U-Boat's starboard quarter at 60° to track, releasing from 80 ft. (using Mark 111 sight) four Mark XI Torpex depth-charges, set to shallow depth, spaced 60 ft., while the U-Boat was still on the surface, with decks awash. One depth-charge was seen to enter the water to starboard of the U-Boat and the others to port, but the explosions were seen straddling the U-Boat, two to port and two to starboard, just forward of the conning-tower. As the depth-charge explosions

subsided, considerable wreckage was seen, consisting of about 24 planks, up to 8 ft. in length, with brighter-coloured planks, about 3 ft. long, also cylinders.

When the first circle was completed, the top of a black cylinder, about 2 ft. by 2 ft., was seen protruding from the sea. Two white cylinders, about 12 ft. by 18 in., were seen floating horizontally, and a black cylinder floating vertically. A large oil patch was seen and this increased in size until after 3½ hours it was 700 yards by 500 yards. The report of the attack was passed to the S.N.O. by R/T and the aircraft was ordered to stay in the vicinity. It continued circling and, at 1935 hours, got an S/E contact bearing Green 010°, range 22 miles, from 100 ft. The aircraft proceeded to investigate and, at 1944 hours, it sighted a faint oil patch about 100 yards by 50 yards, with four or five planks floating in it, in position 47° 12' N., 22° 57' W. At 1946 hours, at 1,400 ft., it sighted a M/V, about 8,000 tons, similar to *Glenroy* in Talbot Booth, single funnel, two masts, four goal posts, in position 47° 28' N., 22° 58' W. The M/V fired at the aircraft so the aircraft returned to the scene of the attack. It remained in the area, keeping in contact with the S.N.O. by R/T, until 2153 hours when it left the wreckage and set course to the convoy. A sloop was seen to alter course and head for the wreckage.

Result

A well-executed approach and a perfect attack. Excellent team work amongst crew. The Mark III bomb sight has made a spectacular first appearance. Very good photographs confirm all the visual evidence. The two long cylinders seen so clearly on one of the photographs are probably the upper deck containers for spare air torpedoes. The wreckage, together with the large amount of oil, indicates the destruction of the U-Boat.

"A Very Severe Shake Up"

At 1807 hours on May 6, **Hudson J/269** was on U-Boat hunt, flying on track 296° at 8,500 ft., in weather no cloud, sea slight, visibility over 30 miles, wind 290°, 10 knots, when it sighted the wake and then a U-Boat on the surface, bearing Green 10°, distant 27 miles, in position 59° 48' N., 27° 55' W., course 204°, 12 knots. This position was 281°, 73 miles from ONS 6. S/E was switched off. Only the conning-tower of the U-Boat was seen so no description was possible. There was a trace of cloud at 4,500 ft. and the aircraft took advantage of this until it was 15 miles from the U-Boat. As there was no more cloud, the aircraft descended to 20 ft., temporarily losing sight of the U-Boat. At about 10 miles it was picked up again, dead ahead. The aircraft maintained a height of 20 ft. and the U-Boat began to submerge. The aircraft attacked from the U-Boat's port quarter at 40° to track, releasing from 50 ft. four Mark XI Torpex depth-charges, set to shallow depth, spaced 100 ft. actual, eight seconds after the U-Boat had disappeared. Evidence states that the depth-charges straddled the U-Boat's track with No. 2, 100 feet ahead of the apex of the swirl. Two minutes after the attack, a small patch of oil, 60 ft. in diameter, was seen slightly to starboard of the U-Boat's estimated track. No bubbles were observed. The aircraft reported to the S.N.O., ONS 6, by R/T. It

remained in the area for 20 minutes and then left. It returned one hour later but nothing further was seen.

Analysis

Interval 8 seconds + 2 seconds, time of flight + 3 seconds to reach depth = 13 seconds. During this time the conning-tower advanced 130 ft. from the apex of the swirl. Photographs disclose a straddle between Nos. 1 and 2 depth-charges, allowing for the under-water advance; also angle of drop was more like 40 to track.

Result

An exceedingly skilful approach in conditions of no cloud cover and maximum visibility to surprise the U-Boat, followed by a very good attack. It is disappointing that more significant after results were not seen and it is therefore difficult to assign definite damage. But at least the U-Boat would receive a very severe shaking up.

"May Have Finally Foundered"

At 1848 hours on May 7, **Hudson X/233** was on anti-submarine patrol, flying on track 275° at 3,500 ft., in weather 5/10 cloud, base 5,000 ft., sea smooth, visibility 15 miles. Low sun hampered vision to the west, wind 325°, 20 knots. It sighted a vessel on the surface, bearing Green 40°, distant 7 miles. The aircraft turned towards it and at 4 miles the U-Boat was identified in position 35° 30' N., 11° 55' W., course 215°, 5 knots S/E was switched off. The U-Boat was of the 517-ton type with a gun close to the conning-tower. The aircraft descended and took evasive action on approach, finally attacking from the U-Boat's starboard bow at 60° to track, releasing from 50-70 ft., four Mark XI Torpex depth-charges, set to shallow depth, spaced 100 ft. actual, while the U-Boat was still on the surface. Evidence states that the depth-charges straddled the U-Boat slightly forward of the conning-tower, three on the starboard side and one on the port side. The nearest depth-charge on the starboard side was 15 yards from the hull and the one on the port side was 10 yards from the hull. A piece of debris was thrown into the air by the explosions. The rear gunner was firing at the time and was unable to observe details of the debris. Four or five men were seen in the conning-tower, looking at the aircraft as it passed over, and two men were standing next to the forward gun. But they made no attempt to fire. The U-Boat appeared to be lifted bodily by the explosions and then it settled down into the water. After the attack the aircraft turned and the U-Boat was seen, still with helm on, moving very slowly and blowing its tanks. The aircraft then sighted I/233 and was doubtful as to what this aircraft had done. X/233 tried to contact I/233, still circling the U-Boat. Eventually signals were made with Aldis, but they were not satisfactory. X remained in the vicinity until P.L.E. had been reached and then set course for base at 1927 hours.

Result

A very good attack. From the evidence given afterwards by I/233, this attack seriously damaged the U-Boat and it may have finally foundered. An aircraft of 48 Squadron reported a large oil patch in this position on the following morning.

"Easy Meat to Finish Off"

At 0931 hours on May 11. **Halifax II D/58** was on escort to OS.47. While carrying out patrol as ordered by the S.N.O. by R/T, flying on track 360° at 3,000 ft., in weather nil cloud, sea moderate, visibility 6-10 miles, hazy, it sighted a wake bearing Red 20°, distant 3 miles. This was at first thought to be caused by an escort vessel and it was not until the aircraft was only 1-2 miles away that a U-Boat was identified on the surface in position 46° 55' N., 14° 47' W., course 090°, 15 knots. This position was 270°, 12 miles from the convoy. The aircraft immediately dived to attack but was too close to get into position and it passed over the U-Boat at about 600 ft. The front gunner opened fire and saw hits on the conning-tower. The aircraft immediately altered course to port and circled round, but by the time that it was in position to attack, the U-Boat had been submerged for 1 minute, so the depth-charges were not released. The aircraft immediately attempted to establish R/T contact with the S.O.E., but had some difficulty, so reported the sighting by V/S. At 0927 hours the aircraft left the convoy and set course back to the position of the sighting. At 0931 hours, flying on track 270° at 1,000 ft., out of sun, in the same weather conditions, it sighted the wake and then the U-Boat on the surface, dead ahead, distant 3-4 miles, in position 46° 55' N., 14° 44' W., course 090°, 12 knots. This position was 270°, 10 miles from the convoy. The U-Boat was believed to be the same one as had been previously sighted. It was painted silver-grey, with a rather broad beam. The top of the front of the stepped conning-tower appeared to be rounded. There was a heavy gun more forward than usual, mounted on a platform which did not extend as far as the conning-tower. There also appeared to be a bandstand aft of the conning-tower. S/E was on at the time of each sighting, but on the first occasion the S/E operators were changing over and on the second occasion, the operator was tuning in. The aircraft immediately dived towards the U-Boat out of sun, achieving almost complete surprise. The navigator opened fire with V.G.O. and saw tracer hitting the conning-tower. He thought that he saw a man on the bridge who crumpled up. The U-Boat made a slight alteration in course, estimated to be less than 10° to starboard, and commenced to dive. The aircraft attacked from the U-Boat's port bow at 0-10° to track, releasing from 50-100 ft., five Mark XI Torpex depth-charges, set to shallow depth, spaced 107 ft. actual, while the after deck was still visible. The rear gunner saw several splashes, mostly to port of the U-Boat. The last splash appeared in the water just forward of the conning-tower, apparently over the U-Boat, and was followed by an explosion right alongside the U-Boat, on the starboard side, about 20 ft. abaft of the conning-tower. The other three explosions were to port, one right alongside the U-Boat, between the conning-tower and the bow. As the plumes rose, the stern appeared to be lifted as if by the force of the explosions, to roll over to starboard and then to fall back into level keel. It immediately disappeared. An object considerably longer than the tail unit was hurled from what appeared to be a secondary explosion, close to the last depth-charge plume, which was then at its maximum height. The aircraft immediately circled to port and the S/E operator, looking through the port window amidships, sighted the

bow lifting out of the foam patch, then falling back onto horizontal, and disappearing. A large patch, several hundred yards in diameter, was seen, dark brownish in colour and presumed to be depth-charge residue. But it was also tinged with iridescent hues and it had a black centre. This large patch was still plainly visible when the aircraft left.

At 0950 hours, having seen nothing further, the pilot set course back to the convoy, to report the attack to the S.O.E. The aircraft sent the report by R/T to S.O.E. but received no acknowledgment. The convoy was seen to alter course to 160° and the aircraft informed S.O.E. by R/T, "I go." He requested position, course and speed by V/S from the nearest escort vessel, but received no reply. At 1020 hours, having reached P.L.E., the aircraft set course for base. As it left the convoy, a corvette appeared to be heading towards the scene of the attack.

Result

Very good baiting tactics and an excellent attack. The visual evidence indicates that the U-Boat was at least severely damaged. —One photograph confirms that the nearest depth-charge was in damaging range. The faint white mark is taken to be the apex of the swirl and would result in the nearest explosion being on the bows. The Fleetwood found the U-Boat, crippled and unable to dive and it was easy meat to finish off. Fleetwood and Mignonette picked up survivors. Major credit for this kill goes to D/58.

New U-Boat Tactics

At 0855 hours on May 13. **Sunderland 111, G/423**. The aircraft was on anti-submarine escort to HX237 and while carrying out patrol as ordered by the S.N.O., by V/S, was flying on track 180° at 3,000 ft., in weather 6/10 cloud, base 2,500 ft., sea moderate, visibility 20 miles, wind 255°, 20 knots. At 0830 hours a U-Boat was sighted on the surface ahead, 12 miles distant, in position 48° 43' N., 22° 15' W., course 360°, 16 knots. The aircraft dived to attack but broke off owing to the U-Boat remaining surfaced. The U-Boat opened fire which was returned by the aircraft, which estimated hits. Aircraft sustained damage. At 0835 hours the aircraft began circling the U-Boat which was continuously changing course and heading towards the convoy. The U-Boat was 180° 10 miles from HX237. It was of the 517-ton type, with a large gun forward and apparently a machine-gun forward of the conning-tower, plus the usual cannon. No further details were observed owing to the heavy spray. The U-Boat continued firing with the fore and aft guns. At 0837 hours the aircraft reported the position of the U-Boat to the S.N.O., by R/T. At 0840 hours it sighted a corvette heading towards the U-Boat which submerged at 0854 hours. The aircraft attacked from astern up the U-Boat's track, releasing from 50 ft. two Mark XI Torpex depth-charges, set to shallow depth, spaced 70 ft., 30 seconds after the U-Boat had disappeared. Evidence states that the stick appeared to be 50 ft. to starboard of the swirl. Twenty-five seconds after the depth-charge explosions, bubbles were seen in the depth-charge explosion mark. Nothing further was seen. At 0900 hours a corvette and a Swordfish aircraft arrived on the scene. A smoke float was dropped by the Swordfish and the corvette immediately

attacked with depth-charges. At 0910 hours the aircraft rejoined the convoy.

Analysis

Interval 30 secs. + 2 secs. time of flight + 3 secs. to reach depth = 35 secs. During this time the conning-tower advanced 350 ft. from the apex of the swirl and to port.

Result

This is typical of the tactics that U-Boats have been following for the past month and under which some seven have been sunk. In this case, para. 5 of C.C.T.I. 40 has been followed, but the aircraft was caught on the wrong foot when the U-Boat decided to dive. The two depth-charges would not have inflicted any damage, but no doubt their explosion mark served as a rough datum point for the asdic hunt.

"Extraordinary Irregular Spacing"

A Halifax was on anti-submarine patrol, flying on track 088° at 4000 ft., in weather 3/10 cloud, just above cloud base, sea moderate, visibility 15-20 miles, wind 032°, 15 m.p.h., when it sighted an iridescent oil streak on the starboard bow, distant 15 miles. The Captain altered course to investigate and almost immediately sighted a U-Boat on the surface, with the aid of binoculars, 3 points forward of the starboard beam, 15 miles distant, in position 47° 39' N., 21° 05' W., course 270°, 13 knots. The U-Boat was believed to be German, with gun platform aft of the conning-tower. Camouflage dark. The aircraft approached to within 4 miles, making as much use as possible of the cloud cover, and then lost height rapidly. The U-Boat began to submerge when the aircraft was at 2,000 ft. The aircraft attacked from the U-Boat's starboard quarter at 30° to track, releasing from 50 ft. six Mark XI Torpex depth-charges, set to shallow depth, spaced 100 ft., while a small portion of the U-Boat's stern was still visible. The hull was visible under the water. Evidence states that the depth-charges were dropped in a gentle curve, Nos. 5 and 6 straddling the U-Boat's estimated track 50 yards ahead of the swirl. No. 1 depth-charge exploded about 10 yards on the starboard side and astern of the swirl. The aircraft climbed and turned in a wide circle to port, but found no after results. A circular patch of dark brown oil, 1 mile in diameter, was seen 2 miles to the north of the scene of attack. But it had no connection with the attack. The aircraft remained in the vicinity for half an hour without seeing anything further of note and then, owing to P.L.E., set course for base.

Result

A good look-out and a clever approach. The pilot tracked too far ahead and so undershot. The photographs disclose extraordinary irregular spacing, culminating in No. 6 depth-charge ricocheting 500 ft. ahead of No. 5 depth-charge. No damage would be inflicted.

"A Model"

At 1810 hours on May 15, Halifax 11/M/58 was flying on track 032° at 6,000 ft., with less than 1/10 cloud, sea moderate to rough, rather confused, visibility 10-15 miles, hazy, wind 080°, 24 m.p.h., when, with the aid of polaroid glasses, a wake was sighted, bearing Green 30°, distant 10 miles. The pilot realized that he was up sun

so he continued on track, gradually losing height to investigate. When the aircraft was 4 miles distant and approximately due west of the track, still flying on track 032° at 2,500 ft., it was seen that the wake was caused by a U-Boat on the surface, in position 45° 28' N., 10° 20' W., course 070°, 10 knots. S/E was on, but no contact.

The U-Boat was of German type, painted grey with brown patches. No other details were observed. The aircraft circled to starboard and at 1,500 yards, began to run up, the Navigator opening fire with V.G.O. at 1,000 yards. He estimated hits on the conning-tower and hull. The aircraft attacked from the U-Boat's port quarter at 10° to track, releasing from 100-120 ft., six Mark XI Torpex depth-charges, set to shallow depth, spaced 96 ft. actual, while the U-Boat was still on the surface. As the aircraft tracked over the conning-tower, the rear gunner opened fire and saw hits on the conning-tower and hull. The position of the depth-charges on entering the water was not seen, but several explosions were observed, with more than one depth-charge, at the end of the stick, right against the port side of the U-Boat, as if the depth-charges were exploding right underneath.

As the plumes rose, the conning-tower disappeared in spray. But as the spray was falling, the conning-tower was again visible and the whole fore part of the U-Boat was seen by the rear gunner to be lifting slowly. Two to three seconds later there was a sudden jerk and the whole of the fore part of the U-Boat rose to a completely vertical position. As the aircraft circled, the bow was seen by several members of the crew to be sticking out of the water vertically. A big light blue oil patch appeared just ahead of the bow of the U-Boat and greenish-white water was boiling all around. The pilot circled and came in to attack on the same course as before, but, seeing the U-Boat's bow still hanging vertically, he decided to keep the remaining depth-charges for another U-Boat.

The U-Boat had apparently twisted so that the keel was now facing north-north-west, instead of the original heading of east-north-east. The aircraft tracked over at 200 ft., between 1½ and 2 minutes after the attack. By then only about 20 ft. of the bow remained above the surface. The wireless operator looked out through the port window and saw it slowly and steadily sinking in the vertical position. About 10-15 seconds after passing over, the U-Boat slid quietly below surface, just over 2 minutes after the attack. The pilot circled round and although he sighted an oil patch, the confused sea and reflection glare, he failed to pick up position. At 1827 hours the aircraft set course on homeward leg of patrol. Excellent mirror photographs show an estimated two depth-charges bursting right underneath the hull of the U-Boat and subsequent photographs show depth-charge plumes completely enveloping the U-Boat. Mirror camera photographs taken 1½-2 minutes after the attack show 20 ft. of bow standing up vertically, before the final disappearance.

Result

A good look-out. Very good approach and an excellent attack. A model of correct execution and team work. The U-Boat was destroyed. This was confirmed by the photographs.

"A Most Interesting Attack"

At 1410 hours on May 16, Czechoslovakian Wellington X, H/311 was on operation, flying on

track 180° at 2,000 ft. in weather nil cloud, sea rough, visibility 15-20 miles, wind 102°, 28 m.p.h., when it sighted a U-Boat on the surface, one point on port bow, distant 2 miles, in position 45° 30' N., 10° 30' W., course 090°, 10-15 knots. The U-Boat was believed to be of German type, with hull and conning-tower almost black. It is believed that there were two guns fore and aft of the conning-tower. No look out. The aircraft maintained its course, losing height until the U-Boat was almost on port beam. It then turned through 70° to port and attacked from the U-Boat's port quarter at 20° to track, releasing from 1,600 ft., three 600 lb. Mark I A/S bombs, hydrostatic fusing, set to 30 ft. depth, spaced 100 ft., while the U-Boat was still fully surfaced. Evidence states that the centre bomb of the stick exploded 30 ft. from the starboard side of the U-Boat's hull, at a distance of one-sixth of the U-Boat's length from stern. After the explosions, the stern of the U-Boat lifted at an angle of about 30° and within 2 seconds it had entirely disappeared.

About 2 minutes after the attack, the disturbance caused by the explosions smoothed up quickly and an oil film appeared in its place. The oil then spread and formed a circular patch about 200 yards in diameter. A few seconds after the first appearance of the oil, large air bubbles about 5-10 ft. in diameter began to come to the surface. These persisted for about 12 minutes. Grey smoke or steam seemed to issue from the air bubbles. Aircraft remained in area 29 minutes and then resumed patrol.

Result

A most interesting attack. This is the first occasion of the 600-lb. A/S bomb being used. Mark XIV sight from 1,600 ft. No. 2, from visual evidence, appears to have been the closest and from after results, there is every hope of serious damage and possible destruction.

"Intelligent Low-Level Approach"

At 2307 hours on May 17, **Hudson J.269** was on U-Boat strike, flying on track 360° at 3,500 ft., in weather 3/10 cloud, base 3,000 ft., sea calm, visibility 11 miles, wind 215°, 5 knots, when a U-Boat was sighted on the surface, bearing 070° T., distant 10 miles, in position 62° 10' N., 14° 30' W., course 270°, 7 knots. The U-Boat was of the 517-ton type, light grey in colour, with one gun forward of the conning-tower. Owing to there being no cloud cover, the aircraft dived to sea level and did all the 10-mile approach at this height.

The aircraft attacked the U-Boat from the port bow at 15° to track, releasing from 50 ft. four Mark XI Torpex depth-charges, set to shallow depth, spaced 100 ft., while the conning-tower was fully visible; also part of the bows. Evidence states that the first depth-charge entered the water approximately 50 ft. ahead of the U-Boat's bow and slightly to port, and that the second depth-charge dropped very close to the U-Boat's starboard bow and the other two in line. One minute after the attack, a 100-ft. cloud of grey smoke, with an oily smell, was noticed over the area of the attack. Ninety seconds after the attack, considerable oil was seen mixed with the debris, which was later seen to be composed of white objects and some long, narrow reddish objects, about 6 ft. and apparently made of wood. A flame float was dropped and the aircraft remained

in the area 23 minutes, until P.L.E. had been reached when it set course for base. The large oil patch could be seen when the aircraft was 5 miles away.

Result

Good look-out being kept. An intelligent and most successful low-level approach, completely surprising the U-Boat. An excellent attack, with very good photographs confirming the visual evidence. The after evidence of a cloud of smoke, debris and oil patch, point conclusively to a kill.

A Disappointing Attack

At 0635 hours on May 19, **Hudson S.269** was on anti-submarine sweep and whilst flying on track 187° at 2,500 ft., in 10/10 cloud, base 3,000 ft., visibility 10/15 miles, in half light, sea calm, wind 340°, 19 knots, sighted the periscope of a U-Boat in the act of surfacing, in position 59° N., 23° 26' W., course 260°, 5 knots, bearing 135° T., distant 4 miles. The aircraft dived to attack and released four Mark XI Torpex depth-charges, shallow setting, spaced 100 ft., from 100 ft., attacking from the starboard quarter at 170° to track, 5 seconds after the disappearance of the U-Boat. Evidence states that the depth-charges straddled 50 ft. ahead of the swirl. The U-Boat appeared to be dark brown or neutral colour. There was no other evidence of damage. The aircraft remained in the vicinity for 5 minutes after the attack and then carried out baiting procedure, returning 30 minutes later. But nothing further was seen.

Analysis

Time interval 5 secs. + time of flight 3 secs. + 3 secs. to reach depth = 11 secs. In 11 secs. the leading edge of the conning-tower would have moved forward of the leading edge of the swirl, 110 ft.

Result

It is disappointing that no after evidence was seen. The pilot did extremely well to get in his attack so soon after the disappearance of the U-Boat. It is possible that the depth-charges fell astern of the U-Boat and it is also a great pity that the photographs did not come out.

"Good Work by Aircraft's Guns"

At 1627 hours on May 19, **Hudson M.269** was on an anti-submarine sweep when it sighted a U-Boat bearing 060° 8 miles, in position 59° 18' N., 24° 23' W., course 260°, 10 knots. The U-Boat dived before an attack could be made. The aircraft adopted baiting tactics and at 1627 hours, the aircraft, which had been flying at 9,000 ft., on track 004°, in weather 5/10 st. cu., base 3,500 ft., visibility 10-15 miles, sea slight, wind 260°, 10 knots, descended through cloud and sighted the U-Boat, 090°, 10 miles, in position 59° 25' N., 24° 33' W., course 270°, 8 knots. The aircraft dived to attack and from 030° port quarter to starboard bow, released four Mark XI Torpex depth-charges, shallow setting, from 50 ft., spaced 100 ft. Evidence states that it was estimated that Nos. 2 and 3 straddled over the conning-tower, No. 3 being seen to enter the water on the starboard side, about 10 yards from the U-Boat. After the attack, considerable oil was seen covering an area 100 ft. wide, 600 yards long. This was distinguishable from the depth-charge scum.

The U-Boat remained on the surface for 7 minutes, leaving a trail of oil in her wake, turning to starboard all the time. About five of the crew were in the conning-tower, manning the A.A. gun over the conning-tower, presumably waiting for range to close. The pilot opened fire with the front gun and saw the A.A. gunner collapse. The turret gunner opened up as the aircraft passed over the U-Boat and continued firing whilst circling. Strikes were seen round the conning-tower and considerable panic was observed among the crew.

Another sailor manned the A.A. gun, but it did not open fire. No attempt was made to man the forward gun. At least one other man was seen in the conning-tower.

At 1634 hours, the U-Boat began to submerge on course 360°, 2 knots. The pilot fired over 200 rounds at the stern before it finally disappeared. Many strikes were seen. A marine marker was dropped and the aircraft circled for

15 minutes and took photographs of the floating wreckage. This consisted of a plank of wood 6 ft. long. Light-coloured patches of no definite shape, resembling two Mae Wests joined together, were seen floating just under the surface, away from the centre of the oil streak.

Result

A very well executed approach and an excellent attack. It is bitterly disappointing that the U-Boat was not immediately killed as the photographs indicate a straddle, although the splash of entry makes a positive statement impossible. The oil trail means that damage was inflicted and the very small diving swirl points to a slow speed on the motors. The dive was steep, but in itself this does not indicate an involuntary dive. The photographs are excellent. Very good work by the aircraft's guns in preventingatak and killing their guns' crew.

A tribute from the Under-Secretary of State for Air

Hats off to Coastal Command who, day and night, whatever the weather, fly the oceans on their allotted duties. Their's is not the sharp glory of the fighter combat, nor the satisfaction of the concentrated destruction of Germany's war machine by the bomber offensive. Their's is a physically arduous and equally hazardous job of flying far out to the west in the front line of the Battle of the Atlantic. The tradition of the "Silent Service" must cover the air, and almost complete secrecy enshrouds the activities of the Allied Navies and Air Forces engaged in anti-submarine duties.

In May, the Germans made their biggest effort to date to halt our shipping with its vital supplies of food, munitions and manpower. The front line of the anti U-Boat warfare covers nearly ten million square miles of sea, and into it they put more submarines than ever have been used before. They attacked our convoys with the greatest determination. It was a major offensive mounted on a grand scale with great forces. Yet our shipping losses during the month of May were lower than at any time since the United States entered the war.

Coastal Command, in co-operation with the Navy, can take a large measure of credit for the success of the month. Air cover, to the extreme limit of aircraft range, was given to our ships. More U-Boats were attacked by Coastal Command than have ever been attacked in any month before. The sightings of the U-Boats reached a peak figure far above that ever previously attained.

It is a positive fact that from the moment aircraft are able to provide air cover for a convoy, sinkings not only decrease rapidly but, in some cases, cease altogether. Our constant attacks on German submarines made their Commanders realize the difficulties of getting within range of our ships. Air cover does not mean Coastal Command just keeping aircraft hovering above a convoy. It means that the sea for scores, sometimes hundreds of miles behind, on each side and in front of our ships, is swept night and day. U-Boat packs were often broken up miles away from their target and sent crash diving to temporary and problematical safety. . . . Give praise to Coastal Command for their unsung glories and feats.

CAPTAIN THE RT. HON. HAROLD BALFOUR, M.C., M.P., at Margate, June 19.

full attack

II. ANTI-SHIPING

Offensive Against Enemy Shipping

The No. 16 Group *Beaufighter* Wing carried out a daylight attack on a northbound enemy convoy off Den Helder on June 13. The convoy consisted of the *Stadt Emden* of 5,180 tons, and three smaller merchant vessels of 2,000 to 3,000 tons, disposed in two lines ahead, escorted by five "M" class minesweepers ahead of and two astern of the convoy, with two trawler type auxiliaries on either flank of the convoy in line ahead. The smaller merchant vessels each flew one balloon with the *Stadt Emden* flying two.

The striking force consisted of 11 torpedo-carrying *Beaufighters* of No. 254 Squadron, nine *Beaufighters* of No. 236 Squadron each armed with two 250-lb. G.P. bombs three-second delay, and four cannon, and nine *Beaufighters* of No. 143 Squadron armed with cannon and machine-guns. The Wing was escorted by four squadrons of long-range *Spitfires*.

Six of the *Torbeaus* were detailed to attack the *Stadt Emden* and five to attack the secondary target, which was the 2,000 to 3,000-ton merchant vessel leading the port column.

No. 143 Squadron were to attack the leading minesweepers and No. 236 Squadron to attack the trawlers which were obstructing the approach and getaway of the torpedo aircraft. On meeting the convoy route, the Wing intended to turn south to strike the convoy's port bow, but the target was sighted to port and the Wing therefore turned to port and passed the port side of the convoy to carry out the attack as planned. During the flight up the port beam of the convoy, flak was intense and an early attack signal was given in order to disperse the aircraft. It was noted that a number of escorts had been added. The aircraft nevertheless endeavoured to attack the targets detailed at briefing. Only seven torpedoes were released as three aircraft were badly positioned and so did not drop.

The main target was hit by at least one torpedo abaft the funnel and swung out of line and was last seen listing to port. Two trawlers and one minesweeper were seen to be hit and on fire. A second merchant vessel photographed at a later stage of the attack showed only her central superstructure above water, with three trawler type auxiliaries standing by and three smaller craft, probably the sunken vessel's boats, making towards one of the escorts. One aircraft was lost.

On the morning of June 19, four *Hampden* torpedo carrying aircraft of No. 455 Squadron were carrying out rover patrols on the Norwegian Coast. Two aircraft, "E" and "D," were flying low in formation when a merchant vessel of 3,500 tons was sighted. Both aircraft immediately attacked on the port beam. No results were observed, although it was considered that two hits were extremely probable.

Hampden "O," in conditions of very poor visibility, sighted one 5-6,000 tons merchant vessel on a south-easterly course. The aircraft immediately made a complete turn to starboard

and whilst running into the estimated position of this merchant vessel, sighted another smaller merchant ship of approximately 2,000 tons. As the aircraft was then in a suitable position to attack, a torpedo was released and a hit was observed on the starboard beam, amidships. The ship was seen to be settling down by the stern with a spiral of thick black smoke rising from amidships.

Hampden "C" sighted a merchant ship of approximately 2,500 tons on a north-westerly course. This ship was immediately attacked from the starboard bow and the rear gunner saw a blinding red flash which completely obliterated the ship, approximately 30 seconds after the release of the torpedo. All these attacks encountered light intense accurate flak. Aircraft "C" suffered extensive damage but the four aircraft all returned safely.

No. 16 Group *Beaufighter* Wing carried out a daylight attack on an enemy convoy between the Hague and Den Helder on June 22. The convoy consisted of five Merchant Vessels, disposed in two lines ahead, escorted by five "M" Class Minesweepers ahead of, and one to port and astern of the convoy, with three armed trawlers in line ahead on the port beam of convoy, four on the starboard beam, and one astern. All the Merchant Vessels (each 2-3,000 tons) were flying balloons. The striking force consisted of 12 *Beaufighters* of 236 Squadron, armed with four cannon and eight R.P. 60-lb. S.A.P., 12 aircraft of 143 Squadron, armed with four cannon and eight 60-lb. S.A.P., and 12 *Beaufighters* of 254 Squadron, armed with four cannon and one torpedo, Mark 13. The Wing was escorted by *Spitfires*.

It was decided that the last two merchant ships in the starboard line and the last merchant ships in the port line of the convoy should each be attacked by four Torpedo Aircraft. No. 143 Squadron were to attack the rear "M" class Minesweeper and the three rearmost armed trawlers on the port side of the convoy, and 236 Squadron were to attack the four rearmost armed trawlers on the starboard side of the convoy.

Complete surprise was achieved, no anti-aircraft fire being met until after the attack had begun. No. 254 Squadron were briefed to attack slightly later than usual in order to escape the possibility of being damaged by R.P. fire. The enemy took advantage of this to take avoiding action together in the direction of the torpedo attack. This proved most effective and no torpedo hits were claimed.

From photographs taken during the attack (see Plate 7) it appears that one trawler was hit and well on fire, three other trawlers hit, one twice, and one hit by cannon fire. Two Torpedo aircraft were seen to ditch, each with one engine on fire.

III. OTHER OPERATIONAL FLYING

Combats with Enemy Aircraft

Sunderland meets eight JU.88's

Perhaps one of the most outstanding and successful combats of the war was fought between **Sunderland N/461** and eight **Ju.88** heavy fighters early this month in the Bay of Biscay.

N/461 was carrying out a normal A/S patrol and was flying east at 2,000 ft. when eight **Ju.88's** were sighted 6 miles distant on the port quarter. The **Ju.88's** were at 3,000 ft. on a southerly course and were flying in three formations, one of four and two of two behind. The **Sunderland** opened to full throttle and made for what cloud cover there was (3/10 at 3,000 ft.). The **Ju.88's** gave chase and took up attacking positions three on each beam, 1,500 yards distant, and 1,500 ft. above and one on each quarter at the same height and distance. The **Sunderland** jettisoned its depth-charges and prepared to meet the attack.

The **Ju.88's** peeled off to attack in pairs, one from each bow. The first attack hit the port outer engine, setting it on fire, and also resulted in an incendiary bullet entering the P.4 compass, setting light to the alcohol. The engine fire was extinguished by means of the Graviner switch, but the engine became unserviceable. The alcohol fire, which had set the Captain's clothing alight, was also put out with the fire extinguisher. In the meantime, the first pilot took control and continued with the evasive action. During the attack, one of the **Ju.88's** attacking from starboard beam broke away, exposing his belly to the midships gunner at point blank range. The midships gunner fired and the **Ju.88** burst into flames and crashed into the sea, disintegrating immediately.

The next attacks severed the hydraulics of the tail turret, shot away the elevator and rudder trimming wires and scored numerous hits on the hull. The tail gunner was temporarily knocked unconscious against the side of his turret. However, the midships and nose gunners made the enemy pay for his success and another **Ju.88** went blazing down towards the sea. It tried to pull out and ditch but hit the water, bounced vertically and crashed nose first into the sea, breaking up on impact.

Simultaneously another **Ju.88** came up on the starboard quarter from below and his burst fatally wounded the starboard galley gunner. The port galley gunner drove off an attack from the port quarter underneath.

Shortly afterwards a **Ju.88** came in on the port quarter and the midships and tail gunners opened fire, the latter, owing to hydraulic failure, depressing the sears with his fingers in short bursts. The **Ju.88** crashed into the sea on the port quarter, leaving five **Ju.88's** still to attack the badly damaged **Sunderland**.

"Conditions," in the words of the Form Orange, "now became chaotic." The intercommunication and the radio were shot away, the A.S.I. ceased to work, the navigator was wounded in the leg by shrapnel, and evasive action was controlled by hand signals from the navigator to the second pilot and thence to the Captain. Owing to the unserviceable engine and the damaged controls it required both pilots to carry out evasive action. The gunners, realizing that the intercommunication was unserviceable, carried on firing as each attack came in.

A **Ju.88** came in from the starboard bow to meet the fire of the nose gunner. It broke away with the port engine ablaze and with smoke pouring from the cockpit. The combat continued for 45 minutes in all and the crew of the **Sunderland** estimated that every **Ju.88** partaking in the attack had been hit. Thus three **Ju.88's** were destroyed, one probably destroyed and the remaining four damaged. The **Sunderland** managed to reach England and beach itself with one member of the crew killed, and others injured. Brilliant shooting, skilful evasive action and determination in the face of heavy odds had altered what looked like an easy kill for the German force into a disastrous hammering, which cannot but affect the morale of "Bay Hunters," who may even choose to turn a blind eye to **Sunderlands** in future rather than risk another debacle of this kind.

Liberator L, No. 224 Squadron, on anti-submarine rover patrol, flying on a course of 260° at 2,000 ft., when it sighted 10 **Ju.88's**, 3 miles away on the starboard beam. Aircraft L increased speed and began to climb in a westerly direction. The enemy aircraft gradually closed the range and took up station, six on the port side and four on the starboard, in loose line astern, at 1,000 yards range. No evasive action was taken by L/224. A **Ju.88** on the port side now attempted to make a head-on attack but as he began his attack, from a position just ahead of the port beam, it was obvious to the Captain of L/224 that a head-on attack was impossible so no evasive action was taken. The Navigator manning the port side gun, and the rear gunner of L, managed to fire short bursts at the enemy aircraft as it circled and took up station to the starboard of L. Another **Ju.88**, on the starboard side, now attempted a quarter attack. Aircraft L levelled out and increased its speed to 260 m.p.h. The Navigator opened fire at extreme range, and as the enemy aircraft broke away to port, it flew into the fire of the rear gunner. Strikes were seen on the underside of the enemy aircraft. The **Ju.88** fell away, emitting smoke, and was not seen again.

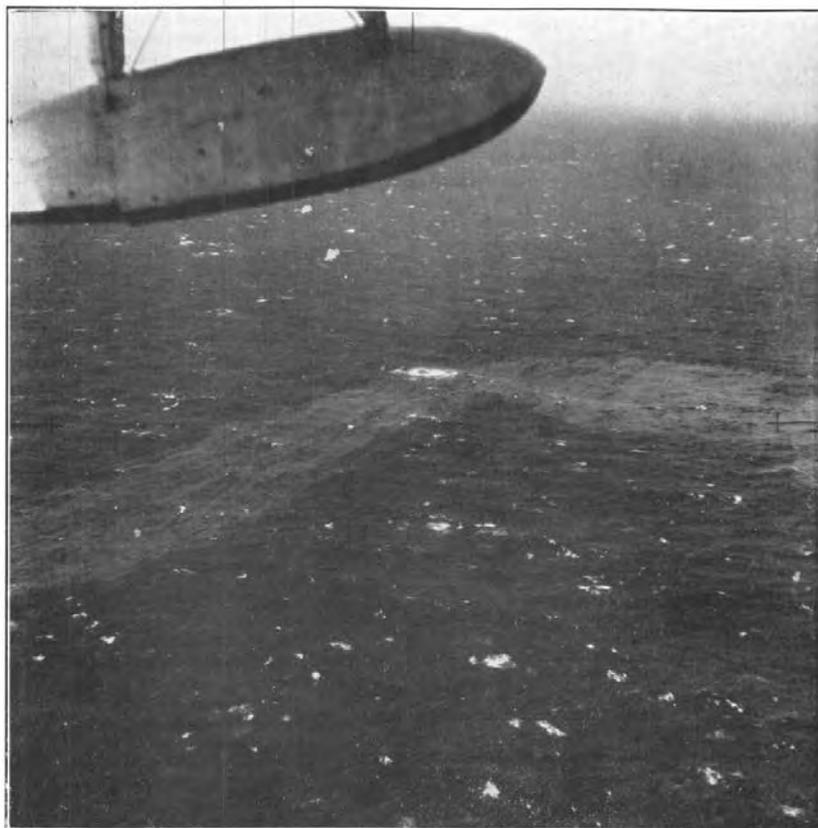
The **Liberator** had been climbing steadily for some 20 minutes and was now flying at 10,000 ft. Low cloud was observed 15 miles on the port bow and aircraft L pulled up sharply to gain a slight advantage in height over the enemy aircraft, and



A perfect set of photographs illustrating the destruction of a U-Boat by SS Squadron on May 15th.



1.—Attack by R/58. First stage in destruction of U-Boat by two Halifaxes and two Sunderlands. (See letterpress pages 7-9).



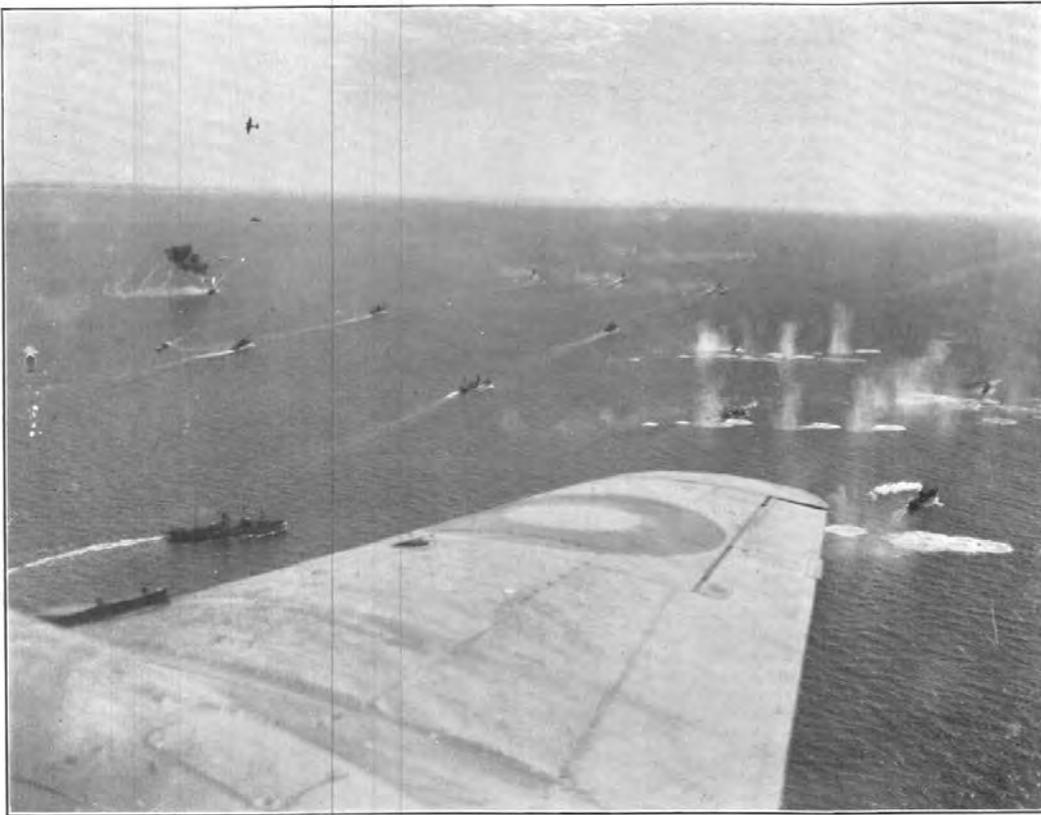
2.—The U-Boat down by the bows.



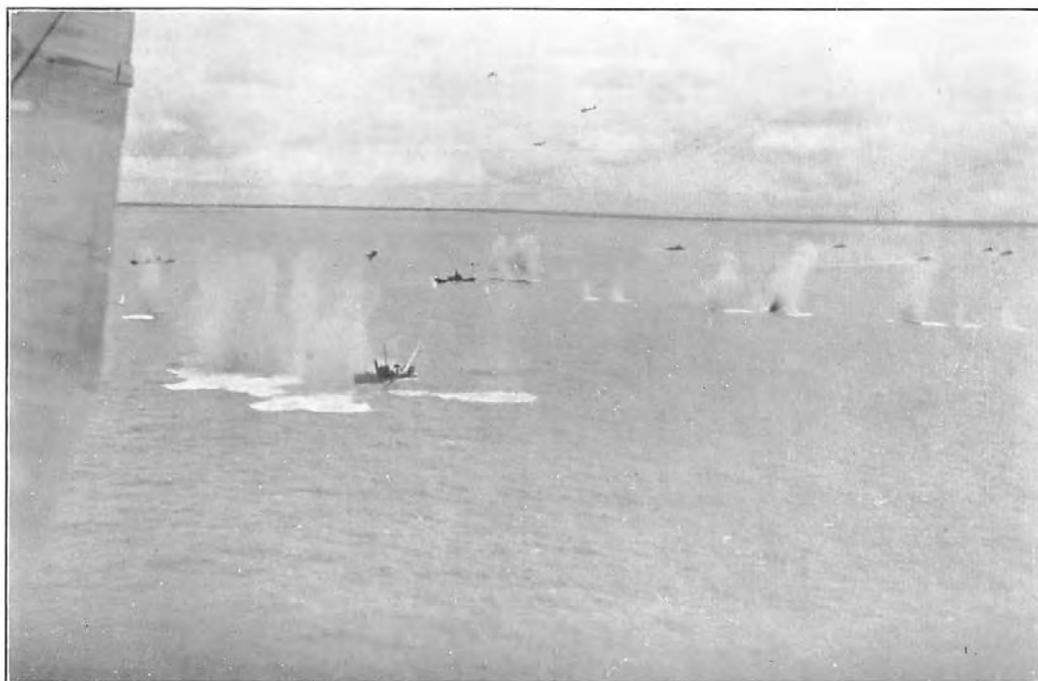
3.—Attack by E/10, taken by X/228.



4.—Attack by E/10, taken by X/228.

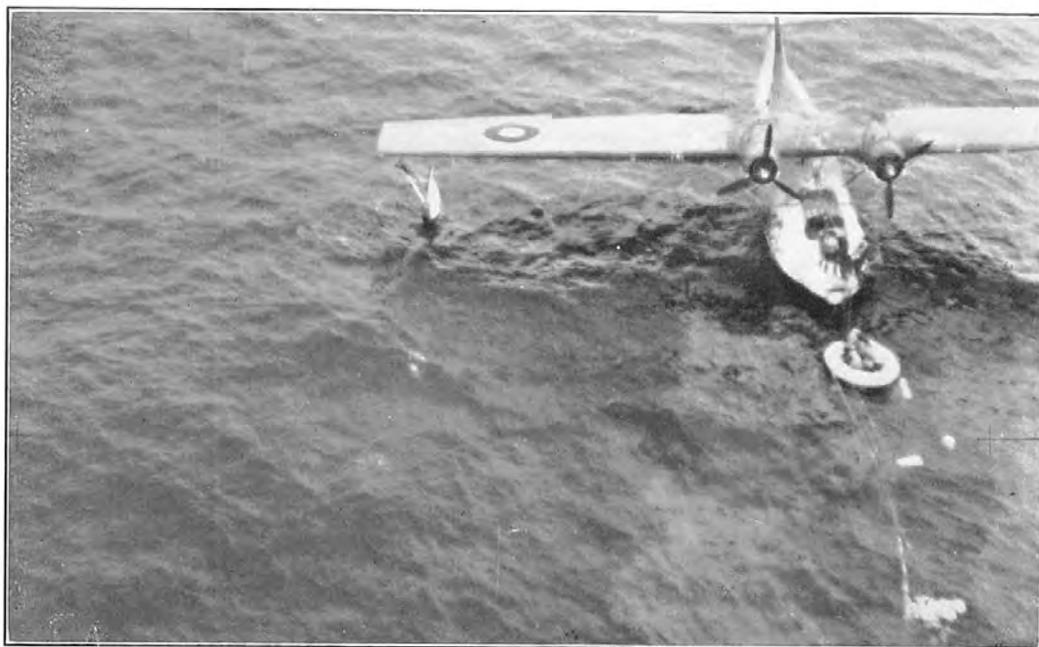
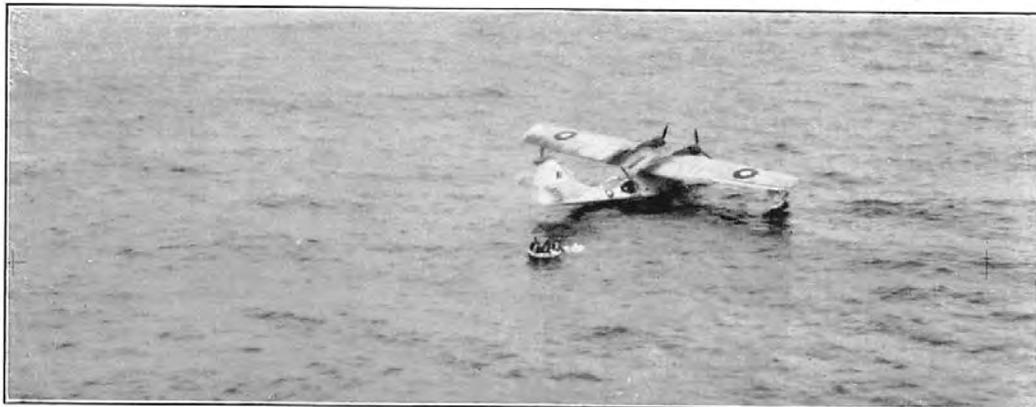


Torpedo-fighter attack on convoy by North Coates wing on June 22. (See letterpress, page 15.)



Attack by North Coates wing on enemy convoy off the Dutch coast on June 27, using R.P. for the first time. It will also appear from the lower photograph that a similar weapon was being used by the enemy, from the bow of the nearest escort vessel.

PLATE 9



Rescue of crew of R/206, referred to in the Summary on page 3.

then went into a steep diving turn to port, through the enemy formation on the port side. The enemy formation scattered and the Liberator continued its steep corkscrew dive at an average speed of 340 m.p.h., making the low cloud cover previously seen at 100 ft. As the Liberator entered cloud, it was hit by a burst of fire from a Ju.88 attacking from above and astern. None of the crew of the Liberator was injured.

Halifax O, of 58 Squadron was flying at 1,500 ft., visibility 9 to 10 miles, on an A/S patrol in the Bay of Biscay when it sighted seven Ju.88's which crossed the bows of O/58 from starboard to port. One Ju.88 attacked from the starboard bow as it passed, opening fire at 600 yards. O/58 went into a diving turn to starboard, opening fire with front guns on the enemy aircraft, which immediately broke away and passed astern. O/58 then made for cloud cover, about 15 miles distant, increasing speed to about 230 m.p.h. It was followed by the Ju.88's at 3,000 yards, except one, which kept strict station on the starboard quarter at 1,000 yards. The Ju.88 then carried out a port beam attack which O countered by a sharp turn to port. The mid-upper gunner opened fire on the enemy aircraft which immediately broke off the attack. The Ju.88's then manoeuvred astern and above O/58 but did not make any further attacks.

Mosquito L of 333 Norwegian Squadron was on reconnaissance off the Norwegian coast when it sighted two F.W.190's and a Do.24. L/333 decided to attack the Do.24 and closed the range to 250 yards and approximately 20 ft. below, opening fire with a 1-second burst of cannon and hitting the hull of the flying boat. L closed to point blank range and fired a second burst. Heavy grey and black smoke issued from the hull and as L passed through the smoke, the windscreen became covered in oil. The enemy aircraft was last seen gliding towards land with smoke still pouring from the hull, and port engine.

The F.W.190's had now closed to within 1,000 yards astern of L/333 and a 10-minute dog fight then ensued, during which both F.W.190's got in bursts of fire from 400 to 500 yards. L/333 managed to manoeuvre on to the tail of one F.W.190 which entered cloud with L in pursuit. L flew south for 3 minutes in cloud, and then set course for base. The F.W.190's were last seen about a

mile behind. The combat took place at about 1,000 ft., L receiving one machine-gun bullet through the fuselage.

Sunderland H, of 461 Squadron was on A/S patrol in the Bay of Biscay when it sighted six Ju.88's, three of which continued on their course and were not seen again. The remaining three enemy aircraft attacked H/461 which jettisoned its depth-charges after the first attack. All the attacks were made forward of the beam. The enemy tactics were to attack on the bow, opposite bow, and head on. H countered by meeting the head-on attacks with a shallow dive and a quick corkscrew evasive action, and the attacks on the bow by diving turns towards the attacker, as instructed by the fire controller. This action appeared to throw the enemy aircraft off their aim. The enemy aircraft gained height and made their attacks in a shallow dive, opening fire at 800 ft. and breaking away 50 to 400 ft. above, in a steep turn. After 15 minutes one enemy aircraft passed close to the tail, and the rear gunner of H got in a 5-second burst. Immediately afterwards another enemy aircraft passed 50 yards ahead, and the nose gunner fired a 3-second burst. The enemy aircraft broke away in a climbing turn to starboard, black smoke coming from the port engine. This aircraft was not seen again. The remaining two enemy aircraft resumed their attacks after a short interval, but did not press home their attacks with the same determination. They eventually followed H/461 at some distance for 10 minutes. H/461 sustained some damage to the fuselage, air screw and pressure line to the A.S.I. Members of the crew were not injured.

G/333 Norwegian Squadron on navigation exercise on the Norge Coast when it sighted a Do.24, 2 miles, at 45°, on the starboard bow, on the same course. G/333 turned to starboard, keeping at sea level. At 1 mile away it came up to the Dornier's height—500 ft.—and closed in rapidly from dead astern. The sun was on the Mosquito's port quarter and the pilot appeared to have achieved surprise as no return fire was met until the end of his attack, which was made from 600 yards. The first burst set fire to the Dornier's two outboard engines. The Mosquito closed in, firing to 300 yards, before breaking away. The Dornier was seen to be falling to pieces in the air before it finally dived into the sea where it left a black column of smoke to mark its resting place.

Air/Sea Rescue

Value of Dinghy Radio Set

A number of rescues of air crews during the month of June confirm the value of the dinghy radio sets now used in connection with air/sea rescue. Signals from the transmitter have been heard at a range of 300 miles, shore stations have taken bearings at 200 miles and aircraft have homed a distance of 100 miles.

The confidence of all air crews must be strengthened by the results of the past few months and it is the duty of all, in their own interest, to learn how to operate the small transmitter, thus helping other aircraft and rescue launches to locate dinghies.

(C49465)

Two outstanding rescues were carried out on May 26 and on June 30. On May 26, 10 members of the crew of a Flying Fortress, which was forced to land in the North Sea, were rescued by an Air/Sea Rescue Launch. Details of this rescue are given below:—

Two Air/Sea Rescue boats were proceeding in company on the morning of May 26 when broken S O S signals were received. The boats were then 49 miles 255° from search position. Course was 073°, speed 12 knots. At 0907 hours, when in position 41 miles 253° from search position, S O S bearing signals were received, strong enough

to begin homing by D/F. Homing was continued and signals were received regularly, with increasing strength.

At 1155 hours, visibility became very bad and contact was lost between the two rescue boats. Each of them then began to use Deep Search W/T procedure.

At 1335 hours, one of the boats reported that the last Homing signal was heard. There was considerable interference and the addition of atmospheric made reception difficult.

At 1845 hours, automatic transmission was heard, very loud and clear. The position of the rescue boat was then 54° 8' N., 2° 20' E. This area was searched at slow speed and homing to this new S O S signal was recommenced. Visibility was less than 100 yards.

At 2005 hours, in position 54° 10' N., 2° 12' E., whistles were heard fine on the port bow, and a red flare was seen. The Rescue boat gave instructions by loud hailer to the airmen in the dinghy, telling them to keep on blowing their whistles as the visibility was then not more than half a cable. The United States air crew kept blowing their whistles and they were found; the entire crew of 10 in three dinghies.

This was considered to be a very creditable performance on the part of the officer in charge of the rescue boat, under adverse weather conditions. Great credit is also due to the wireless operator, and to the Ordinary Telegraphist, who kept continuous and accurate W/T watch from 0810 hours on May 22 until the return to harbour at 0217 hours on May 23.

Underground Hangars on Pantellaria

The 84 aircraft found on Pantellaria included 14 different types. Only five were found, together with about a dozen crated engines, in the underground hangar. In addition, there were airframe components, propellers, and a large quantity of Italian documents, technical and otherwise.

The underground stores and hangars, which were found intact, are of particular interest. The main hangar is hewn out of the hill, on the west side of the aerodrome. It is approximately 1,200 ft. by 90 ft. in size. The floor, walls, and roof are of concrete and the roof is arched over the main area, without supporting pillars. There are two main entrances, set at right angles to the main floor space, which is recessed about 150 ft. back from the doors.

Above the hangar is a second floor given over to store rooms, office accommodation, etc., with galleries overlooking the main space. The building has its own electricity generating plant, water supply and ventilation.

Further underground workings were found behind the main hangar. They include a main gallery about 10 ft. broad by 10 ft. high, extending about a quarter of a mile and emerging on the far side of the hill. There are big bays and subsidiary tunnels at regular intervals.

Hundreds of tons of bombs, hand grenades and ammunition, both German and Italian, were stored in half of these workings. The remainder was used as a hospital for the Italians, both military and civil.

It has since been proved that the number of casualties from our raids was comparatively small, because the hangar and the galleries were used as shelters by the garrison and by a proportion of the civilian population.

Latest reports state that the town and harbour are a shambles.

The Italians had prepared to destroy the hangar and bomb dump by placing 1,000-lb. bombs in the main hangar, the power station, passage and galleries. With the addition of the main underground bomb and the ammunition dump, these would have been sufficient to destroy the whole place, had the Italians been able to carry out their plans; which they weren't.

Value of Dinghy Rafts Set

Two aircraft rescue boats were captured on May 22 and on June 20. The first was found by the crew of a flying boat, which was forced to land in the North Sea, near the coast of the island of Pantellaria. Details of the capture are given below.

Two aircraft rescue boats were flying in company on the morning of May 22 when the flying boat was forced to land. The first was found by the crew of a flying boat, which was forced to land in the North Sea, near the coast of the island of Pantellaria. Details of the capture are given below.

A number of aircraft rescue boats were captured on May 22 and on June 20. The first was found by the crew of a flying boat, which was forced to land in the North Sea, near the coast of the island of Pantellaria. Details of the capture are given below.

The conditions in all the rescue boats were similar. The conditions in the first few months of the war were very similar. The conditions in the first few months of the war were very similar. The conditions in the first few months of the war were very similar.



Photographs from Nassau.

A letter from Nassau appeared in the *Coastal Command Review*, No. 12, April, 1943, describing flying conditions and Service life in the Bahamas. The above photographs amplify this story. The first photograph shows the remarkable clearness of the sea: the bottom is visible under 10 to 20 feet of water. This photograph was taken near Rose Island, eight miles east of Providence Island. The centre photograph, taken along the north coast of Andros Island, shows islands at the extreme left and right. All the remaining areas are beneath the surface of the sea. Note the interesting formation of what resemble under-water rivers. The third photograph shows the extremely limited visibility which is common during the tropical rain squalls in this area.



The landing of a Sunderland on an aerodrome, with the engines still running. (See letterpress opposite page.)



Another view of the Sunderland, showing hole ripped in its bottom.

IV. SPECIALIST AND GENERAL ARTICLES

Grass or Water

The present U-Boat tactics of staying on the surface and fighting back has created a new problem for the crews of Flying Boats.

Statistics show that Flying Boats are by no means inferior as weapons for engaging aggressive U-Boats, but, in spite of his unstable and narrow gun platform, the Hun does occasionally get in a lucky shot. Unfortunately, he always has an almost uninterrupted view of the Flying Boat's most vulnerable area, its bottom, or as the more technical people would say, the area below the chine.

This area has to sink into the water if a normal landing is carried out and a certain amount of embarrassment is caused if the bottom is full of holes. After all, a colander will not float and neither will a Flying Boat when it is riddled with holes. However, we have several advantages over a colander as leak stoppers are provided to block up holes and an auxiliary power unit is at hand to pump water out as fast as it comes in, provided, of course, the holes are not too big.

You may ask "but suppose the holes are too big?" Then there is only one answer. We must land the boat on the water and run on to the beach or, better still, land on land, preferably a grass aerodrome.

It is obvious that no definite procedure can be laid down, as each and every case will be different. The holes may be anywhere and of any variation of size and the decision as to whether he will land on land or water must rest with the Captain of the aircraft. First, having, we hope, demolished the U-Boat and sent off all the necessary signals, an inspection must be made. To do this all the floor boards must be taken up and a careful inspection made to see if any daylight is showing. Having found the holes, jagged metal should be removed, or, better still, hammered back into place as this will reduce the size of the hole. Leak stoppers should then be inserted where possible. Remember that a hole in the bow has to take a weight of water at nearly 90°, whereas a hole behind the main step takes a weight at a much less angle. Concentrate on the holes in front of the main step first, and, if after using all your leak stoppers there are still some holes to plug up, block these with something solid, wrapped round with rag or anything you can find. Keep one of the crew to stand by each particular hole, where possible.

Have the A.P.U. ready primed for when you land and two of the crew ready to go up top to start the motor for pumping. Do not forget to inform base of your intentions and of how badly you are damaged. They will then have Marine Craft ready for you, should anything happen. Look out for the Marine Craft and try to land close to it. Most important of all, make sure that everyone has his Mae West on.

There have been two recent cases of holed Flying Boats landing on water, one successfully and the other unsuccessfully. The first was a Sunderland which had been shot up by a F.W.200 and badly holed underneath. The holes in the hull were patched up as best possible, some with leak stoppers and the rest with rags. The

A.P.U. was unserviceable, but on landing, the Captain organized the Bilge Hand Pump and a Zwicky Pump which was available, and the water was kept at bay. Approximately half an hour after landing on the water there were many volunteers upon the jetty standing by to take a hand at the pumps. It was impossible to beach the aircraft that night as no beaching chassis were available, but the pumps were kept going until morning when the aircraft was brought up the slip.

The second case unfortunately was less successful. A Catalina was holed badly in the bows by A.A. fire from a submarine. The hole was too big for leak stoppers and Mae Wests were jammed in to block it up. The aircraft landed successfully on the water, but as soon as the bows went under the pressure of water on the 90° basis, forced the Mae Wests out and the aircraft sank. The crew were saved except for one member who was badly wounded during the engagement with the U-Boat.

We see now that if the aircraft is damaged so that makeshift repairs to the hull will not assure its being watertight, the only alternative is to put it down on land. When this decision has been made, one or two points should be borne in mind. First, a Flying Boat hull is not built to take the whole weight on the keel, but on the area between the keelson and the chine. The concentration of weight on the keel during an aerodrome landing may, therefore, mean that the garboard strakes and the keelson will collapse and the bottom of the aircraft be torn out. If you are in a Sunderland you must, therefore, see that all the crew are on the top deck.

Second, although it should be as easy to make a landing on land as on water, there is always the possibility of a wing being taken off, and the consequent danger of fire. So do not forget to take all the necessary anti-fire precautions, *i.e.*, petrol off, switches off, and have some of the crew standing by the detachable fire extinguishers and one standing by the engine fire extinguisher buttons.

Do a normal landing and keep to the grass. There is little to worry about. A Sunderland recently pulled off a very neat landing on the grass part of an aerodrome and nothing happened. (*See Plate opposite.*) The aircraft was slightly bent, but all the crew walked out smiling. The only headaches were among the Maintenance Section. As Maintenance people have your interests at heart they do not mind an odd headache, particularly if you use a little foresight and select an aerodrome from which it will be an easy matter to return your aircraft to the water, after it has been repaired.

So there we have the picture, land or water—that is the problem and one that can only be decided by the Captain. Whichever, you decide upon, jettison your depth-charges and any surplus petrol in a safe area before you make your landing. Remember that the crew are more valuable than the aircraft, but also, that Flying Boats take up a lot of man-hours to build and that they cost a lot of money. So try to save both if you can.

Flak Intelligence and Aircrews

In order to reduce, as far as possible, the risk from the enemy's land-based or seaborne A.A. defences, it is essential to find out details of his types of guns, their numbers and locations, the ammunition used, and his methods of directing the fire. Although much of this necessary knowledge is obtained from ground reports, prisoners of war, captured documents and reconnaissance photographs, a lot of valuable information comes from aircrews. Reports, however, indicate that many aircrews are not familiar with some of the more simple A.A. terms employed and the likely performance of A.A. guns. The following notes on light and heavy flak are, therefore, given to help aircrews and I.O.s in making their reports.

HEAVY FLAK GUNS

The calibre of heavy flak guns varies from 3-in. for the smallest, to nearly 6-in. for the largest. They fire tracerless, H.E. shells, at the comparatively slow rate of fire of about 15 rounds per minute for the smaller guns, and six rounds per minute for the larger guns. The flash of discharge of each gun may often be seen from the air, although by night, flashless propellant is used to some extent.

Heavy Flak Gun Layout.—Land-based guns are usually employed in fours, laid out on the corners of a square, about 100 yards apart. Such a formation is known as a gun site. Six-gun layouts are also frequently employed. Shipborne heavy flak guns on large naval units are often in pairs, but on smaller ships are usually single. Their position varies considerably, depending on the type of ship.

Range of Heavy Flak Guns.—Heavy flak guns are primarily designed to engage aircraft flying above 3,000 ft., although they may be used at much lower heights but with less chance of success. Against individual seen aircraft, heavy guns are at their best between 4,000 ft. and 10,000 ft. Above this latter height their effectiveness decreases progressively with increase in height. Against unseen aircraft, heavy guns are most effective at heights between 6,000 ft. and 12,000 ft. Their effectiveness also decreases above this latter height. The maximum height limit varies with the calibre of the gun; 16,000 ft. is the limit for the 3-in. gun, and 40,000 ft. for the 6-in. gun. The minimum range for any heavy flak gun is about 1,500 yards. The maximum range again depends on the calibre, being about 10,000 yards for the smaller types and 20,000 yards for the larger.

Heavy Flak Damage.—The shells fired from heavy guns do not normally explode on striking an aircraft. They explode, automatically, a set number of seconds after leaving the gun, depending upon the aircraft's range and height at the time. As a rough approximation, a shell fired against an aircraft at 1,000 ft. high will take about 4 seconds to reach a range of 3,000 yards, and 22 seconds to reach 10,000 yards. The so-called lethal radius of burst varies from 25 ft. for the smaller calibres to 75 ft. for the larger.

The H.E. in the shell explodes with a flash, fragmenting the thick steel case into a number of splinters which are intended to damage the aircraft. If the shell explodes very near to an aircraft, the blast effect will also cause damage. Each shell

explosion leaves a large puff of smoke which is the characteristic of all heavy flak fire.

Shrapnel.—This is an expression which is frequently used incorrectly. An aircraft hit by heavy flak is often said to have shrapnel holes in it. In fact, these holes are caused by heavy shell splinters as described above. A shrapnel shell consists of a thin metal case filled with a small bursting charge and a large number of lead bullets. On exploding, the bullets are forced forwards out of the shell case, producing a large size shot gun effect. Shrapnel ammunition is not thought to be used by the Germans against aircraft.

Method of Directing Heavy Flak Guns against Seen Targets

(a) **Predictor Control.**—All land-based heavy guns and probably some on the larger naval units are equipped with an instrument called a predictor, which continuously works out the problem of deflections and shell fuze settings, usually on the assumption that the aircraft is flying on a straight and level course. Each predictor controls two or more guns, all of which fire on the same data. This method of aiming a heavy gun is the most accurate of all and is used wherever possible. It may be recognized by the way the shell-bursts follow the aircraft along its line of flight, continuously, without wide gaps between each group of bursts.

(b) **Predicted Concentrations.**—In this type of control, on one gun site, the course of the aircraft is plotted and its speed and height are calculated, thus allowing the gun crew to estimate where the aircraft will be about half a minute later. The guns are then fired at this point. Other gun sites may also be ordered to fire at the same point simultaneously, thus producing a concentration of fire. These predicted concentrations may be recognized by the large number of shells which burst almost simultaneously in one small area of sky. The time between each concentration of shell bursts may be 50–60 seconds.

(c) **Fixed Barrages.**—The word barrage is nearly always used incorrectly. An A.A. barrage is a definite type of A.A. fire and not merely A.A. fire generally. To produce barrage fire, various fixed points above the ground or fixed points relative to the ship, called fixed barrage points, are chosen. These are the most likely points of bomb release, or likely points of torpedo release. All the gunnery data is worked out beforehand, to explode shells at these fixed barrage points for various heights. When an aircraft is judged to be approaching one of the points, a height is guessed and as many rounds as possible are fired. It is a most inaccurate method of aiming the guns, but it is often used for want of a better. Although the method of aiming the guns relative to the expected position of the aircraft is very vague, as many guns as possible are used to fire the barrage. A barrage may be recognized by the large number of shells which explode in one comparatively small fixed area of sky.

Marker Rounds.—It is known that heavy flak shells may be fired, even though the aircraft is well out of range, in order to attract the attention of fighters. Shells exploding with red smoke are generally used for this purpose and they may be fired in such a way as to form an arrow in the sky, pointing in the direction of the aircraft.

Method of directing Heavy Flak Guns against unseen Targets.—Each land-based heavy flak gun site consisting of four or six guns is usually provided with a radiolocator which takes the place of the human eye. The data from the radiolocator is fed into the predictor and predictor-controlled fire results in a way similar to that employed by day. Owing to the inherent errors of the radiolocator, however, the fire which results is much less accurate. These radiolocators are also used for plotting the course and height of an unseen aircraft, thus enabling predicted concentrations and fixed barrages to be fired as well. Shipborne R.D.F. is not thought to be sufficiently accurate to enable heavy guns to fire at unseen aircraft.

LIGHT FLAK GUNS

There are several different types of light flak cannon in use by the enemy. The smallest and most numerous is the 20-mm. cannon. The largest is the 50-mm. cannon. These guns are automatic in action, resulting in a high rate of fire of between 200 rounds per minute for a 20-mm. and about 25 rounds per minute for the 50-mm. There are three types of shell in use. H.E./Incendiary/Tracer, H.E./Incendiary, and Armour Piercing. Each H.E. shell bursts on impact or self-destroys when beyond its effective range. The shells are loaded into the gun in clips of six or more. As far as is known, time-fuzed shells are not employed.

Light Flak Gun Layout.—These guns on land are usually employed in threes, often on roofs or towers near a vulnerable point. They are extremely mobile and the layout may often vary. The number and position of light flak guns on ships is also very variable as they are light in weight and small in size, and can be fitted on a very small space.

Range of Light Flak.—Light flak guns are primarily designed for engaging aircraft flying below 5,000 ft., but they are probably most effective between 250 ft. and 2,500 ft. The 20-mm. is not very effective beyond 2,000 yards range, or above 3,500 ft. The 37-mm. (the next most popular gun after the 20-mm.) is not very effective beyond 2,500 yards range, and heights above 5,000 ft., although tracer will be seen from both these guns at greater heights and ranges than these. The 50-mm. gun, for instance, of which there are not many and those all probably land based, has a ceiling of about 18,000 ft., but it is not very effective above 8,000–10,000 ft.

Machine-guns are also used against aircraft. Tracer solid bullet ammunition is used. The maximum effective range is not much more than 600 yards and the maximum effective height is about 1,000 ft.

Light Flak Characteristics.—The tracer which always accompanies light flak is its most obvious characteristic, differentiating it from heavy flak. The colour of the tracer is variable, but bears no relation to the effectiveness or otherwise of the ammunition being used. When a light flak cannon shell self-destroys, it may leave a slight puff of smoke which should not be confused with the heavy shell bursts. These puffs will always take place at ranges greater than 2,000 yds. from the gun.

Method of Directing Light Flak Fire.—There is no evidence to show that light guns can be fired at unseen aircraft except purely by guesswork, as a possible deterrent. Radiolocators are not used.

Automatic Sights.—For seen targets, there are several types of automatic sights in use which aid the gunner in making his deflections. These are probably not used to any extent for shipborne guns. These sights require the gunner to estimate the course, speed and range of the aircraft, and this data when set into the sight automatically gives the gunner the corresponding deflections.

Eye Shooting.—When automatic sights cannot be used, ordinary eye shooting is employed. Each gun is provided with a ring and bead type of sight and the gunner estimates the deflections himself. The accuracy of this form of fire is probably only a quarter that of shooting which employs the automatic sights.

All flak cannons are fired in bursts of ten rounds or so at a time, the gunner observing the tracer relative to the target and correcting his aim accordingly.

ACCURACY AND INTENSITY OF FLAK FIRE

It is impossible to quote quantitative figures under these headings. The qualitative method of describing flak for accuracy is usually to use the words *accurate* or *inaccurate*, and for the intensity of fire, the words *intense*, *moderate*, or *slight*.

SEARCHLIGHTS

There are two types in use. The small type has a reflecting mirror of 60 cm. (24 in.) diameter and the large, a reflecting mirror of 150 cm. (60 in.) diameter. The smaller one is usually employed near light flak gun positions and the large one in conjunction with heavy flak guns and for co-operating with fighter aircraft.

Method of Searchlight Control.—Until recently, all searchlights were directed on to the aircraft by sound locators. These are not entirely satisfactory because of the sound lag (sound travels at only 1,100 ft. per second). This means that the course of an aircraft, its speed and height, have to be estimated before the beam can hope to be put quickly on to the aircraft. However, there have been recent indications that some searchlights are now directed by radiolocators, thus avoiding sound lag troubles and enabling them to be put on to an aircraft without much initial searching.

Searchlight Layout.—The layout of searchlights is very variable. At present the Germans have concentrated most of theirs in areas where there are heavy and light A.A. gun defences. They have almost abandoned them for use with fighters. For illuminating targets for guns, they endeavour to form cones, consisting of 8 to 25 beams each.

Range of Searchlights.—The maximum range at which searchlights may illuminate aircraft sufficiently for them to be seen from the ground depends entirely on the weather. On a dark, clear night, 16,000 ft. is about the upper height limit.

OTHER FORMS OF A.A. DEFENCE

Flares.—The Germans are very fond of using different types of flares by night, projected from guns or by rockets. These flares do not seem to be lethal and are considered to be merely deterrents. A popular type, called a scarecrow flare, is said to resemble an aircraft falling in flames.

Rockets.—It is not known if the enemy uses rocket projectiles to the extent we do, although some types of explosive rockets have occasionally been seen by night over land.

The Royal Air Force Regiment

The Royal Air Force Regiment was born in the stress of war, at a time when the R.A.F. was pre-occupied with many urgent operational and administrative tasks, so the arrival of this new member of the family was perhaps little noticed, or at all events little understood by some of the older brothers, particularly if they happened to be on foreign service when the event took place. Moreover, many of the godfathers who were present at the christening and who sponsored the new infant's early training, were of necessity soldiers. Some doubt may, therefore, have arisen as to whether the new arrival was born on the right side of the blanket and totally free from any taint of the bar sinister.

The first point we wish, therefore, to make in giving some short account of the Regiment's birth and early progress is that it is an integral part of the Royal Air Force. This is best brought home by pointing out that all its members with suitable qualifications and inclinations are encouraged to volunteer for transfer to flying duties under precisely the same conditions as others in ground branches of the service.

The exact functions of the Royal Air Force Regiment have been set forth in various official edicts; but they may best be summarized by saying that the Regiment exists to protect the establishments, aircraft and equipment of the R.A.F. on the ground, against hostile ground forces, hostile airborne forces, or hostile aircraft. The organization and training of its members must be extremely flexible and designed to cope with a variety of attack. At one time the main threat may be purely air attack, at another ground or airborne attack. The probability will vary as the general war situation changes. One type of attack may be a first priority in one theatre, another type in a second theatre. Members of the Regiment, who are, of course, all liable to service in any theatre of war, must, therefore receive complete all-round training.

At the time of the Regiment's inception its major role was dictated, as it always must be, by the general war policy of the country. At that time the western allies were definitely on the defensive and the bulk of the Regiment was, therefore, allotted to the protection of home air fields against invasion. A smaller proportion was allotted to the anti-aircraft side of defence. During the past year the threat of hostile invasion has diminished and the western allies are passing to the offensive. It follows, therefore, that the protection of air force establishments in this country has become primarily one of anti-aircraft defence, whilst the protection of those in overseas theatres must still be designed to meet attack by ground or airborne forces as well. The policy of the Regiment must necessarily conform to this swing of the pendulum and appropriate action has been inaugurated.

During its short life of some 15 months, the Royal Air Force Regiment has (a) Trained itself to a standard of efficiency sufficient to relieve the army from providing garrisons for local defence of aerodromes in this country in case of invasion; (b) Provided a number of squadrons and flights which have taken an honourable part in the campaigns of the Eighth and First Armies in

North Africa; (c) It is now in process of training itself to undertake complete responsibility for the A.A. defence of aerodromes in the United Kingdom; (d) It is training contingents to accompany the Royal Air Force on future overseas operations, and to provide it with both ground to ground and ground to air protection; (e) It is in process of taking over responsibility for the military side of the initial training of all recruits of the R.A.F.

Modern methods of fighting call for a standard of training higher than ever before. No training can produce desired results until all taking part in it, both the instructors and organizers, and the trainees, set about their task with enthusiasm. Enthusiasm is largely the product of example and during its short life, the Regiment has learned that enthusiasm will overcome any difficulty.

And there have been difficulties. The programme has been carried out against a background of increasing need for economy in man power. Weapons, equipment, and training stores have not always come to hand as quickly or in the quantity desired. Yet all calls made on the Regiment have been satisfactorily met in such a manner as to inspire confidence in the future of the Regiment.

No fighting unit can be said to have proved its worth until it has met the enemy in action. We must close, therefore, with an account of what the Regiment has done in North Africa.

While landing with the First Army, one of the Regiment's transports was torpedoed. So their baptism of fire came early. The discipline of the units of the Regiment was exemplary and earned the praise of all who witnessed the incident. Shortly after the landing, an Army Brigadier in charge of a base sub-area described a Squadron of the Regiment as "the only body of first-class trained fighting troops in his area," and in the first few days of the campaign, the A.A. flights had several successes to their credit, not, naturally, without casualties to themselves. Generally speaking, with both the Eighth and First Armies, their task has been to move close behind the advancing army, take over captured enemy air fields or the sites chosen for new ones, and assume the responsibility for their defence.

At times this taking over of enemy airfields has incurred actual fighting, as at Daba and Fuka, where the Regiment took their first prisoners—some 350, mostly Germans. From Alamein to Tripoli, Flights of the R.A.F. Regiment were definitely in the van of the advance. Some of them have been trained as airborne troops to be flown over and put down behind the enemy lines, though they have not yet played this role in actual fighting. When not actively employed on protection of airfields, Squadrons of the Regiment have been sent up into the line with the First Army to gain battle experience.

To found a completely new unit of this nature and to test it almost at once in battle is a severe strain on its morale. All members of the Royal Air Force can help by extending a welcome to the youngest branch of their service and by helping them to feel that they are truly members of the Service and, therefore, heirs and guardians of its traditions.

Escape Exercise

THE HOME GUARD WINS

Further escape exercises have been carried out during May and June, and the following report of one of these is printed for the lessons it teaches. The aircrews employed on the exercise said that they thoroughly enjoyed it and that the Police and Home Guard carried out their work extraordinarily well. When the crews were interrogated on their return, they said that the Police and Home Guard appeared to be everywhere.

Thirty-one pilots, under the guidance of two Intelligence Officers, were driven in an enclosed 'bus, with blinds drawn, to two districts 7 to 8 miles from the aerodrome. They were then dropped singly, at intervals of approximately half to three-quarters of a mile; except the twin-engined aircraft crews, who were dropped in pairs.

Each pilot wore the clothing in which he would fly, except for his tunic and headgear. He carried a pocket compass and twopence for an emergency telephone call; also a million map of the area. As soon as he was dropped each pilot was told his approximate direction in relationship to the aerodrome. The idea, therefore, was to reproduce conditions following a crash landing in enemy-occupied territory, when a pilot would endeavour to make his initial escape. In this case he was instructed to make his way into the Officers' Mess on his own station.

Out of the thirty-one aircrew dropped, only two evaded the Police and Home Guard and succeeded in reaching the Officers' Mess without being caught. With the exception of the two who were not caught at all, the pilots were caught on an average of three times each. Each of them gave a detailed account of his journey on his return. One officer said, "It was rather nice for once to run away from a Police Constable, with a clear conscience."

One Sergeant Pilot was dropped at 1035 hours. He made his way in the direction of the aerodrome, keeping as much as possible to the woods and eventually coming out by a golf course. Outside the golf club house he found a service car which was not immobilized. He got into this and drove off. He reached the camp and blew his horn at the gate. The Guard promptly opened the gate and he drove in, right up to the Officers' Mess, which he reached at 1350 hours.

This was one of the pilots who were not caught at all.

Two officers were dropped, as a crew, at 1045 hours. They passed some members of the Home Guard, who apparently took no notice of them. Within 15 minutes they had been caught by other members of the Home Guard. They gave their names and were allowed to proceed. About three-quarters of an hour later, while trying to cross a road, they were caught a second time; again by the Home Guard. They gave their names and when a member of the Home Guard wasn't looking, one of them stole his bicycle. The other one proceeded on his way across country for approximately 1½ hours. He nearly ran into two Special Policemen and more Home Guards, who proceeded to chase him. He lay in a ditch, but he was finally caught, for the third time. He was released again, but he had not gone far when he saw a Special Policeman questioning his fellow officer, who had stolen the bicycle. This officer crept up behind them, got into the police car and drove off. He was chased for six miles by the Police and Home Guard, in another car. Unfortunately, he turned into a cul-de-sac and was caught for the fourth time. These two officers eventually set off together again. After taking another bicycle, being caught again, and hiding in the back seat of a Home Guard 'bus, they rather lost their way. They came across a farmhouse which appeared to be empty, so they entered by a window. They found some letters that had been pushed under the door and were able to see where they were by the addresses. They then went on their way and arrived at their mess at 1550 hours.

Observations made from the Exercise

Many pilots lost the small pocket compass which was handed out. Some were given old and damaged food boxes and all reported favourably on the contents, particularly the condensed milk. In the report of a similar exercise printed in the last number of the *Review*, one "escapee" was detected by the glint of the sun on his badges. In this exercise, similar difficulties arose from the glint of the sun on whistles, which should have been hidden.

It was noticed that the civilian population generally took no notice of the activities of the aircrew, although they must have sometimes been eccentric and suspicious.

Our Heritage

Amid the wreck and the misery of nations, it is our just exultation that we have continued superior to all that ambition or that despotism could effect . . . that we provide not only for our own safety, but hold out a prospect to nations now bending under the iron yoke of tyranny . . . and that, at least in this corner of the world, the name of liberty is still revered, cherished and sanctified.

WILLIAM PITT THE YOUNGER, 1804.

Leaves from a Navigator's Log Book—VII

Compasses are a sore point these days, as some have found to their cost after using a bowlful of liquid as emergency rations in the desert. (Oh, for a nice drop of sea water!) Seriously, though, why is the old north-seeker the first to get the blame every time there is a navigational failure? It isn't as if the importance of a good reliable compass has ever been in doubt since Navigators first dreamed of leaving the friendliness of convenient railway lines to strike out boldly and alone on straight cross-country jaunts. True, the earlier models had been borrowed from ships' binnacles, but as this almost always meant leaving the passenger behind, from fear of overloading, lighter instruments were soon evolved which could at least be regarded as reliable on the calmer summer evenings when bumps were few and you could see where you were going, anyway!

With the passing years, compass development reached a pitch of efficiency which enabled all the great pioneering world-spanning flights to be undertaken without undue pessimism. It was the advent of the all-metal aircraft, later to be still further complicated by the introduction of electrical gear of all kinds, that made necessary a further revolution in compass design. Thus were remote-indicating compasses born.

The basic requirement of the remote-indicating compass is that the magnetic element shall be so situated in the aircraft that it shall be as far from disturbing magnetic fields as possible. The cockpit is about as bad a place as can be found in modern aircraft, excluding the engine nacelles; and so it is thus no wonder that the master unit of the remote-indicating compass should invariably be located elsewhere. This is true of all the various designs invented by no matter what belligerent. The indications of the master unit are then transmitted in a variety of ways to the various stations throughout the aircraft where compass courses are required, namely to the Pilot's cockpit, the Navigator's table, and may be to the automatic pilot, the bombsight, the air position indicator as well as to certain marks of S.E.

Although the basic requirement of all remote-indicating compasses is the same, their functional principles vary widely from simply picking up the readings of a magnetic needle in ordinary liquid suspension and repeating it as required, to complicated systems of gyros and electrical circuits. The most advanced type has no needle component whatever, but relies on electric currents induced into specially wound coils to give the north-seeking characteristics. The British Distant Reading (Gyro Magnetic) Compass

represents the result of more than a decade of research and development and is an instrument of which the R.A.E., Farnborough, may be justly proud. Careful maintenance is elixir of all precision instruments, and in competent hands the D.R. Compass is a wow. It is now familiar to many navigators in this Command, but it is a pity to have to admit that the ignorance of the average pilot and navigator concerning its value and proper use is abysmal. Only too often is it regarded as an additional directional gyro. Only too often are its temporary vicissitudes taken to be failures that defy rectification in the air.

The D.R. Compass is an essential part of the modern G.R. aircraft, and, apart from real failures which are no more frequent than 5 per cent. of all occasions, it gives better results than any other compass as provided for stand-by purposes. Our feelings can thus be well imagined when, in the course of conversation with the Captain of a V.L.R. Liberator who was up for a U-Boat interrogation, he said that the D.R. Compass wasn't used "because it often varies quite a bit from the P.9." Here was an Officer in whose hands was entrusted the care of untold Allied interests; the skipper of one of our longest-ranged, highly-prized aircraft, to be in whose boots many a pilot would willingly give up a stripe! Here was a nincompoop who thought his P.9 better than his D.R. Compass. If this were so, then in the name of all that navigation stands for, what would have been the point of producing such a compass?

It never rains but it pours. The Squadron to whom our worthy Captain belonged shortly afterwards produced a "black," in the form of a "not met" convoy which, upon investigation, showed that the D.R. Compass had not been used in preference to the P.9, which latter had 11° unrecorded deviation and led the aircraft to search for four hours without result in an area 110 miles from where the navigator thought he was by Dead Reckoning. The fact that the wrong kind of search (C.L.A.) was used instead of the rectangular search, and the fact that two sun position lines were discarded though they agreed closely and showed the D.R. navigation to be hideously wrong, were but incidentals. If the s.s. *Queen Mary* had been sunk whilst this tomfoolery was in progress, the blame would have fallen on the Captain for not using his D.R. Compass for his courses, and on the Navigator for not checking the courses by astro-compass, if he suspected the D.R. Compass. An ocean-going liner for a P.9 compass is quite an expensive swop and makes for sober thought. We hope.

On the Eve of Trafalgar

May the great God whom I worship grant to my country, and for the benefit of Europe in general, a great and glorious victory; and may no misconduct in anyone tarnish it; and may humanity after victory be the predominant feature in the British Fleet.

HORATIO NELSON, 1805.