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COASTAL COMMAND REVIEW

December 1943

Vol. II, No. 8

HEADQUARTERS,
COASTAL COMMAND
ROYAL AIR FORCE

COASTAL COMMAND REVIEW

Vol. II, No. 8—December 1943

CONTENTS

	<i>Page</i>
Summary of the Year's Work : 1943	1
I. ANTI U-BOAT	
Anti U-Boat Scores, June to November	5
Notes on Table	5
Summary of Anti U-Boat Operations, December	6
Assessments and Analysis of U-Boats Sighted during December	7
Squadron Results, December	7
Recent Attacks on U-Boats	8
Mark III Bomb Sight used at Night	8
Destruction of U-Boat in the Mediterranean	9
II. ANTI-SHIPING	
The Year's Work—Anti-shipping	10
Shipping Strikes in December :	
Attack on Blockade Runner	11
Potential Blockade Runner Severely Damaged	12
The End of a Blockade Runner	12
Other Attacks	13
Fine Co-operation	14
Far Eastern Blockade Running	15
A Wing and a Half	16
III. OTHER OPERATIONAL FLYING	
Combats with Enemy Aircraft	17
Photographic Reconnaissance during 1943	20
P.R. Sorties during December	21
Air Sea Rescue during 1943, with Chart	23
Some Notes on Air Sea Rescue	25
IV. SPECIALIST AND GENERAL ARTICLES	
A Year of Training	27
Engineering in 1943	28
Armament in 1943	30
<i>Plate</i>	<i>Opp. Page</i>
PLATES	
1. { The Runway at Gibraltar	4
2. { H.M.S. <i>King George V</i> , photographed by 423 Squadron	5
3. German 1,200-ton U-Boat, photographs and plan	12
4. Destruction of German Destroyers, and Survivors	13
5. { Destruction of German Blockade Runner <i>Alsterufer</i>	16
6. { A German <i>Seetier</i> Destroyer on the way to meet the incoming <i>Osorno</i>	17
7. { The <i>Osorno</i> Beached off Le Verdon	20
8. { Destruction of Ju. 88 by 143 Squadron	21
9. { Attack on the <i>Pietro Orseolo</i>	
10. { Landfall at Stadlandet	
11. { U.S.A.A.F. Fortresses over Germany	
12. { German Torpedo Boats of the T.1-20 Class in the Baltic	
13. { A Beaufighter escorting H.M.S. <i>Enterprise</i>	
14. { Line being fired out by rockets from airborne lifeboat	
<i>Chart</i>	<i>facing page 8</i>
1. Anti U-Boat activities, December	

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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.*

Summary of the Year's Work—1943

1. The year 1943 will have many claims on history; high among them will be that it saw the defeat of the U-Boat menace in the Atlantic which, at the beginning of the year, bade fair to strangle our strategy in Europe and held out to the Axis their last remaining hope of avoiding decisive defeat. In January 1943 the Combined Chiefs of Staff at Casablanca laid down that in the coming year the defeat of the U-Boat should be the first charge on our combined resources. In January 1944 that defeat can be said to be an accomplished fact. There are still many U-Boats at sea; we are still losing some ships every month at their hands; and we can still not afford to relax our vigilance or energy in dealing with them. But, while they continue to be a serious nuisance, they have ceased to be a menace and it is unlikely that their activities can in any way influence the European strategy of the United Nations in the year just opening. The building and maintenance of an enormous U-Boat fleet has absorbed a substantial proportion of the industrial effort and the best man-power of Germany. But, today, the United Nations between them dispose of more shipping (and better shipping) than they did when the U-Boat offensive opened in September 1939; a vast volume of shipping sails the Atlantic, in convoy and independently, with insignificant loss; and there can be no doubt that the morale and fighting spirit of the U-Boat crews still at sea have suffered a disastrous decline. In short, the U-Boat menace has been defeated.

2. For us this has been primarily a defensive victory. The main object of the operations against the U-Boat was to prevent us losing the war (for an inconclusive ending would have amounted to that). But it has been by no means only a defensive victory. Some day, perhaps not far distant, we shall be in a better position to judge the extent to which the failure of their last hope is contributing to the decline of the enemy's will to continue. In the view of many who are well-placed to form an opinion that contribution is one of the first importance. That is the strongest reason why, so far from relaxing, we must intensify our efforts to kill U-Boats. It has not been given to us in Coastal Command to share in the great air offensive that is tearing the heart out of Germany, or in the resounding victories in the Mediterranean. But it has been, and still is, our luck to share with the British and American Navies in a less spectacular but no less important success in the Battle of the Atlantic. The problems of accurate assessment in deciding the number of U-Boats destroyed are amongst the most complicated with which we have to contend, and it is still impossible to be certain of the exact fate of many U-Boats whose loss we suspect. But it can already be said with reasonable certainty that about 250 U-Boats (including Italian and Japanese) were destroyed in 1943, a total exceeding all those destroyed from September 1939 until the end of 1942. So far as is yet known, about 80 of the 1943 total were sunk by surface ships, 12 by submarines, more than 20 by aircraft operating from carriers and more than 120 by shore-based aircraft, of which 81 have so far been credited to Coastal Command and the U.S. squadrons operating under our operational control from the United Kingdom and Iceland.

Of the thousands of merchant ships that have crossed the Atlantic during the year 83 have been sunk by U-Boats while within range of Coastal Command bases. 62 were in convoy, the remainder were independents or stragglers; and the great majority were sunk either at night or when bad weather prevented air escort. Only one ship was sunk during the whole year when air escort was actually present. Since the beginning of May, when our V.L.R. strength was really building up, only 8 ships have been sunk by U-Boats within 800 miles of our bases in the Atlantic.

3. The first explanation of the enormous advance in the lethal efficiency of Coastal Command during 1943 is undoubtedly the great increase in strength represented by the re-equipment of many squadrons with more modern types of aircraft, notably the Liberator, of which we have now seven squadrons in the Command plus three of Fleet Air Wing 7, as opposed to half a squadron at the opening of the year. It goes without saying that the improved aircraft would have been of no avail without the courage and skill of the crews. On the former we have always been entitled to rely. The latter has undoubtedly increased to a marked degree since the beginning of the year in spite of added complications of equipment and technique; for instance, the percentage proportion of U-Boats killed to those attacked rose from an average of 8.5 per cent. in the first four months to 30 per cent. in July and again in October; that speaks well for the training in O.T.U.s and in the first line squadrons. Another most significant figure is the decrease in the proportion of abortive attacks owing to weapon failures, from 21 per cent. in April, and 19 per cent. in June to 4 per cent. in September and 6 per cent. in November; that means that several U-Boats are now at the bottom which would have been still afloat but for the hard work and efficiency of maintenance personnel. Our work in Coastal squadrons is always arduous and usually unexciting—long hours of offensive patrol and convoy escort in dirty weather without a sign of a U-Boat to reward them. It is all the more essential that when a contact is made all that is humanly possible is done to turn it into a kill; that means training, practice and yet more training. And every man and woman on the Station from the Group Captain downwards can play, and in the past year has played well, their part in ensuring that nothing is left to chance when the blip comes up on the tube and the conning tower is sighted.

4. The Battle of the Atlantic in 1943 can be divided into three phases. The first, from January to April inclusive, was still in the era of mass pack attacks on the North Atlantic convoys, culminating

in the action in mid-March when 20 ships were sunk out of H.X.229 and S.C.122—we lost 620,000 gross registered tons of shipping that month. But that month also saw the Atlantic Convoy Conference in Washington which reorganised the system of convoy cover and—most important from the air point of view—established in Newfoundland the V.L.R. aircraft of the R.C.A.F. and U.S.A.A.F. that closed the Atlantic Gap. In April—the month which saw the first successful attack from an auxiliary carrier, H.M.S. *Biter*—our Liberator strength was beginning to build up; eight U-Boats were killed by the Command in that month, and the tactics of remaining surfaced and fighting back began to make their appearance. April was a bumper month for the Leigh Light Wellingtons with the Mark III A.S.V.—so much so that the enemy virtually abandoned surfacing by night in the first week of May.

5. Then came the second phase, from the beginning of May till the end of the first week of August, in which 43 U-Boats were killed by the Command, *i.e.*, an average of about three U-Boats killed per week. May was, and will probably remain our record month with 18 kills, the great majority being killed on the surface while fighting back. Then came a curious lull in the Bay—only seven sightings in the first 11 days of June—and then on the 12th the first of the group transits were sighted, a little pack of five U-Boats outward bound. At the same time they started using the Spanish Coast route in earnest, the Musketry patrols were instituted and for the first time a surface hunting group was made available to co-operate with our Bay patrols. But July was the black month for the U-Boat in the Bay—14 being sunk and a number seriously damaged there by aircraft; the group transits persisted throughout that month till on the 30th a whole group of three was wiped out in a combined action, two falling to the air and one to the surface hunting group. It could not last; for the first five days of August we killed one U-Boat a day and then on about the 7th with dramatic suddenness the enemy changed his tactics; he couldn't face the going any longer and the second phase was over. In that period of about three months, in which the enemy lost a total of 30 a month, the number of U-Boats at sea in the Atlantic had been cut by nearly a half and our shipping losses reduced to a relatively negligible quantity.

6. The first few weeks of the third phase were an anti-climax. The Hun was doing us no harm, but he was also studiously avoiding giving us opportunities for killing him. In the Bay and in the Northern Transit Area he abandoned surfacing by day almost altogether and adopted ultra-cautious tactics, surfacing only at night for the minimum period necessary to charge batteries and renew air supply. U-Boats on transit through the Bay hugged the Spanish Coast, which obviously increased our difficulties; and the Luftwaffe was called in to the aid of the U-Boat service to give them greatly increased fighter cover in the Bay and to attack our surface hunting forces with the new glider bomb. Then after a long lull the U-Boats attempted a come-back, this time with the new acoustic torpedo. O.N.S.18 and O.N.202 were attacked in the Western North Atlantic from the 19th to 23rd September by a pack which, while getting some success with the new weapon, suffered severely at the hands of the surface escorts and aircraft of Eastern Air Command. In October the same pack moved eastwards and three main actions took place in which the U-Boats showed a flash of the old form, staying up and fighting back with their now formidable A.A. armament. During the month they lost in the area north of 46 N., 11 boats to Coastal and Eastern Air Command and 5 to the surface escorts. The balance sheet by the end of October in this area showed 5 escort vessels, 3 aircraft and 6 merchant ships lost to us for 17 U-Boats killed, which is a very fair rate of exchange.

Meanwhile, on October 8, the British Forces had taken advantage of the facilities extended to us by our ancient ally and by the end of the month No. 247 Group of this Command was firmly established in the Island of Terceira. It must always be one of the mysteries of the war that the enemy should have waited to stage a serious attack on the Gibraltar convoys until we were established in the Azores and were thus in a position to give them effective air cover throughout their passage. In mid-November a very formidable pack deployed across the route of S.L.139 and K.M.S.30. But the form had changed from that of October. There was no attempt to follow up by day, no evidence of any inclination to stay up and fight it out, and a marked lack of determination in the attacks by night. It is very difficult to resist the conclusion that the primary pre-occupation of the U-Boat crews is now not to kill but to avoid being killed—and that is the beginning of the end in a Service which must rely entirely for its effect on a bold offensive spirit.

7. We are still in this third phase. Our shipping losses are still very light; and (though he may achieve sporadic successes in favourable circumstances) it is difficult to see how the Hun can again do us much harm without offering us opportunities for killing him at a rate which he does not seem prepared any longer to face. In view of the fact that his monthly rate of loss has recently been something of the order of twice that which broke the morale of the U-Boat crews in 1918, it is perhaps hardly surprising that his aggressive spirit has been unable to keep up under the strain.

8. We have had valuable assistance in our area during the past year from the United States Air Forces. The A/S squadrons of the U.S. Army Air Force, who had co-operated with us splendidly and scored a number of kills, were relieved in July and August by the Liberator squadrons of Fleet Air Wing 7, now based at Dunkeswell. No. 63 Squadron (Catalinas) having operated from Pembroke Dock since July has now moved to Port Lyautey to join the squadrons of Fleet Air Wing 15 who co-operate with us in the Southern Approaches to the Bay and on the Gibraltar convoy routes. And No. 128 Squadron (P.V.1), which relieved No. 84 in Iceland earlier in the year, has just left us to return to an area where its shorter range aircraft can more profitably be employed than in the far North Atlantic.

One of the most remarkable features of the year in the Atlantic has been the brilliant success of the U.S. auxiliary carriers against the U-Boats. *Card* and *Core*, *Bogue*, *Block Island* and *Santee* are household words, and the skill and boldness with which they have been handled are the admiration of all.

9. The attack on enemy shipping in 1943 has resulted not only in a substantial tonnage sunk and damaged, but also in compelling the enemy to take steps that cannot fail to have been a serious inconvenience to him. Of these the abandonment of Rotterdam as the principal importing terminal of his North Sea shipping route and the greatly increased weight of escort allotted to his convoys are outstanding.

The loss of the use of Rotterdam was a really serious blow to him. There is ample evidence that it was to have been used throughout 1943. From every viewpoint Rotterdam, as the gateway to the Ruhr, is the outstanding port through which Germany could route her imports—particularly the vital iron ore from Northern Sweden. The substitution of Emden and Bremen, with their less specialised facilities, was mainly due to the pressure of direct attack by the North Coates Wing (254 and 236 Squadrons), together with that exerted indirectly by the minelayers.

The increase in the number of escort vessels allocated to his convoys testifies to the enemy's apprehension for their safety, as did also the maintenance, until recently, of a substantial fighter force in Southern Norway. Virtually the only purpose of the latter was the provision of constant air cover for his shipping against the threat represented mainly by the strike squadrons of No. 18 Group. Thus large numbers of minor war vessels and aircraft have been contained at a time when the enemy has been faced with an acute shortage of both.

In the Bay of Biscay the complete frustration early in the year of blockade running with the Far East, as a result of close co-operation between Air and Sea, was instrumental in causing the suspension of this traffic during the summer months. As the year ended the destruction by 311 (Czech) Squadron of the *Alsterufer*, inward bound with a valuable cargo from the Far East, was a good start to the current blockade running season.

10. The total number of ships sunk during the year by the strike squadrons of the Command was 21, with a total tonnage of about 93,000 tons; another 23 ships, totalling about 81,000 tons, were damaged. Unfortunately a series of vicissitudes beyond our control have inevitably reduced the efficacy of the strike squadrons, and it is only now as the year ends that the strike force is falling into the shape for which it has long been designed. 1943 has seen the development of the Strike Wing—the integrated force of torpedo and anti-flak escort Beaufighters trained and operating together as one unit. But, largely owing to the more pressing requirements of the Mediterranean, only one such Wing, that at North Coates, has as yet operated as a Wing. Now that our re-equipment troubles are at last coming to an end, two more such Wings are taking shape, at Leuchars (Nos. 489 and 455 Squadrons) and Wick (Nos. 144 and 404). That fine old aircraft, the Hampden, which, after a distinguished career in Bomber Command, was called in as a torpedo aircraft to stop the gap caused by the shortage of Beaufighters, has at last passed from the first line of the R.A.F. No. 144 Squadron did distinguished service in the Mediterranean during the operations for the capture of Sicily and is now back in the line as the Torbeau Squadron of the Wick Wing. While No. 415 Squadron with one Flight of Wellingtons and one of Albacores has specialised in operations against the "E" and "R" boats in the Channel and the southern part of the North Sea.

The Fighter squadrons of No. 12 Group have co-operated nobly in providing the essential fighter cover for the operations of the North Coates Wing against the Dutch Coast convoys.

11. It was inevitable that the successes of the anti-submarine squadrons in the Bay should evoke a strong reaction on the part of the Luftwaffe, and in the second half of the year the enemy's long-range fighter force on the Biscay coast was substantially reinforced. To meet this threat it was necessary to strengthen our own long-range fighter force in Cornwall. To-day the only three long-range fighter, i.e., anti-aircraft fighter, squadrons, Nos. 248, 143 and 235, are operating in the Bay where they have provided a valuable moral and material backing to the A/S patrols. There have been several notable instances of successful interception of enemy formations by fighter direction from H.M. ships, and we have had the invaluable assistance of Mosquito squadrons of 10 Group. The Beaufighter is getting a bit short of performance for this rôle and the Coastal fighter squadrons are to re-equip with Mosquitos—No. 248 has actually begun.

A total of 42 enemy aircraft have been destroyed by the fighter and strike squadrons of the Command during 1943.

12. The Photographic Reconnaissance Squadrons of No. 106 Wing flew over 3,000 sorties in the year, of which about 75 per cent. were productive of photographs, totalling nearly 470,000 operational negatives. The enormous extent to which we rely on this Wing for our knowledge of every aspect of the enemy's activity is perhaps not generally realised; the science, not only of air photography but of interpretation, has made enormous strides in the last four years and the Intelligence Staffs would be blind indeed without the courage and skill of the pilots and ground personnel of 106 Wing. In particular, their work is an invaluable, indeed an essential, factor in the day-to-day planning of the Bomber Offensive. And the Battle of Berlin has provided a striking example of the difficulties of long-range P.R. work in winter and of the determination with which they are overcome. No less than 37 sorties were flown before clear photographs of Berlin could be obtained after the first great attack on November 18; on many occasions the pilots were only just able to get back to East Coast airfields before their fuel ran out, and 15 sorties were intercepted by enemy fighters—one formation of three being encountered at 42,000 ft. over Berlin.

13. Behind the first line squadrons the Air/Sea Rescue Squadrons and High-speed launches have carried on their unspectacular but invaluable duties. Air/Sea Rescue gets less than its share of public recognition for the best of reasons—the Hun has far less to gain than we have from Air/Sea Rescue and we do not want to draw undesirable attention to our activities. But the personnel concerned

can rest assured that the value of their work is fully appreciated by those most directly affected, the aircrews of our own and Allied squadrons. Lieutenant-General I. C. Eaker, Commanding the U.S. Eighth Air Force, made the following generous reference to the Air/Sea Rescue Service in a letter to the A.O.C.-in-C. on Christmas Eve:—

"Your superlative Air/Sea Rescue Service has been one of the prime factors in the high morale of our own combat crews. This organisation of yours has picked up from the sea nearly 600 of our combat crewmen since we began operations in this theater. This is a remarkable achievement made possible only by the highest efficiency and the greatest courage and fortitude. It has our unbounded admiration."

A total of 1,684 lives of Allied aircrews, were saved during 1943. The two high lights of the year were the week July 25 to August 1, when 156 were saved, of whom 121 were Americans, and the one day, September 6, when 131 were rescued, all Americans except the crew of a Coastal Sunderland. Many new aids are coming into the Service; a larger airborne lifeboat, "Walter," the radio transmitter which will be carried by all R.A.F. aircraft, improved Mae Wests and emergency packs. If these are to be fully effective, it is essential that all aircrews should be thoroughly and constantly practised in ditching drill, and really familiar with the use of all the various aids provided for their rescue if they are unlucky enough to come down in the sea.

14. The Met. Squadrons constitute another branch of Coastal Command that does yeoman service not only for the Command itself but for all British and Allied Air Forces operating from the United Kingdom. It must be admitted that the Met. Units have been in the past the Cinderella of the Air Force; for a number of reasons, such as shortage of suitable aircraft, they have not been given the opportunity of providing adequately the information which is so vital to the planning and control of any form of air operations. This is now being put right, and the Met. squadrons are being equipped with the Halifax and the Ventura—the vertical climbs for air temperatures and humidity still being done by the Spitfire and the veteran Gladiator, than which there is no better aircraft for the medium altitude work below 24,000 ft. During the re-equipment period we have received most welcome and efficient assistance from the U.S. Army Air Force who, for the time being, are providing all the Met. sorties in the south-west with Fortresses.

15. It is perhaps not generally realised that until very recently No. 17 (Training) Group trained all G.R., Torpedo, Coastal Fighter and P.R. crews for the entire R.A.F. at home and abroad, as well as the ferry crews delivering new aircraft to overseas Commands. That has now changed and Coastal O.T.U.s are now being established overseas where the local conditions are more suitable for training and more akin to the actual conditions which the crews will meet when they are trained. In 1943 No. 17 Group trained a total of 1,863 complete crews, of which 1,223 were for overseas Commands, the grand total of individuals trained amounting to 11,482 including the output from S. of G.R., B.A.T. and B.A.B.S. Units. Crews have been trained on 14 different types of operational aircraft, and 26 different training syllabuses have been operated covering every aspect of air/sea activity.

It is very satisfactory to be able to record that, despite the intensity of flying in the O.T.U.'s by pupils inexperienced on the type of aircraft they are flying, and often under congested conditions, there has been a steady and marked improvement in accident prevention throughout the year in the O.T.U. Group. During 1943 the Group flew 255,800 hours with an accident rate from all causes of three per 1,000 flying hours, the "avoidable" accident rate being two per 1,000 hours. This is a remarkable achievement and shows what can be done if the right steps are taken to deal with the accident menace.

A Tribute from the Cargo Liners

The following letter has been sent to the A. O. C.-in-C. Coastal Command by Colonel D. H. Bates, Chairman of Thomas and John Brocklebank, Ltd., "The oldest shipping line in the world still afloat."

Christmas is a period when one naturally thinks a good bit of others, and it has been my custom for many years to send a copy of my own Company's Christmas message to our many Friends with my best thanks and good wishes.

Coastal Command has indeed been a Friend to the men at sea, whom I have the honour to serve, and so I hope you, as C.-in-C. Coastal Command will accept this letter and its enclosure as a sincere but totally inadequate expression of thanks for the magnificent support you and those under your command have given my men at sea in this heavy "cyclone."

No words of mine can possibly describe the sense of comfort and security which air cover brings to these Merchant Seamen and its growth and increase this year has been of inestimable value to them.

Being a perfect stranger to you I should perhaps explain that "Brocklebanks" are cargo liners, and we are proud of the fact that we are the oldest Shipping Line in the world still afloat.

Again my very grateful thanks and with every possible good wish to you and all those under your command for 1944.

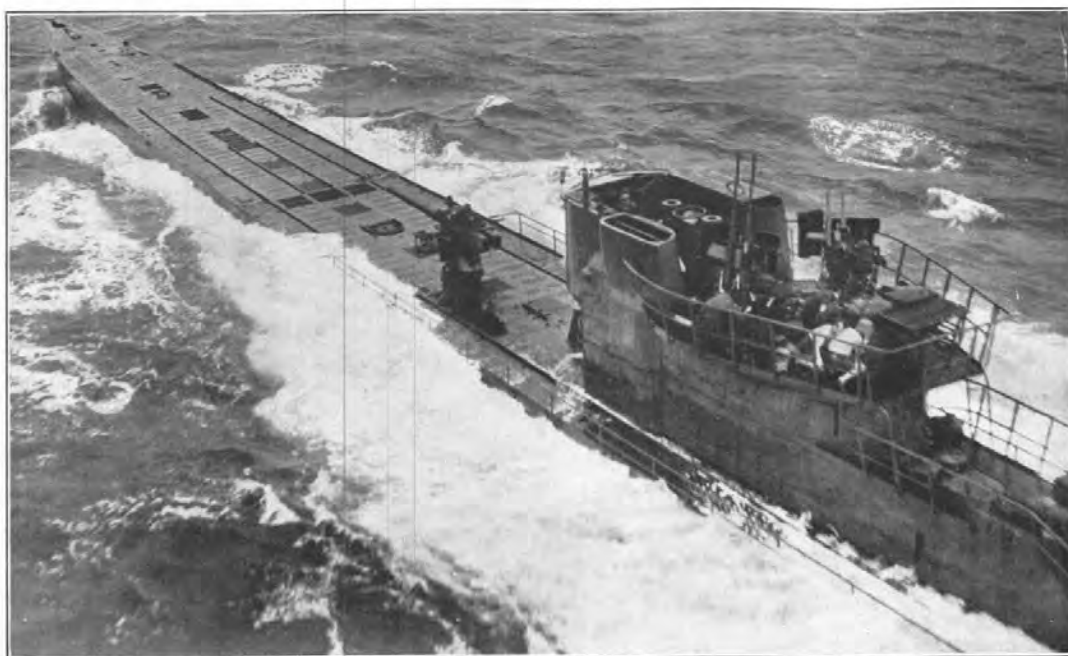


PLATE 1

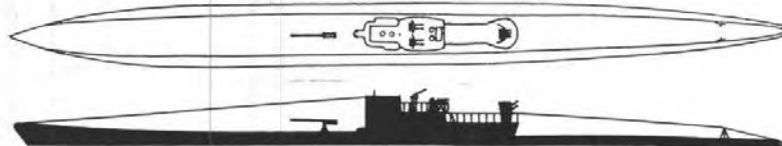
Above.—Gibraltar: The North Front looking east, showing the completed runway. Taken by K/48. (See Article in *Coastal Command Review*, "Landing in Gibraltar," No. 9, January, 1943.)

Below.—H.M.S. *King George V*. Taken by 423 Squadron.





Plan and silhouette of GERMAN 1200 ton U-boat



Dimensions

Length 283 ft. (o.a.)
Beam About 22 ft.

Armament

1 gun probably 105 mm. (4.1 ins)
8 guns probably 20 mm. (0.78 ins)



These photographs were taken during attacks on a 1,200-ton U-Boat sunk near Ascension Island on November 5, 1943, by aircraft of the U.S.A.A.F. and U.S.N. The boat, a U-Kreuzer (cruiser), had a number of interesting features including new modifications to the conning tower and guns. The total armament was one gun—probably 105 mm. (4.1 in.)—forward, and eight 20 mm. guns on the conning tower structure. There were two twin and one quadruple mounting for the 20 mm. guns, the latter being clearly visible on the lower bandstand.

I.—ANTI U-BOAT

(See notes below.)

ANTI U-BOAT SCORES FROM JUNE TO NOVEMBER, 1943

PERCENTAGE FIGURES OF MERIT
IN BIG NUMERALS

63 Sq. U.S.N.	10 Sq.	48 Sq.	53 Sq.	58 Sq.	59 Sq.	86 Sq.	120 Sq.	172 Sq.
$\frac{0}{10} = 0$	$\frac{10}{40} = 25$	$\frac{33}{50} = 66$	$\frac{33}{80} = 41$	$\frac{26}{50} = 52$	$\frac{36}{150} = 24$	$\frac{82}{150} = 55$	$\frac{108}{310} = 35$	$\frac{39}{70} = 56$
179 Sq.	190 Sq.	201 Sq.	202 Sq.	206 Sq.	210 Sq.	220 Sq.	224 Sq.	228 Sq.
$\frac{124}{230} = 54$	$\frac{0}{0} = 0$	$\frac{3}{20} = 15$	$\frac{6}{20} = 30$	$\frac{20}{30} = 66$	$\frac{16}{30} = 53$	$\frac{20}{20} = 100$	$\frac{43}{100} = 43$	$\frac{30}{50} = 60$
233 Sq.	269 Sq.	304 Sq.	311 Sq.	330 Sq.	333 Sq.	407 Sq.	423 Sq.	461 Sq.
$\frac{10}{10} = 100$	$\frac{49}{30} = 38$	$\frac{3}{10} = 30$	$\frac{13}{20} = 65$	$\frac{0}{0} = 0$	$\frac{0}{0} = 0$	$\frac{39}{60} = 65$	$\frac{20}{20} = 100$	$\frac{23}{40} = 57$
502 Sq.	547 Sq.	612 Sq.	236 Sq. (R.P.)	422 Sq.	128 Sq. U.S.N.	105 Sq. U.S.N.	103 Sq.	110 Sq.
$\frac{13}{90} = 14$	$\frac{6}{60} = 12$	$\frac{12}{50} = 24$	$\frac{10}{10} = 100$	$\frac{20}{20} = 100$	$\frac{13}{20} = 43$	$\frac{0}{10} = 0$	$\frac{30}{50} = 60$	$\frac{20}{20} = 100$

2 of 179 Squadron not assessed.

Attacks on U-Boats

Note on Table above, showing Squadron Scores for the Six Months, June to November, 1943

The tables are 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, or Known Sunk** 10

November was a very quiet month, the chief alteration to the scoreboard being the first appearance of 103 Squadron and 110 Squadron with 60 per cent. and 100 per cent. respectively.

SUMMARY OF ANTI U-BOAT OPERATIONS BY COASTAL COMMAND AIRCRAFT
(Including Iceland, Azores, Gibraltar and U.S. Moroccan Sea Frontier Aircraft)

DECEMBER, 1943

Duty and Base or Area.	Total Sorties.	Hours Flown.		U-Boats Sighted.		U-Boats Attacked.		Hours per Sighting.		Number of Sorties.		Col. 10 Sorties with Flak.
		Base to Base.	On Patrol.	Day.	Night.	Day.	Night.	Base to Base.	On Patrol.	When U-Boat Sighted.	When U-Boat Attacked.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Convoy Cover</i>												
United Kingdom	59	769	262	—	—	—	—	—	—	—	—	—
Iceland	11	112	48	1	—	1	—	112	48	1	1	1
Gibraltar and Moroccan Sea Frontier	146	1,234	632	—	—	—	—	—	—	—	—	—
Azores	42	412	159	—	—	—	—	—	—	—	—	—
TOTAL CONVOY EFFORT	258	2,527	1,101	1	—	1	—	2,527	1,101	1	1	1
<i>A/U Patrols</i>												
Northern Transit												
United Kingdom	77	872	367	— (1)	—	— (1)	—	—	—	—	—	—
Iceland	7	44	13	— (1)	—	—	—	—	—	—	—	—
Northern Convoy												
United Kingdom	18	236	45	—	—	—	—	—	—	—	—	—
Iceland	76	452	271	—	—	—	—	—	—	—	—	—
Azores	56	547	184	—	3	—	2	182	61	3	2	1
Bay of Biscay (including adjacent patrols)												
United Kingdom	886	9,028	4,315	2(3)	9	1	5	821	392	9	6	4
Gibraltar and Moroccan Sea Frontier	165	1,958	550	1(1)	—	—	—	1,958	550	1	—	—
Central Convoy												
Gibraltar and Moroccan Sea Frontier	303	2,201	1,175	—	—	—	—	—	—	—	—	—
Azores	112	1,044	486	—	1	—	1	1,044	486	1	1	1
TOTAL A/U PATROLS	1,700	16,382	7,406	3	13	1	8	1,024	463	14	9	6
Add Convoy Effort	258	2,527	1,101	1	—	1	—	—	—	1	1	1
TOTAL COASTAL COMMAND EFFORT	1,958	18,909	8,507	4 13 17 U-Boats sighted.		2 8 10 U-Boats Attacked.		1,112	500	15	10	7

Notes

1. The figures in brackets represent six chance sightings by Coastal Command aircraft engaged on other operations (four on Anti-Shipping, one on Transit and one on a Met. Flight). In only one of these cases was the aircraft carrying suitable weapons which enabled an attack to be made.
2. In addition to the above there were three chance sightings by Transit aircraft.
3. Operations against blockade runners adversely affected the anti U-Boat effort during December.

Summary—continued

Assessments

Month.	Known Sunk.	Probably Sunk.	Damaged A.	Damaged B.	Slight Damage.	Insufficient Evidence of Damage.	No Damage.	Unassessed.
October	10	1	—	1	3	12	15	—
November	2	2	1	1	—	4	2	2
December	—	1	—	—	—	2	—	7

Analysis of U-Boats Sighted during December

Particulars of Incidents.	U-Boats.		Sorties when Aircraft	
	Sighted.	Attacked.	Sighted.	Attacked.
On 13 occasions one U-Boat was sighted by one aircraft—eight aircraft attacked	13	8	13	8
On two occasions two U-Boats were sighted by one aircraft—each aircraft attacked one U-Boat	4	2	2	2
Totals	17	10	15	10

Squadron Results—December

					Sorties when U-Boat Sighted.	Sorties when U-Boat Attacked.
1. United Kingdom and Iceland						
502	Halifax	Holmesley South	1 (night)	1 (night)		
53	Liberator LL	Beaulieu	4 (night)	2 (night)		
120	Liberator	Reykjavik	1	1		
10	Sunderland	Mount Batten	1	1		
461	Sunderland	Pembroke Dock	1 (night)	—		
407	Wellington LL	St. Eval (det.)	1 (night)	1 (night)		
612	Wellington LL	St. Eval (det.)	1 (night)	1 (night)		
2. Gibraltar						
210	Catalina	New Camp (det.)	1	—		
3. Azores						
172	Wellington LL	Lagens (det.)	4 (night)	3 (night)		
			15	10		
4. Chance Sightings by Coastal Aircraft Engaged on Other Duties						
144	Beaufighter	Wick	1	1		
248	Beaufighter	Predannack	1	—		
502	Halifax	St. Davids	2	—		
520	Hudson	North Front	1	—		
120	Liberator	Reykjavik	1	—		
			21	11		

Recent Attacks on U-Boats

A Kill by Three Liberators

On November 10 three **Liberators** made attacks on a 500-ton U-Boat near the Spanish coast and she subsequently sank. The credit was divided between the three aircraft.

E/103 (U.S.N.) attacked first. It was directed to the spot by a signal from control and contacted the enemy by Radar after evading two Ju.88s. The Captain intended to attack from ahead, but the enemy altered course at the last moment and the attack developed from the starboard beam. The Mark XV bomb sight was used and five depth charges spaced at 40 ft. were released from 90 ft. One depth charge hung up. The rear gunner saw one depth charge enter the water on the port side, but did not see the points of entry of the others. The explosions seemed to engulf the U-Boat which slowly emerged from the spray and continued on the surface. The Liberator then made a second run and dropped one 600-lb. depth charge. The U-Boat was down by the stern and leaked oil freely. After about half an hour she recovered trim and the oil slick lessened. During both attacks the Germans put up considerable flak from either quadruple or triple 20-mm. cannon. The aircraft returned the fire whenever the range was less than 1,000 yards and at least one dead German was seen hanging over the side of the conning tower. The enemy's fire was not effective. At 1310 hours the Liberator returned to base.

E/110 (U.S.N.) found the U-Boat after getting a Radar contact at 20 miles. The enemy was very low in the water and seas were breaking over the conning tower. The aircraft circled the U-Boat and then attacked her starboard bow in the face of light flak. Six depth charges were dropped, which fell correctly for range but 100 ft. out for line. The U-Boat appeared to roll heavily and turned sharply to port, subsequently zigzagging violently in the general direction of the Spanish coast about 15 miles away.

At this moment **D/311** (Czech) arrived and the U-Boat fired a pyrotechnic which left a double trail of light blue smoke in the air. D/311 crossed ahead of the U-Boat, being unable to make an immediate attack owing to the nearness of high land on the Spanish coast, and then attacked with R.P. from Green 90. One of the first pair of rockets and both of the second pair failed, and the last salvo of four entered the water about 50 ft. short of the U-Boat, near the bows.

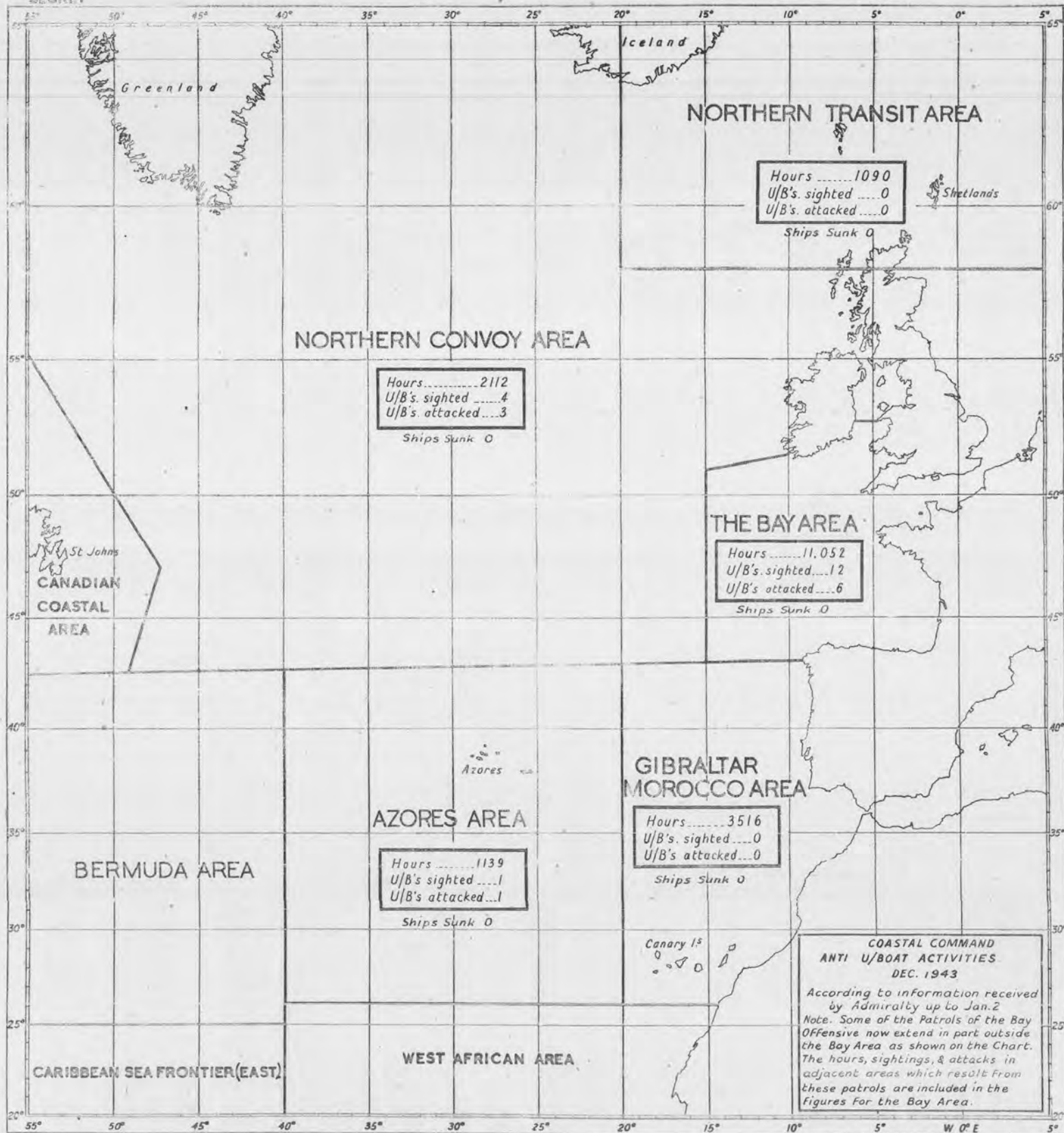
None of these was seen to emerge. The U-Boat fired at the aircraft without success. After the attack, the U-Boat slowed to 6-8 knots and when closing the shore reduced to 2 knots. When last seen, 1½ hours after the attack, she was proceeding at 2 knots very close inshore. E/103's attack had damaged her steering and the other two aircraft inflicted such damage that she eventually sank. All three attacks were skilfully made in the face of flak and E/103 was awarded 40 per cent. of the sinking, E/110 10 per cent. and D/311 50 per cent.

Mark III Bomb Sight used at Night

On December 13 **Liberator B/53** took off soon after midnight on anti U-Boat patrol, but after half an hour was diverted to hunt a U-Boat which had been sighted shortly before. The Mark V Radar became partially unserviceable and the captain ordered that it should be used only for periods of three minutes at three-minute intervals. It is considered that but for this action the Radar would soon have ceased to work at all. On reaching the position of the previous sighting B/53 carried out a square search for nearly three hours. This was unproductive, so the captain returned to the first position and began again. There was six-tenths light strato-cumulus cloud and visibility was two miles up moon and less than a quarter of a mile down moon. At 0700 hours, while the aircraft was flying at 1,500 ft., a Radar contact was obtained on the port quarter at a range of 7½ miles. The aircraft turned to home but the Radar again became unserviceable and the inter-com. also failed. As a result, when the Leigh Light was switched on the U-Boat was not illuminated, but she immediately opened accurate and concentrated fire from a position about 1,300 yards away on the starboard beam. She was on a westerly course and was zig-zagging violently at 15 knots. The Liberator's Leigh Light and Radar were switched off, but as it turned away to port the aircraft was silhouetted against the moon and the German gunners scored some hits. The aircraft circled to port and lost contact for a few minutes until the U-Boat again opened fire. The enemy, however, soon

lost touch and ceased fire, and the Liberator was able to manoeuvre into position for an up-moon attack. The aircraft came in just forward of the enemy's beam and, with the help of the Mark III bomb sight, dropped six depth charges from 130 ft. Neither the Radar nor the Leigh Light was used during the run-in, which was straight and level, and the front gunner held his fire in order not to reveal the aircraft's position. At 300 yards the Germans opened fire without scoring any hits and the front gunner immediately replied. He kept the conning tower in his sights and saw tracer hitting the superstructure in a steady stream. The rear gunner states that the depth charges straddled the conning tower and that he saw two explosions. The Liberator turned to port and when on a reciprocal course a very small sharp Radar contact was obtained a mile and a quarter abaft the port beam. The aircraft set course for the position, but the blip disappeared almost at once. It is thought that this blip may have been caused by the bow or stern of the U-Boat for, when the Liberator passed over the position, the crew saw a flame float which they had dropped at the time of the attack. After about 15 minutes what appeared to be a flashing light was seen in the water, but it disappeared before it could be found. A second flashing light later turned out to be a flame float. The Liberator then made a number of runs over the position, using the Leigh Light. During the first run the pilot, navigator and front gunner saw two bodies

SECRET



in the water, one with his head and shoulders showing as though he was wearing a life jacket. On the third run at 100 ft. both the navigator and the front gunner saw two bodies, one of which seemed to be alive. After a Halifax and a Sunderland arrived B/53 set course for base.

Analysis

In view of the defective Radar this was a very well executed approach with a most intelligent appreciation of the position. Good gunnery control and excellent shooting saved the aircraft

from more serious flak on the run-in. The attack was pressed home in flak and appears to have been accurate. The after results of the momentary blip and the two bodies in the water point to the probable destruction of the U-Boat. The attack is noteworthy in that the Mark III bomb sight was used at night and this is the first case in which definite after results in the shape of bodies have been seen by using the searchlight. The complete operation reflects great credit on the whole crew.

Destruction of U-Boat in the Mediterranean

After a short career and brief success the *U 593* sank at 1508 hours on December 13, 50 miles north-east of Djidjelli, as a result of a "Swamp" Operation which had begun 32 hours before.

Anti-U-Boat Operation "Swamp" aims to cover with aircraft the area in which it is anticipated that a U-Boat can move after its presence has been established. The U-Boat is thus enclosed in a net from which there is no escape. She is eventually exhausted and pounded to destruction by the aircraft or by the surface vessels taking part in the operation.

U-Boats in the Mediterranean are forced to operate close to the North African coast, as this is where the convoy routes lie. Their manoeuvrability when escaping from attack is reduced to half, in comparison with the open ocean conditions in the Atlantic. This reduction makes it possible to employ total air saturation with the limited number of A/U Squadrons available in this theatre.

As soon as a U-Boat is contacted up to about 30 miles from the coast, strike aircraft are despatched to cover a semi-circular area around the position, and surface forces are detailed to begin asdic hunting. It is necessary that each part of the area be swept either visually or by radar at half-hour intervals to prevent the U-Boat from making a get-away. As the hunt continues the air cover must be spread by increasing the radius of the semi-circle, assuming that the U-Boat may travel at 2 knots during the first 24 hours and thereafter at 1 knot as long as she is submerged and kept submerged. The operation is planned in eight-hour phases and the area is increased at the end of every eight hours. As designed at present the operation calls for 86 flying hours on patrol during the first 24 hours and 144 flying hours on patrol during subsequent periods of 24 hours, when six aircraft are on patrol at any one time.

U 593 left Marseilles on or about December 1 and at 0710 hours on December 12 she torpedoed and sank H.M.S. *Tynedale* which was escorting an east-bound convoy north of Djidjelli. Three Wellingtons of 458 Squadron from Bone were at once ordered to begin Operation "Swamp," using the *Tynedale's* position as the datum. H.M.S. *Niblack* and H.M.S. *Holcombe* were detailed to begin hunting immediately, and later H.M.S. *Calpe* and U.S.S. *Wainwright* and *Benson* were also despatched to co-operate. Leigh Light Wellingtons of 36 Squadron were flown from Blida to Bone to undertake the night phase of the operation.

At 1505 hours H.M.S. *Holcombe* was torpedoed and sunk about 15 miles from where H.M.S.

Tynedale was lost; this was seen and reported by a 36 Squadron aircraft on passage to Bone.

Operation "Swamp" was immediately begun afresh with the position of this last attack as its datum. The surface forces renewed their hunt in two groups of two in company.

At 0035 hours on December 13 Wellington B/36 obtained a radar contact and homed to attack. At three-quarters of a mile range the aircraft was hit and again at half a mile. The aircraft lurched to port out of control and the pilot was unable to carry out a depth charge attack. However, the rear-gunner opened fire on passing over and silenced the flak from the U-Boat. The aircraft's Leigh Light had jammed and was not switched on, but the U-Boat was identified in the moonlight. The aircraft sent out a sighting report and an S.O.S. but was able to regain base. The other two aircraft on patrol at the time, together with H.M.S. *Calpe* and U.S.S. *Wainwright*, proceeded to the U-Boat's position, but it had submerged and was not contacted. The "Swamp" operation was again adjusted to conform to this new position.

At 0816 hours H.M.S. *Calpe* had a sound contact, but with no development. At 1407 hours asdic contact was made by *Wainwright* and she attacked at 1412 hours, dropping a five-charge pattern. This was followed by an attack by *Calpe* at 1430 hours with a ten-charge pattern with maximum setting. She repeated this at 1441 hours. The *U 593* was then forced to the surface and both ships opened fire with Oerlikon and pom-pom to prevent the crew from manning their guns. The U-Boat made no attempt to return the fire and the crew began abandoning ship as she settled low in the water and sank at 1508 hours.

Five officers and 46 ratings were picked up. All the crew of the U-Boat, youths of an average age of 20-21, had a healthy respect for aircraft and had found it impossible to surface during the 32-hour period. They had made an attempt at 0030 hours but had been forced to submerge because of Wellington B/36's attack. Although not injured they appeared to be considerably exhausted and unnerved by their experiences. They had been short of air and their Captain had instructed them to move about as little as possible. Their batteries were running low and they were unable to take violent evasive action against the *Calpe's* and *Wainwright's* depth charge attacks.

In all 21 Wellington sorties were flown during the 32-hour period. The destruction of this U-Boat was the outcome of the patient and efficient execution of Operation "Swamp," and of the closest co-operation between air and surface craft.

II.—ANTI-SHIPING

The Year's Work—Anti-Shipping

The opening months of 1943 saw the introduction of several new factors which increased our successes against enemy shipping very considerably; chief among them was the adaptation of the Beaufighter as a torpedo bomber, with its natural corollary, the development of strike wing tactics. In addition, the improved air tail for the torpedo, and an increase in the supply of this weapon, together with the use of cannon and R.P., produced a much better success/loss ratio, which is the yardstick for measuring results in anti-shipping operations.

There is a naval precept that "the gun is the weapon for crippling, stopping, or disabling ships, and the torpedo, fired at a range at which it cannot miss, the weapon for sinking them." The same principle applies to aircraft missiles, for, although a torpedo hit will not always sink a ship, an underwater hit will certainly cause far more damage than a hit by the same weight of explosive above the waterline.

Up to 1943 the obsolete Hampden, preceded by the Beaufort, had been in general use as a torpedo-carrying aircraft. The results were remarkable, considering the disadvantages under which these aircraft operated. When weather conditions were suitable they patrolled the Dutch and Norwegian coasts, but many good targets were missed owing to lack of cloud cover. The advent of the Beaufighter with its heavy front armament and high speed at sea level changed all this. After it had been proved possible for a Beaufighter to carry a torpedo there was another difficulty to overcome; that of providing suitable escort for the torpedo aircraft. A wing was formed with Beaufighters operating in torpedo, anti-flak and anti-fighter roles. With the development of suitable tactics they proved highly successful. The wing worked on the principle that six torpedoes must be dropped to sink a ship and that three anti-flak aircraft were necessary to deal effectively with each escort vessel. In addition, when operations took place within our single-engined fighter range, the striking force was always covered by squadrons of S.E. fighters which were able to establish local

air superiority during the short time it took to carry out the strike. For long range strikes, Beaufighters were able to distract the enemy's air defences sufficiently to enable the "Torbeaus" to attack with minimum interference. An improved torpedo sight was produced as a further aid and the percentage of hits rose steadily.

The enemy had been increasing the anti-aircraft armament of his escort vessels, especially the lighter calibres; also the number of escorts in his convoys. It was therefore necessary to silence the guns on these escorts at least long enough for the "Torbeaus" to gain suitable dropping positions and make their getaway. The torpedo was always considered the main weapon, but the increased use of R.P. and cannon fire saturated the enemy defences and kept our losses down. R.P. was also used (with cannons, to a lesser extent), in attacking ships too small to warrant a torpedo. But unless the aim and sighting were extremely good, the percentage of hits was small when the opposition was heavy. But on the whole, the results were good.

The Mark IV gyro-controlled air tail was also brought into general use in 1943. This greatly simplified torpedo dropping, always a highly skilled pastime owing to the inherent limitations of the weapon. The necessary skill became greater as dropping speeds increased. The Mark IV tail allowed greater latitude in dropping speeds and heights (both closely connected) although it was still necessary for the aircraft to be in straight and level flight at the moment of release. It also controlled the torpedo during its flight in the air and the percentage of runs in water increased accordingly. Another factor in the successes of 1943 was the introduction of Torpex instead of T.N.T., as the explosive charge, and of the "B" type head which contained about 100 lb. more explosive than the old torpedo. The striking forces were further helped by improved reconnaissance, especially through the increased use of photography. The forces were thus able to take off with complete mental pictures of the targets they were going to attack.

The following are the more valuable lessons learned during the year:—

- (i) *When the strike wing is to operate in an area accessible to enemy single engine fighters, it should be given adequate support by a force of our own S.E. fighters.*
- (ii) *Although the striking force no longer depends for protection on cloud cover in the area, it is nevertheless dependent to a certain extent on weather conditions. If visibility at base is poor and the cloud base low, the wing cannot be formed up. Also, bad visibility in the area of operation will not allow the target to be sighted early enough for the wing to get into position for a good attack.*
- (iii) *To allow the torpedo aircraft to reach a good dropping position with minimum interference, it is necessary for the anti-flak Beaufighters to engage all the escort vessels near the main target.*
- (iv) *For the Wing to carry out a good attack reconnaissance should be accurate and up to the minute, and whenever possible supplemented by photographs.*
- (v) *The whole attack must be carefully worked out on the ground, and a time schedule strictly adhered to. The S.E. fighters have a very limited range and must not be kept airborne longer than absolutely necessary.*
- (vi) *A torpedo attack on a convoy in port is not practicable and is likely to result in heavy casualties to our own force, with small chance of success against the enemy.*

Table of Anti-Shipping and Fighter Successes, 1943. Coastal Command Area

Weapon.	Sunk.		Severely damaged.		Damaged.	
	No. of ships.	Tonnage.	No. of ships.	Tonnage.	No. of ships.	Tonnage.
Torpedo	16	68,690	7	26,965	7	29,945
Other	5½	24,324	1	3,500	8	20,300
Total	21½	93,014	8	30,465	15	50,245

The following E/A are recorded as destroyed during 1943, by the Fighter or Strike Squadrons of the Command :—

Squadron.	Type.								Squadron Total.
	Ju.88	F.W.200	B.V.138	Do.24	Ju.52	He.177	F.W.190	He.111	
248	9	5							14
143	6				1	1			8
333	4			1	1		1		7
235	4		2						6
233		2							2
404			2						2
144				1					1
254				1					1
2 O.T.U.								1	1
Type Total	23	7	4	3	2	1	1	1	42

SHIPPING STRIKES IN DECEMBER

Attack on Blockade Runner

During the night and morning of December 24–25, heavy attacks developed in the Atlantic against an inward bound blockade runner of 6,000 tons escorted by 11 destroyers. These destroyers had sailed from French ports in two separate formations, one of six ships and one of five, in order to meet the blockade runner in the approaches to the Bay of Biscay.

The attacks really began on the night of December 23–24. At 2015 hours on the 23rd, a Wellington on anti-U-Boat patrol sighted 12 vessels in position 45° 38' N., 06° 18' W., on a course of 300°, speed 20 knots. At 2125 hours another of the Wellingtons detected surface vessels in position 45° 25' N., 06° 25' W., and at 2305 hours sighted seven vessels on a course of 290° in position 45° 30' N., 06° 30' W. A third Wellington detected surface vessels at 2150 hours in approximately the same position and a Liberator sighted the wakes of five vessels in position 45° 18' N., 06° 36' W., at 2107 hours and continued to shadow them.

The first attack was at 0008 hours on the 24th when Wellington J/304 sighted and attacked five vessels in position 45° 30' N., 06° 50' W., with six 250 lb. depth charges from a height of 400 ft.

Owing to darkness no results were observed. This was followed by an attack at 0615 hours by Liberator K/110 (U.S.N.) on six vessels in position 45° 53' N., 09° 21' W. Four 250 lb. depth charges were released but no results were observed.

A Halifax next sighted five destroyers in position 45° 48' N., 07° 25' W., and later saw the wakes of seven vessels on a similar course, in position 45° 48' N., 07° 49' W. In spite of the variation in the number of vessels sighted, it is thought that they comprised the two sections of destroyers proceeding to meet the blockade runner.

Patrols were maintained during the day of the 24th and at 0736 hours a United States Liberator sighted 11 vessels on a course of 270°, in position 45° 50' N., 10° 26' W., and identified nine of the vessels as destroyers. This force was sighted again at 0812, 0845 and 1525 hours by U.S. Liberators all of which met heavy flak. Further sightings were made by Sunderlands and Beaufighters.

Following these sightings a striking force of eight **Halifaxes of 502 Squadron**, armed with 500 lb. M.C. bombs, was detailed to attack. The convoy was located and attacks were made

between 1700 and 1900 hours on the 24th, at heights varying from 5,000 to 12,000 ft. Violent evasive action made it difficult to observe results but several crews report seeing dense clouds of smoke coming from the large merchant vessel. Between 0101 and 0910 hours on December 25, nine further bombing attacks and one machine gun attack were made. **G/311** (Czech) claims a hit amidships followed by an outbreak of fire. No other certain bomb hits were seen but there were many machine gun strikes.

During the afternoon a force of 14 Mosquitos, 15 Torbeaus and 29 Beaufighters were despatched to attack the convoy, but they failed to make contact.

All crews showed great determination and fortitude in searching for, finding and attacking this convoy. The fact that the target was located not once but many times by different aircraft reveals a high standard of navigation. It is unfortunate that after all these efforts there is no confirmation of damage to the blockade runner.

Potential Blockade Runner Severely Damaged

At about 1230 hours on December 18 the merchant vessel *Pietro Orseolo*, 6,344 G.R.T., was attacked whilst lying stationary south-west of Concarneau. Two torpedo hits and many cannon strikes severely damaged this potential blockade runner, which is considered now to be far from watertight.

The striking force consisted of six **Beaufighters** of **254 Squadron** each armed with an 18-in. torpedo and four 20-mm. cannon, and an anti-flak force of one **Beaufighter** of **254 Squadron** and five **Beaufighters** of **248 Squadron**, all armed with four 20-mm. cannon. The force was escorted by eight Typhoons of No. 183 Squadron. The attack developed from the south-west. The anti-flak **Beaufighters** made diving attacks from 1,500 ft.

to close range, and many cannon strikes were seen all over the target. Meanwhile the target was also under fire from the Typhoons, who raked the vessel from stem to stern. The Torbeaus approached in fluid pairs at heights varying from 100 to 300 ft. Torpedoes were released at ranges of from 1,000 to 1,200 yards and two hits were seen, one amidships and one near the stern. After the attack black smoke poured from the vessel and she listed to starboard.

No enemy fighters were encountered but there was considerable flak from the target and shore batteries. Two of the **Beaufighters** received slight damage but all aircraft returned safely to base.

The End of a Blockade Runner

The 2,700-ton German blockade-runner which went to the bottom on December 27, was caught and sunk after a determined and prolonged effort on the part of many aircraft and squadrons of the Command. The performance of the Czech Liberator which delivered the final blow, is in every way outstanding.

The German was first sighted at 0945 hours by **Sunderland T/201**. Her position was then 46° 40' N., 19° 30' W. "T" shadowed for four hours and then attacked with two 500-lb. M.C. bombs and two 250-lb. depth charges. As the attack was made from 3,000 feet above cloud, no results were seen. Meanwhile at 1135 hours another **Sunderland**, **Q/422**, made contact and went into attack. The aircraft overshot the target on the first run, but raked the enemy's decks with machine-gun fire. On the second run two 500-lb. M.C. bombs were dropped from 1,500 feet and the decks were again well sprayed with fire. Only one bomb was seen to explode and this was a 40-yard undershoot. The **Sunderland** attacked in the face of considerable flak but returned safely to base in spite of some damage.

The third attack was also made by a **Sunderland U/201**. This aircraft dropped one 500-lb. M.C. bomb from 4,000 feet above cloud, but no results were seen.

The next attack was lethal. At 1607 hours **Liberator H/311** (Czech) came in low on the starboard beam and used every available weapon.

The Czechs dived through intense flak and parachutes on cables and fired eight R.P.s in pairs, the first at 800 feet and the last at 600 feet. They also dropped one 500-lb. M.C. bomb and one 250-lb. G.P. bomb from 600 feet. Five of the rocket projectiles struck the enemy's stern above the waterline and one bomb hit the stern and set it on fire. During the attack all the Liberator's guns except the port gun were fired as they could be brought to bear. The starboard outer engine was hit by flak but the crew were uninjured and returned safely to base.

Even after this the attacks were kept up. About an hour later two more Liberators, **F** and **L/86**, attacked with 500-lb. M.C. bombs, but without result. The German was again sighted at 1758 hours by four Halifaxes. She was blazing from end to end, listing to port and down by the stern. From time to time explosions were seen. Four lifeboats containing about seventy survivors stood off about a mile from the blazing ship.

The captain and crew of **H/311** are to be congratulated on pressing home so skilful and determined an attack, and the other crews concerned deserve praise for their skill and persistence in shadowing and attacking in face of considerable opposition. As a result of this action the enemy has been deprived of a useful ship and a cargo which he can ill afford to lose at this stage of the war.

[PLATE 3 opposite



The three upper photographs, taken by 105 and 110 Squadrons (U.S.N.), show various stages in the action on December 28 between H.M.S. *Glasgow* and *Enterprise* and eleven enemy destroyers. The oil in the lowest of the three was left by one German after she had been sunk. The bottom photograph was taken by 461 Squadron on December 30 and shows a boatload of German survivors.





Three stages in the destruction of the German blockade runner *Alsterufer* (2,700 tons), described on page 12. The photograph on the left, taken by 311 Squadron, shows the huge explosion which followed the bomb hit, and in the centre photograph (taken by 86 Squadron) the fire is seen on the after part of the ship. 502 Squadron's photograph on the right shows the German still further on the way to destruction. She is lower in the water, her superstructure is burnt away, and the funnel is white hot. Although it is not known what cargo she was carrying, her speed suggests that it was both urgent and valuable.

Other Attacks

On November 30 five **Beaufighters** of **No. 404 Squadron**, each armed with four 20-mm. cannon and eight 25-lb. A.P. R.P., carried out a Rover patrol off the coast of Norway.

As the strike force was nearing Sogne Fjord an enemy convoy was sighted eight miles ahead and to starboard of the track of the aircraft. It consisted of one tanker of 6,000 tons and one 3 island type M/V of 2,700 tons escorted by two "M" class minesweepers and an armed trawler. The convoy was steaming at 8 knots on a course of 050°.

The leader took the **Beaufighters** to cloud six miles ahead of the convoy, hoping to achieve some surprise. It was assumed that the aircraft had been sighted but it was still thought that the direction of attack might be concealed to some extent. The cloud was about two miles long and the convoy was sighted again from a distance of about a mile. The approach to the target was made into sun and the attack delivered across the sunpath. Four aircraft, L, S, N, B, attacked the tanker with R.P. and cannon, pressing the attacks home to a close range. On breaking away from the vessel, aircraft N attacked one of the "M" class minesweepers and B attacked the second M/V. Aircraft J also attacked this M/V. Many R.P. hits and cannon strikes were seen on the tanker, and the M/V, the trawler and the "M" class minesweeper were repeatedly hit with cannon shells.

This successful attack was made in the face of intense flak. Four enemy ships were damaged for the price of slight damage to two of our aircraft; a most satisfactory result.

A striking force of seven **Beaufighters** of **No. 404 Squadron** was despatched from Wick on December 7, to carry out a Rover patrol on the Norwegian coast. The aircraft were all armed with four 20-mm. cannon. In addition, four of them carried eight 25-lb. A.P. R.P. each and three carried eight 60-lb. H.E. R.P.

The aircraft had completed part of the patrol and when flying at 2,000 feet, near Stadtlandet, the leader sighted an enemy convoy 10 miles ahead steaming at slow speed on a southerly course.

The convoy consisted of one 3,000-ton M/V, one 2,000-ton M/V, and a small vessel of 500 tons. They were escorted by two "M" class minesweepers and a flak vessel. As soon as the convoy sighted the aircraft it turned to port.

All our aircraft attacked in dives from 2,000 to 500 feet, releasing their R.P.s at ranges varying from 800 to 600 yards. Three aircraft attacked the "M" class minesweeper to the starboard and rear of the convoy. No R.P. hits were seen but the vessel was heavily damaged by cannon fire and was left enveloped in smoke. The 3,000-ton and 2,000-ton M/Vs were receiving attention meanwhile. Three aircraft dived on the 3,000-ton M/V and it was seen to be hit by cannon fire from all the aircraft and by R.P. from aircraft "P." The remaining one aircraft attacked the 2,000-ton M/V and the pilot estimated that he scored hits with some of the R.P.

Intense heavy and light flak from the convoy and shore batteries failed to do any damage of

consequence and an Arado 196 which appeared from the north firing M.G. and cannon disappeared rapidly behind the convoy.

The fact that only three of our aircraft suffered slight damage is attributed to the accuracy of the cannon fire and the effect of the 60-lb. H.E. as an anti-flak weapon.

Two trawlers were sighted by five **Beaufighters** of **No. 235 Squadron** whilst on patrol in the Bay area December 10, 1943. Aircraft "J" was detailed to attack the vessels and opened fire, raking the first trawler from stem to stern with a five-second burst of 20-mm. cannon. No signs of damage were seen. An attack was then made on the second trawler with a three-second burst of fire. Strikes were seen on the waterline and superstructure and the crew could be seen taking cover under the hatchways. After the attack, both trawlers were seen to be blowing steam and the second trawler appeared to be listing.

On December 20 a striking force of nine **Beaufighters** of **144** and **404 Squadrons** took off from Wick on a Rover patrol. Four aircraft from 144 Squadron carried one 18-in. torpedo each and four 20-mm. cannon, and the rest of the force was armed with cannon alone. The weather on the Norwegian coast was bad—10/10ths cloud at 800 ft., visibility 2 miles, a strong wind and a very rough sea. In fact, conditions for torpedo attack were very far from perfect. Near Lister our aircraft sighted an enemy force of one destroyer followed by a U-Boat, but as a result of the poor visibility the **Beaufighters** found themselves almost on top of the target before they saw it. Moreover, identification was very difficult. The striking force therefore did not have enough time to deploy and the anti-flak aircraft could not get in ahead of the Torbeaus. Nevertheless an attack was made; aircraft "C" and "A" of 144 attacked the destroyer from the starboard side while "T" came in from the port. No hits were seen and it is doubtful if the torpedoes would have run in such rough seas. Aircraft "B" attacked the U-Boat, but again no results were seen. "T" opened fire on the destroyer with cannon and scored hits on the superstructure. The anti-flak aircraft attacked both the destroyer and the U-Boat with cannon and many hits were seen on both targets. The return fire was very heavy and two of our aircraft crashed into the sea.

It seems that this attack was doomed to failure from the beginning, for the sea was too rough for torpedoes and the poor visibility prevented the attack being carried out as it had been planned. It is unfortunate that we lost two aircraft, but at least it is hoped that the cannon fire killed some Germans and damaged their ships.

On the night of December 20, **Albacore P/415** was detailed to carry out a search for a target thought to be near Dunkirk. This target, however, had gone into harbour and "P" was vectored on to a convoy consisting of seven 150 ft. vessels. This convoy was sighted 6 miles north-west of Calais steaming on a north-easterly course. "P" attacked from astern of the convoy with six 250 lb. G.P. bombs from a height of 1,200 ft. The pilot saw the bombs burst and estimates a near miss on the second vessel.

Albacore E/415 on shipping patrol in the Channel in the early morning of December 21, sighted an enemy convoy 6 miles north-west of Calais. This convoy, which was steering a south-westerly course, consisted of six 150 ft. vessels, the first three close together and the second three strung out behind. "E" attacked from ahead releasing six 250 lb. bombs from a height of 900/1,000 ft. and aimed at the centre of the first three vessels. The bombs straddled the targets and a red flash and explosion told of at least one direct hit. The remaining vessels opened up with intense flak but the aircraft was not hit.

The **Wick Beaufighter Wing** again operated against enemy shipping off the Norwegian coast on December 27. The striking force consisted of four Torbeaus of 144 Squadron, each armed with one 18-in. torpedo and four 20-mm. cannon, and five Beaufighters of 404 Squadron (four 20-mm. cannon) as escort and anti-flak force. The enemy convoy was made up of eight vessels, one 6,000-ton 3-island Type M/V, four coastal vessels of 1,500 tons, escorted by one "M" class minesweeper and two escort vessels. The ships were steaming on a southerly course at 5 knots.

The formation made a landfall near Egersund and had deployed for a turn to starboard. Just before turning, the leader saw the convoy to port and gave the order to attack. This sudden sighting upset the original plan, so the four Torbeaus turned in to attack in two waves of two aircraft. Aircraft "J" and "T" attacked the 6,000-ton M/V from fine on the bow at ranges of 1,500 and 800 yards respectively. While making the run in, aircraft "A" was damaged by flak and the torpedo failed to release. Aircraft "M" was blocked by an escort vessel and was forced to attack one of the small 1,500-ton vessels releasing the torpedo at a range of 900 yards. During and after the torpedo attack aircraft "T" and "A" attacked with cannon and scored hits on the largest M/V and an escort vessel. The anti-flak aircraft flew on either side of the Torbeaus, "V" and "R" to port and "N," "B" and "T" to star-

board. "V," "R" and "N" then made a turn to port and attacked a 1,500-ton M/V immediately astern of the main target. "B" and "T" came in from the starboard bow and attacked the two escort vessels immediately in front of the 6,000-ton M/V. All attacks were carried out in dives from 900 feet to close range and cannon strikes were seen all over the targets.

After the attack a spurt of water was seen between the bow and the bridge of the largest M/V and one of the smaller M/Vs was on fire. Later the same day a Mosquito on reconnaissance saw a 6,000-ton M/V listing to starboard. It was steaming towards Egersund, accompanied by a small coaster and an escort vessel. The main target was, therefore, probably damaged.

On December 28 nine **Beaufighters of 404 Squadron** took off from Wick to attack shipping on the Norwegian coast. Seven of the aircraft carried eight 60 lb. H.E. R.P. each and all were armed with four 20-mm. cannon. The force was airborne at 1202 hours and at 1347 a landfall was made at Kraakenes. The formation turned north and flying at a height of 1,500 ft. passed Stadlandet and flew into the entrance of Vanelos Fjord. There they found a stationary destroyer while further in was a 2,000 ton M/V with three escort vessels steaming at 8 knots on a course of 140°. Seven aircraft, six with R.P. and cannon and one with cannon only attacked the 2,000-ton M/V in 20° dives from 800 ft. and at ranges between 700 and 800 yards. One of the leading escort vessels was attacked with R.P. and cannon while the other was strafed with cannon. No R.P. hits were seen owing to the steep angle of dive, the smoke and the columns of water. However, smoke and debris were seen coming from the large vessel and it is claimed that all three escort vessels were damaged.

Lack of room in which to manoeuvre, and flak from the destroyers, shore batteries and escort vessels made this a hazardous attack. Two of our aircraft were damaged but all returned to base.

Fine Co-operation

Anti-shipping operations to the west of the Bay of Biscay on December 27-28, provided us with a pleasant post-Christmas pick-me-up. The destruction of the blockade-runner *Alsterufer* is described on page 12 of this issue, but these attacks were by no means the end of Coastal Command's contribution to the successful operations in this area. The sinking of the *Alsterufer* not only cost the enemy a valuable ship and cargo, but it also directly involved the German Navy in the loss of three of their best destroyers. These vessels had already encountered numerous Coastal aircraft over Christmas and the United States Navy Liberators which kept them company during December 28 played a big part in their eventual destruction by H.M.S. *Glasgow* and *Enterprise*.

These operations were new to most of the crews concerned and aircraft normally engaged in hunting U-Boats changed their function and were given the chance of attacking targets which could

not evade them by disappearing beneath the surface of the sea.

On the morning of the 28th, the first U.S.N. Liberator **V/103**, found a force of four destroyers steaming westwards and shortly afterwards another batch of six also on a westerly course. The aircraft shadowed the forces from first sighting at 0920 hours (when they were approximately 270 miles east of the *Alsterufer's* final plunge) until 1510 hours when it left the scene, having had a grandstand view of the naval action which ensued as the result of its sighting report. Fifteen U.S.N. Liberators, six of which carried out most courageous attacks with bombs from heights of 1,000 ft. or under, were also despatched as a striking force, and twenty-eight Beaufighters provided air cover for the two cruisers which engaged the enemy destroyers. Other aircraft were also diverted from Anti U-Boat patrols to shadow the force, and as a result of all these efforts, three German destroyers were definitely

sunk by the Navy and others were severely mauled before they got away.

The pilots and crews of the attacking Liberators are to be congratulated on their courage in

pressing home the attack to 1,000 ft., which is, to say the least, an unhealthy position over a hostile-minded ship, especially one so well blessed with flak as a modern German destroyer.

Far Eastern Blockade Running

The long expected revival of attempts by Axis ships to evade Allied blockade has begun and, as before, Coastal Command has played its part in the Allied counter-measures.

Early in December, it was noticed that ships which had previously been engaged in this traffic with the Far East had dispersed to ports and anchorages between Brest and Bordeaux. It was believed that all these ships had loaded and it seemed reasonable to assume that a breakout had been planned.

Also, as there have usually been arrivals in the Bay of Biscay simultaneously with departures, it was reasonable to suppose that some homeward ships were also due. The presence in Biscay ports of a strong escort force, consisting of five large and six small destroyers, showed that there would be escorts available for any evaders.

Before the enemy had made any move, other than the dispersal of these ships, Coastal Command had already reduced their number by one. On December 18, the *Pietro Orseolo*, 6344 G.R.T., was torpedoed as she lay at anchor in Concarneau Bay. This ship was the only one of six returning from the East early in 1943 that broke our blockade. She had reached the Gironde in April. Torpedoes are not strangers to her for she had been torpedoed by a U.S. submarine while approaching the Bay of Biscay. She made port, however, and has spent most of the intervening period in Bordeaux. In the attack on December 18, described on page 12 and illustrated on Plate 6 two torpedo hits were scored. Again this lucky ship failed to sink. However, it is safe to assume that the damage will make her projected voyage impossible.

There was no further activity until December 23, when a westbound force of destroyers in the Bay of Biscay, and a suspicious merchant ship of around 6,000 tons sailing independently on an easterly course, still far out in the Atlantic, were seen almost simultaneously. It was soon clear that the destroyer force was on the way to meet the inward bound ship. The two forces were afterwards seen to have merged into one convoy, heading for the west coast of France.

A number of strikes on December 24 and 25 (described on page 11) unfortunately failed to stop the ship, which was later identified as the *Osorno*, 6951 G.R.T. But it is possible that some damage had been inflicted. She was ultimately beached in shallow water off Le Verdon, with lighters alongside which show that the cargo was being unloaded. It is not clear whether this beaching was due to damage from air attack or from mining while she was entering the Gironde.

Just as the *Pietro Orseolo*, inward bound early in 1943, was the only one of six ships to evade our patrols, so was the *Osorno* the only one of three starters that left the Gironde at that time to reach the East.

The next incident was on December 27, when another inward bound ship was sighted far out, at about 20° W. Within a few hours she had been attacked and destroyed by Coastal Command aircraft (see page 12 and Plate 4). She has been identified as the *Alsterufer*, 2,700 tons, the smallest but fastest and most heavily armed of the enemy's fleet of blockade breakers. The violence of the explosion when she was hit by bombs suggests that her W/T must have been made unserviceable. It is probable, therefore, that the enemy remained unaware of her destruction for some time.

There is no other way of explaining why an escort force was despatched presumably to meet the *Alsterufer* and to repeat the successful tactics of December 25. It was this force that was sighted and shadowed on December 28 by U.S.N. Liberators and in due course intercepted by the cruisers *Glasgow* and *Enterprise* that had been disposed to intercept *Alsterufer*. The cruisers intercepted the destroyer force instead and, against heavy odds, sank three of them with almost no damage to themselves. It is apparent therefore that the destruction of the *Alsterufer* freed the cruiser force of their first commitment and contributed to the later success against the enemy destroyers. After this action, during which air cover was provided by the Command, there were strikes by aircraft, but with no evidence of any damage.

Later reconnaissance shows that the expected breakout from the French coast has not so far been made. Nevertheless it would be unwise to assume that it has been cancelled. But the rough handling received by the enemy in the course of these operations will no doubt give the Germans a good excuse for holding up sailings to the East in the meantime and therefore breaking faith with the Japanese.

The enemy has provided us with any further evidence we needed of the value of the cargoes despatched to German Europe from the East (commented on in previous issues of the *Coastal Command Review*). In order to escort *Osorno* and *Alsterufer* through the approaches to the Bay, on each occasion he despatched five large and six small destroyers; a greater force than has been provided for any previous units, thus showing that he appreciates the value of the Allied air and sea forces operating there.

Since the beginning of 1944, another blockade breaker has been sunk, by U.S. naval surface forces in the South Atlantic. She was the Weserland (ex Ermland), 6,528 tons, which was attacked when outward bound by Coastal Command aircraft in August 1942.

A Wing and a Half

At 1935 hours on December 24 **Liberator O/224** took off from a 19 Group Station on an Anti U-Boat patrol. Nothing happened until 0020 hours when a message was received from base ordering them to attack an enemy force. Course was set for the Spanish coast in order to obtain an accurate point of departure, and then the Liberator set course for the enemy ships.

At 0311 hours they arrived at the position and began a square search. Nothing was seen until a contact was obtained to starboard and at the same time a flare was sighted. "O" flew over the enemy at 4,000 ft. and released a 4.5-in. recce. flare in order to illuminate the ships. At the same time another aircraft directly above "O" released a flare which brilliantly illuminated "O" and exposed her to the combined fire of at least six destroyers and one M.V. "O" was doing a steep turn to port and intense flak of all kinds was coming up to meet her. A violent bang was heard somewhere to port and the Liberator fell almost out of control in a steep left hand turn, losing height rapidly. The Captain found that she would not answer to the controls and pushed the throttles right through the gate in an endeavour to bring the port wing up. After several seconds, with the engines running at maximum boost the aircraft was brought on an even keel.

The gunner rushed out of the rear turret and found one of the wireless operators immobile on the floor by the flare-chute. He spoke to him and got no reply. Thinking that there was no time to waste as he had seen a great stream of tangled metal and fabric trailing from the port wing, outboard of No. 1 engine, he rushed through the bomb-bay and told the Captain that half the port wing had gone.

The Captain found that "O" could be flown quite well with full right trim and the control wheel wound over almost one full turn to the right. He therefore flew away a little way and turned back over the enemy. But the aircraft was still losing height and the bombs had to be jettisoned. Course was then set for base and the crew settled down for a long trip in their very badly damaged aircraft. Signals were sent reporting the position of the enemy and at 0615 hours a landfall was made at the Scillies. At 0650 hours on Christmas Day, "O" came in to land at St. Eval, still with the controls wound hard over to the right. By careful use of his engines, the Captain made a perfect night landing and taxied to dispersal.

On inspection it was found that exactly 13 ft. of the port wing had been cut right off, probably by a cable of some sort.

Then and Now

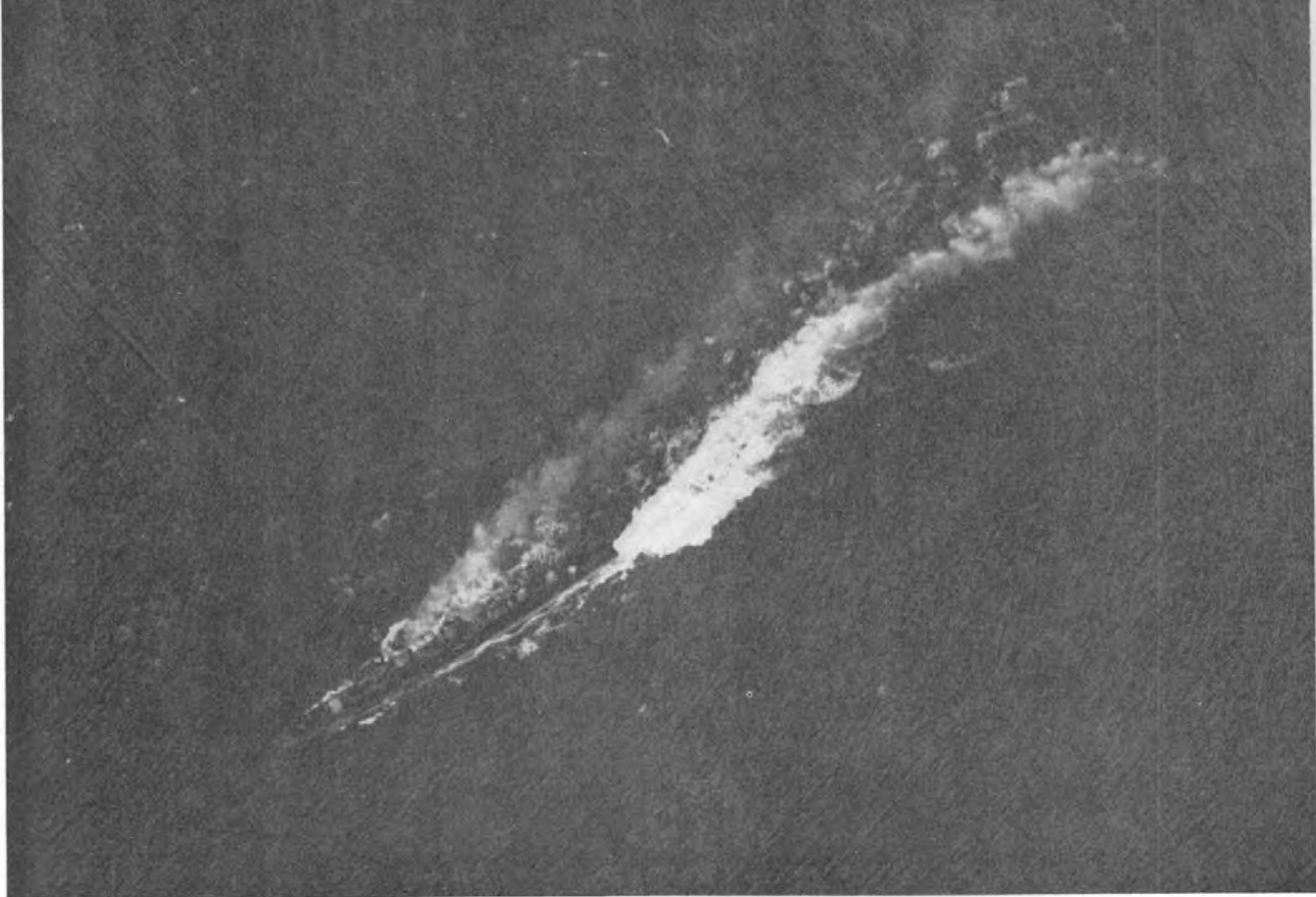
Their want of practice will make them unskilful, and their want of skill, timid. Maritime skill, like skills of other kinds is not cultivated by the way, or at chance times.

Thucydides, 333 B.C.

Courage alone is not enough—in technical warfare of this nature we must also have the best possible weapons and, above all, be so well trained as to be able to use those weapons effectively.

Gen. MacArthur, 1941.

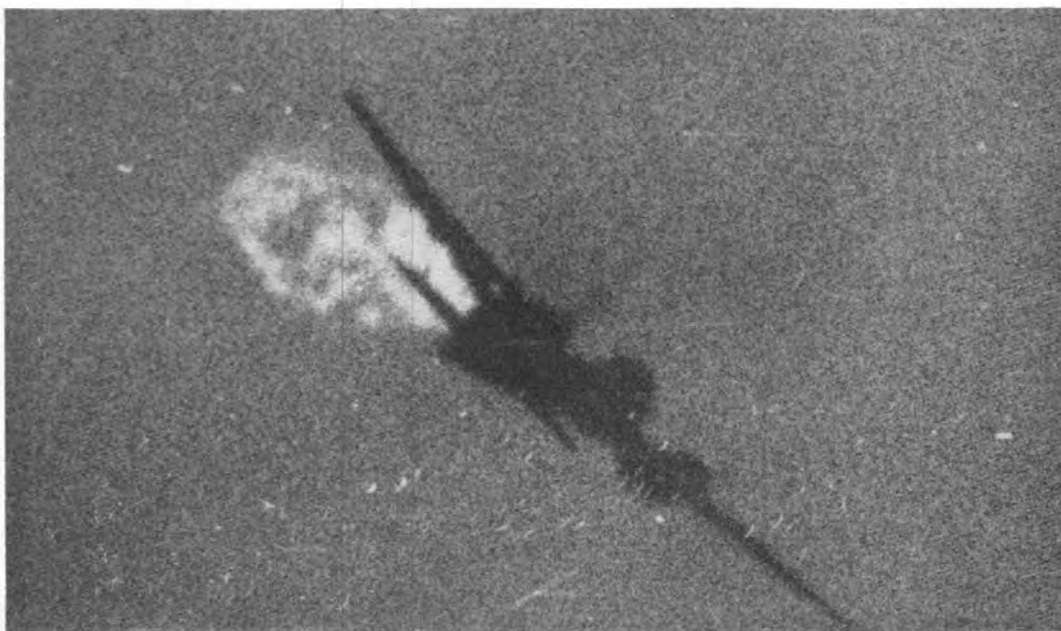
[PLATE 5 opposite



The top photograph, taken by 103 Squadron (U.S.N.), shows one of the German *Seetier* destroyers on the way to meet the incoming *Osorno*. These destroyers displace about 2,400 tons and are armed with five 5.9-in.

Below :—The German blockade runner *Osorno* was the target of a number of attacks on December 24 and 25, but unfortunately she reached the Gironde. Here, however, she seems to have struck a submerged wreck and was beached off Le Verdon. The lower photograph, taken by 544 Squadron, shows, her discharging her cargo into coasters for transport to the shore. The number of auxiliary vessels near her indicate that her cargo must be valuable. In addition to their flak the enemy also had a number of heavy railway guns on the shore.





An enlargement of a camera gun "still" showing the destruction of a Ju. 88 by a Beaufighter of 143 Squadron.



On December 18, Beaufighters of 254 Squadron, escorted by 248 Squadron attacked the *Pietro Orseolo*, 6,344 tons, lying in Concarneau Bay. Two torpedo hits were scored. The ship is seen on fire after the attack. (See letterpress, page 12.)



Landfall at Stadtlandet. Photographed by 144 Squadron.

III.—OTHER OPERATIONAL FLYING

Combats with Enemy Aircraft

On November 9 a Liberator of **110 Squadron (U.S.N.)** on anti-U-Boat patrol was intercepted by an Me.210. The enemy aircraft, flying at 1,500 ft. on a parallel course to the Liberator, made two feints, bringing itself within 600 yards range. The deck turret opened fire and, as the Me. drew ahead, the bow turret was also able to get in a burst. The deck gunner estimated that there were hits on the enemy. When it had reached a position 600 yards away on the Liberator's starboard bow, the Me. peeled off for an attack, but it passed beneath the Liberator at great speed apparently without opening fire. It continued diving until about 200 ft. above the sea when it levelled out and flew away. The Liberator had not jettisoned its depth charges so it resumed patrol.

While on offensive patrol off the Spanish coast on November 20, **G/235** lost the two other Beaufighters with which it had been in formation. A Ju.88, at 3,000 ft., was sighted 3,000 yards away on the port quarter and on a converging course. "G," flying at 1,500 ft., made a climbing turn to port through 180° to engage the enemy which also turned to port, but was unable to bring his guns to bear. The enemy crossed his tail at 150 yards, but the enemy rear gunner did not open fire. Both aircraft then turned to make a head-on attack, but when they were still 1,500 yards apart the Ju. broke away to port. "G" turned to starboard and opened fire, using one and a quarter rings deflection at 300 yards, and closing to 250 yards. Strikes were observed on the port wing root and port motor, which quickly burst into flames. The remainder of the enemy aircraft rapidly became enveloped and it crashed into the sea, a mass of flames and black smoke. There was no return fire from the Ju., nor did it take any evasive action when "G" was astern of it.

On November 20, **Beaufighter A/235** was on offensive patrol off the Spanish coast when it lost formation in cloud. It emerged on a course of 090° at 3,000 ft., and the pilot sighted a Ju.88 about 600 yards away on the port beam, flying on a parallel course and at the same height. The enemy aircraft opened fire with the rear gun and began turning to starboard for an attack. "A" throttled back, did a steep turn to port and attacked from 400 yards, using full deflection and closing to 150 yards astern of the 88 which had turned sharply to port. The pilot got in three short bursts at the Ju., the last one being seen to enter the fuselage. The Ju. immediately caught fire and lost height slowly; "A" followed it down until, at 500 ft., it disintegrated, leaving a patch of burning fuel on the water. The Beaufighter was not hit.

On November 30 a Liberator of **110 Squadron (U.S.N.)** was flying on anti-U-Boat patrol at a height of 2,000 ft. and on course 140°. The rear gunner sighted eight Ju.88's, 1,000 yards away on the starboard quarter, on a parallel course and at

the same height. The pilot immediately increased speed and turned 90° starboard to reach cloud at 3,000 ft. At the same time five of the 88's turned, peeled off singly and attacked from the starboard. Return fire was accurate and tracer was seen to enter three of the Ju.88's. Their fire was low and it burst ahead of the Liberator. On reaching cloud the Liberator altered course a further 90° starboard and broke cover about five minutes later. Here it was attacked by three 88's which had apparently stayed on a course parallel to the one on which the Liberator had entered cloud. Hits were scored on at least one of these aircraft by the port and rear gunners. The pilot then turned port through 180° to regain cloud cover, and entering cloud he made a further turn to port on to 270°. The enemy were not seen again. The Liberator had not jettisoned the depth charges during the action, and continuing on the course of 270° as far as 13° W., was able to resume patrol. Damage was limited to a few small shrapnel holes in the port wing tip.

While **Sunderland L/10** was on anti-U-Boat patrol on November 30, six Ju.88's were sighted on the starboard bow. The enemy aircraft were flying on a course at right angles to that of the Sunderland, and at the same height, 2,500 ft. Two aircraft detached themselves from the formation and crossed "L's" bow at 2,000 yards range. During this time the main body of aircraft turned to port and attacked from the starboard quarter. Three of them broke away early and the fourth closed to 400 yards before following the others below the Sunderland. The starboard galley gunner fired several short bursts at one of the three, and the mid-upper gunner scored many hits on the fourth. "L" had taken no evasive action meanwhile, other than a slight turn to starboard, cloud cover being on the port. All six Ju.88's then formed up in line astern about 2,000 yards away on the port quarter. Two of them began an attack, but one, emitting a lot of smoke, broke off and circled at about 1,500 yards range, while the other pressed home his attack to within 100 yards. This aircraft was hit by fire from three positions on the Sunderland, and it was seen to be smoking from both engines as it passed beneath the tail. Several more short but ineffectual attacks were made at extreme range before "L" gained cloud cover. Two of the Ju.88's were damaged but the Sunderland also suffered badly from machine gun and cannon holes. The captain and two others of the crew suffered leg injuries.

On December 1 **Beaufighter D/235** flying at 4,000 ft., was orbiting a dinghy when the Captain sighted three enemy aircraft at a distance of two miles. They were all heading south towards "D." Two of them, Ju.88's, were at 6,000 feet and the other, an He.111, at 3,000 ft. As the He.111 passed below the Beaufighter pilot, he made a tight turn in an effort to get on its tail. He managed a short burst at 600 yards just before

the He. gained cloud cover. No hits are claimed. The 88's had now begun to dive on "D" and, being at a temporary disadvantage, the pilot sought and gained cloud cover before he could be fired at. When "D" broke the top of the cloud at 4,000 ft., the captain saw one of the Ju.88's at 5,000 ft., about 800 yards ahead. Making use of cloud, "D" closed the range to 300 yards and, pulling up the nose, fired a burst from 800 ft. below. The belly of the 88 was hit and several pieces fell off. The Beaufighter had to break off this attack owing to lack of speed and the enemy got away in cloud. There was a large amount of cloud in the area and none of the enemy was seen again.

Sunderland L/228, while patrolling on December 1, sighted eight Ju.88's, 4-5 miles away on the starboard bow. They were stepped up in line astern and flying on a course at right angles to that of "L." The nearest one, at 1,600 ft., was slightly higher than the Sunderland. The formation at once headed for L/228, the leading aircraft peeled off and attacking on the starboard bow, came in very close before breaking away. While fixing his gun in position the second pilot was hit in the arm, and he had to retire. But the mid-upper and rear gunners got in several bursts at the Ju., and tracer from both these positions was seen to enter the aircraft. At this point "L" was put into a violent diving turn to starboard, causing all the belt feeds in the tail turret to jump off their rollers and putting the four guns temporarily out of action. Also, an attempt was made to get rid of the depth charges. Two of them were jettisoned but the remainder hung up owing to a trolley jamming the bomb doors. The enemy aircraft which had been hit was last seen by the tail gunner, diving almost vertically at the water. Black smoke was pouring from both engines. This disaster appeared to disconcert the other Ju.88's and the second one made only a half-hearted effort, breaking off his attack at 1,000 yards. The rest of the formation then wheeled around to starboard of the Sunderland and formed up as follows:—Two on the starboard bow, two on the starboard beam, two astern and one on the port quarter, the whole lot flying roughly parallel with "L." The single aircraft made a dummy attack, breaking away at 800 yards. At the same time, one of the enemy on the starboard bow joined forces with one on the beam and the two attacked from the starboard bow. They seemed reluctant to get in close and broke away at 1,000 yards, most of their fire bursting short. "L" had not been drawn by the dummy attack and was able to turn in to meet this attack on the bow. Two of the remaining aircraft had come round to the port bow in the meantime and attacked in quick succession, firing from 2,000 yards to 800 yards. The first of them came in close after ceasing to fire and, when at 300 yards range, was fired at by the front gunner. The Sunderland dived steeply to port and as the Ju. passed above, it was hit in the port engine by fire from the nose and mid-upper turrets. The tail gunner had repaired three of his guns and managed to get in a short burst at the enemy aircraft as it broke away. The tail and mid-upper gunners saw this Ju. diving steeply towards the sea with black smoke coming from its port engine. Soon after the mid-upper gunner saw a patch of foam on the sea. The second of the two Ju. 88's, which was

then ahead of "L," fired a short burst but broke away to starboard at 1,000 yards. A few bursts were fired at this aircraft but as it was at extreme range no hits were estimated. The enemy formation was then widely scattered and, before it could be reformed, "L" was able to gain cover in a medium-sized cloud. For about five minutes the crew caught occasional glimpses of the enemy but no further contact was made. It was then possible to release the jammed bomb doors with the aid of a fire axe, and the remaining depth charges were jettisoned. The Sunderland continued to circle in the cloud for an hour and then set course north-west, making use of all available cloud cover.

The action had lasted for half an hour and it is interesting to note that, after the first unsuccessful attack, the only other Ju.88 to press home at all closely was consequently hit. The crew of the Sunderland put up a very fine show and it is disappointing that the two Ju.88's which were almost certainly destroyed, were not seen to crash and can therefore be claimed only as "Probables."

On December 8 while approaching the Norwegian coast **Mosquito R/333** sighted a Ju.88 on a northerly course, about three miles off the coast. The pilot of "R" kept the enemy in sight, and, crossing the coast, he carried out his shipping reconnaissance before increasing speed to overhaul the 88. Closing to 500 yards astern, "R" gave two short bursts, scoring hits on the starboard side of the Ju.88 which began giving off clouds of black smoke. Return fire, including greenish tracer, was fairly heavy and the enemy continued firing after the Mosquito's guns had stopped. Both aircraft were taking evasive action and "R" broke away to port after its guns ceased firing. The Ju.88 turned towards the coast and, leaving a dense trail of smoke, appeared to be losing height as it made for the nearest islands. Owing to the mountainous nature of the country in that part, it is extremely unlikely that the Ju. was able to make a successful forced landing.

On December 10 **Beaufighters W and Z/404** were orbiting an M.T.B. in position 61° 10' N., 02° 42' E. A Ju.188 entered the circuit and was immediately chased by "Z," who warned "W" on R/T of the enemy's presence. The Ju. turned into sun and "Z" lost sight of it. Meanwhile "W" made a steep turn and closed to 500 yards astern of the enemy, who turned steeply into the attack. "W" was able to get on his tail again and fired five short bursts from 400-500 yards; tracer were seen to enter the cockpit. The enemy aircraft took violent corkscrew evasive action, and headed for cloud at 1,000 feet. "Z" sighted the Ju. again while it was being attacked by "W," and fired several short bursts from extreme range, but no hits were scored. The enemy was last seen entering cloud with a thin trail of black smoke coming from the port engine. Up to the time when the enemy's cockpit was hit, return fire was experienced from the cockpit rear gun. Neither of the Beaufighters was damaged, and the Ju.188 was prevented from attacking the M.T.B.

Mosquito O/333 was flying in the direction of the Norwegian coast on December 10 when it sighted a Ju.88 two miles away on the starboard bow. The enemy, which had been heading in a

north-westerly direction, turned due north as "O" closed in and fired a burst from 600 yards dead astern. This caused smoke to come from the starboard engine of the 88 which then turned towards the coast and fired a red cartridge. The Mosquito carried out another attack from astern, this time closing to 300 yards. The Ju.'s starboard engine burst into flames which spread to the fuselage. The aircraft crashed into the sea about 15 miles off the coast. The M.G. fire returned from the 88 made only one hole in the Mosquito. The Navigator took some good photographs confirming the destruction of the enemy. After the combat the pilot carried out his shipping reconnaissance as originally briefed.

On December 12 **Beafighters G, P, N, D, T, A/143** were on offensive patrol in the Bay of Biscay. While heading north they were attacked from astern by five Ju.88s out of sun. "G," the leader, received V.H.F. warning of the presence of bandits at 7 o'clock, and saw "T" on his port quarter being attacked by two 88s. He turned steeply to port to make straight for the enemy and, despite evasive action, got on the tail of one of them. Closing to less than 200 yards he fired a burst and saw the port engine blow up. As "G" broke below the Ju., "P" dived on its tail and from 200 yards scored hits on fuselage and starboard engine; the enemy aircraft crashed into the sea. Meanwhile, "G" had sighted another Ju.88 in combat with a Beafighter and dived to attack, but was unable to fire while they were all milling around. The enemy broke away and climbed steeply, followed by "G" who fired a burst from 200 yards; flashes came from the Ju.'s cockpit and it rolled over and went into a steep dive. "G" also rolled over and, diving vertically, got in another burst at the 88 which hit the sea and disintegrated. After this the Beafighter climbed to 3,000 feet where it was attacked by another enemy aircraft. During the combat which followed a big piece fell off the Ju. The Beafighter's navigator fired several bursts with his rear gun and claims hits on the enemy's port wing root. Although "G" was undamaged, ammunition was now exhausted and the captain broke away on a northerly course; the 88 was last seen heading east and losing height.

After his first attack "P" saw a Ju.88 cross his bows about half-a-mile away. It was being pursued by a Beafighter, which in turn had another 88 on its tail. "P" engaged the second Ju. and in the ensuing combat scored numerous hits on the enemy fuselage and cockpit; the starboard engine was also hit, and the Ju. dived into the sea. Having expended all his ammunition "P" set course for base.

The pilot of Beafighter "N" fired at a Ju.88 which crossed his sights, but claims no hits; he was fired at by another Ju. but not hit. The observer saw a Beafighter's tail unit sticking out of the water. "D" was hit in the top of the cockpit by fire from an aircraft which the crew did not see; the Beafighter was only slightly damaged.

Although surprised by the Ju.88s, the Beafighters gave a good account of themselves. They destroyed three enemy aircraft and damaged a fourth. Two Beafighters, "T" and "A," failed to return.

On December 14 **Beafighters O and S/144** were on Rover patrol along the Norwegian coast when

a Do.24 was sighted two miles away and approaching from the opposite direction. "O" turned sharply and climbed to intercept the enemy about 200 ft. above. Two bursts of cannon were fired causing smoke and flame to issue from the Dornier's port motor. "S" followed in after this attack and scored hits on the port engine and wing of the Do. which crashed into the sea. No survivors were seen. During the combat the Do.24 took no evasive action and fired only a 4-star red cartridge. The Beafighters retained their torpedoes throughout the action.

On December 16 **Mosquito O/833**, while flying near the Norwegian coast on a southerly course, sighted two F.W.190s about 1,500 yards ahead and slightly to port. The enemy aircraft were heading east when sighted, but turned south in front of "O" and climbed to about 1,000 feet. "O" stayed at sea level until 880 yards astern of the nearer F.W. and then climbed above the enemy's slipstream and closed to 300-400 yards, where the pilot fired a burst with all four cannon. An explosion was seen in the front of the aircraft and pieces flew off in all directions; the damaged aircraft rolled over on its back and dived spirally into the sea. No avoiding action was taken by the F.W., which seems to have been completely surprised. The other F.W.190 continued steadily on its course and was chased by "O." The Mosquito pilot, however, finding that his gunsight had become unserviceable, broke off and turned out to sea.

While escorting a convoy on November 19 **Fortress S/220** was informed on R/T by the S.N.O. of the presence of a bandit. Flying on a course of 180° T, for the sector indicated, the Fortress emerged from a bank of cloud at 2,400 ft. and the second pilot saw an aircraft heading north at 1,600 ft., 2-3 miles away on the starboard bow. "S" immediately turned right to intercept and when about 1,200 yards away the captain decided that the aircraft was not friendly. He thought it to be a Ju.290. The enemy made a slight turn to port and climbed rapidly for cloud cover. Fire was opened from the upper turret and nose gun of the Fortress and hits were registered on the after part of the enemy's fuselage. A short burst of tracer was returned from the enemy but it did no damage. When "S" was within 250 yards, the supposed Ju.290 disappeared in cloud and was not seen again.

On December 24 **Beafighters N, Q, M, and V/143** were flying at 1,000 ft. on offensive patrol in the Bay of Biscay. Two He.177s in tight formation at sea level were sighted about 1,000 yards to port. The Beafighters immediately turned to attack. "N" went in first and closed to 200 yards, but was hit by return fire and blew up in mid-air. "Q" followed in and fired three bursts at the port He. but saw no hits; he then turned to attack again but, finding his guns had failed, broke away. "M" made four attacks on the starboard aircraft, but without result. The pilot then saw smoke coming from the port engine of the other He. so decided to attack it; he fired six bursts and broke away, having run out of ammunition. Meanwhile "V" had climbed 4,000 ft. into sun and made three diving attacks on the port aircraft; the enemy pilot attempted to reach cloud but his starboard engine burst into flames and the aircraft crashed into the sea.

The other He.177 broke away at right angles to the original track and disappeared. Throughout the action the enemy aircraft stayed close together and made no attempt at evasion.

On December 27 **Beaufighter M/144**, after carrying out a torpedo attack sighted a B.V.138 1½ miles away on the starboard bow. The B.V. was about 600 feet above, so "M" made a climbing turn to starboard to attack. The pilot opened fire from 300 yards on the enemy's port beam and closed to 150 yards. Hits were seen on the port

engine and centre nacelle. The centre engine caught fire and pieces fell off and a green flash followed by a red flame was seen in the cabin. The enemy aircraft made a gentle diving turn towards the sea, levelled off high, then struck the water and cartwheeled on to its back. During the combat a short inaccurate burst of machine gun fire came from the enemy's rear cockpit, but did no damage. Photographs taken by the observer in "M" show the B.V.138 burning on the water.

Photographic Reconnaissance during 1943

The year 1943 has seen considerable advance in the range and scope of Photographic Reconnaissance. This has been primarily achieved by the acquisition of new bases abroad and by the re-equipment of the Spitfire Squadrons with the Mark XI Type and the Mosquito Squadrons with the Mark IX Type. The first sorties with these new aircraft were flown towards the end of December, 1942.

The new Spitfire's speed at height is so much greater than that of the Mark V that tactics have been altered to make full use of its improved performance. Formerly it had been usual to fly just beneath the trail level, but only up to the aircraft's most efficient and economical height. In the summer, when there were either no trails at all or the trail level was very high, it became advantageous to fly at an increasingly greater height than before, and it was soon appreciated that the higher this new type flew, the greater was its superiority over the F.W.190 and Me.109G. In the spring of this year when the trail level was low, it was decided to experiment by flying at maximum height and disregarding trails, so as to make full use of the high altitude performance. Unless the pilot was able to get out of trails at this height his track was of course obvious to the enemy, but these tactics had the advantage that any enemy aircraft climbing to intercept would have to pass through anything up to 15,000 feet of trails to gain the same height—it being clearly impossible for the enemy aircraft to climb and at the same time overtake and intercept the Spitfire. Since using these methods, which sometimes mean flying as high as 42,000 feet, interceptions have been few, but just lately enemy aircraft have been met even at these extreme heights. The control of aircraft at this height is so difficult that it would be no easy matter for the enemy to make a successful interception. One of the greatest difficulties is the complete freezing up, under certain conditions, of the cockpit hood, so that if the enemy has overcome this difficulty he might be in a position to jump one of our aircraft. It should be mentioned that P.R. Spitfires and Mosquitoes have no pressure cabin and that some pilots find it a considerable physical strain to fly for long distances at these heights, whereas they had no trouble flying up to 35,000 feet.

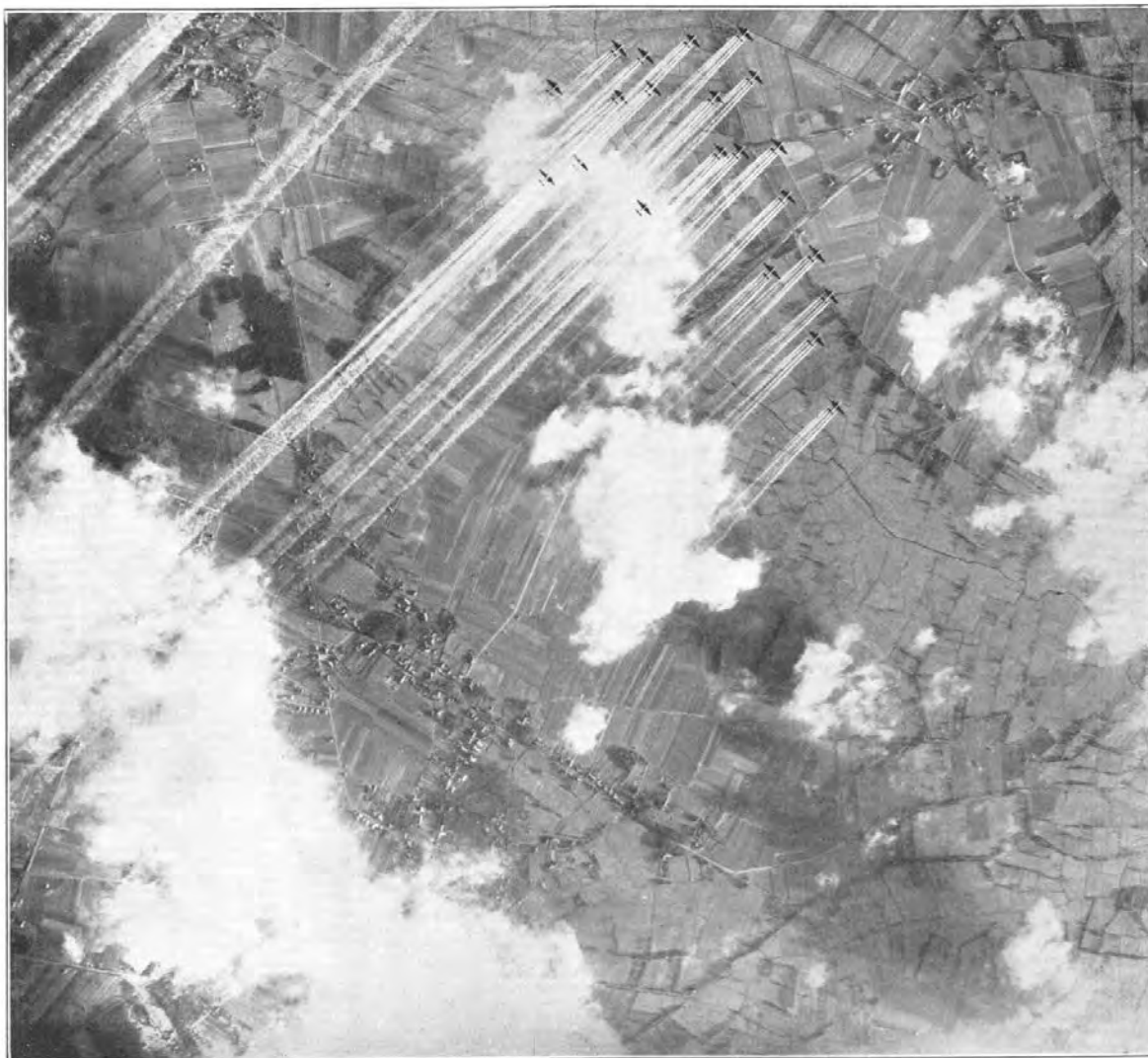
During the past year the range of operations has been considerably increased by the acquisition of new bases abroad. There have been several long Mosquito sorties covering targets as far away as Narvik, Gdynia, Berlin, Gleiwitz, Vienna, Belgrade and Budapest. Many of these have

taken off from this country and used airfields in Southern Italy, Sicily, Malta, Tunis, Algiers and Gibraltar at which to refuel before returning home. In addition to the sorties flown from home bases, special work has also been carried out by detached P.R. flights in Russia, Gibraltar and the Azores.

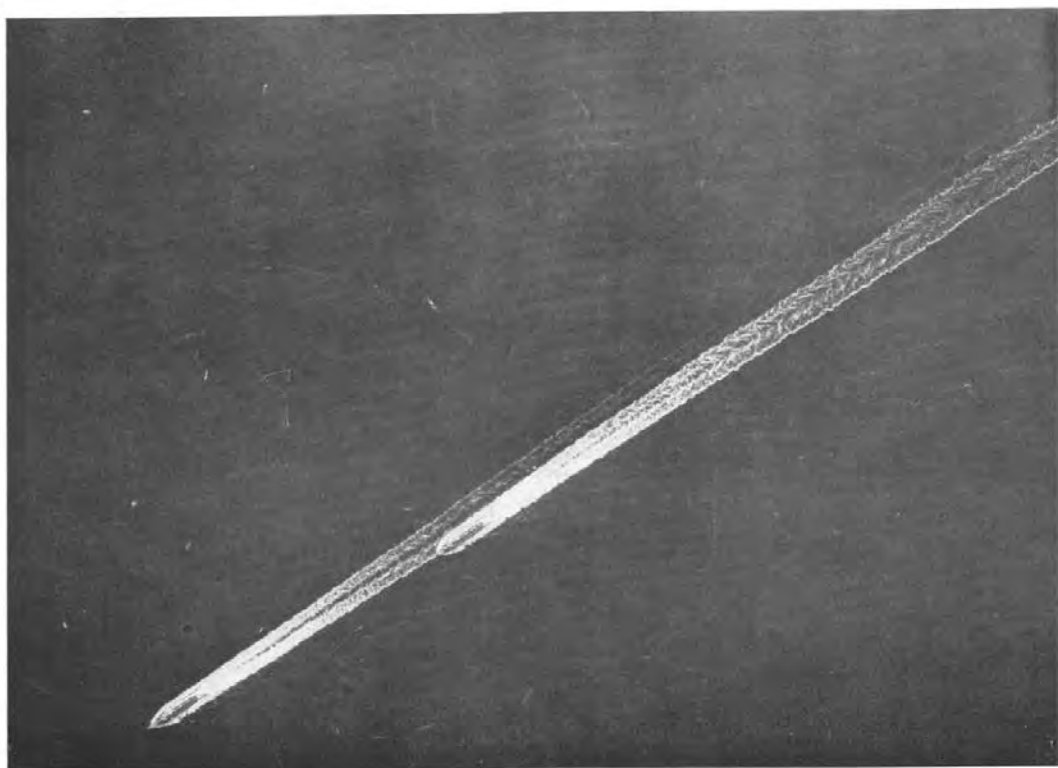
From the camera point of view the greatest advance was the successful installation in the Spitfire Mark XI of split cameras with long focal length. Formerly, in the old marks it was only possible to install a single vertical long focal length camera suitable for assessing bomb damage. Owing to the large scale needed for this type of work, the area covered was relatively small. Over large and particularly hostile areas such as the Ruhr and Berlin, it was often impossible for the desired area to be covered in one sortie. On one occasion a Spitfire pilot made 12 runs over Berlin and stayed over the target for nearly three-quarters of an hour. But since the large-scale bombing of the German capital, more attention is paid even to a single aircraft flying above it, so that now it would hardly be possible to stay as long as this. The successful installation of the split cameras has almost doubled the area covered and thereby halved the number of runs necessary to cover the target.

The main opposition to P.R. is interception, although it has been found that flak can be very accurate even at extreme heights. Normally it takes some time before the direction and height of the flak become accurate and by this time the target is usually successfully photographed. However, there have been occasions where the speed and accuracy with which the flak starts up succeeds in preventing the target being completely covered. Nevertheless, the main worry to any P.R. pilot is that of interception and with the enormous increase both in British and American day activity over enemy territory, particularly at great height, many more enemy fighters are encountered than formerly. On active days when there is practically continuous bomber, fighter and fighter-bomber activity from this country, it is virtually impossible to route all photographic sorties to avoid contact with these operations.

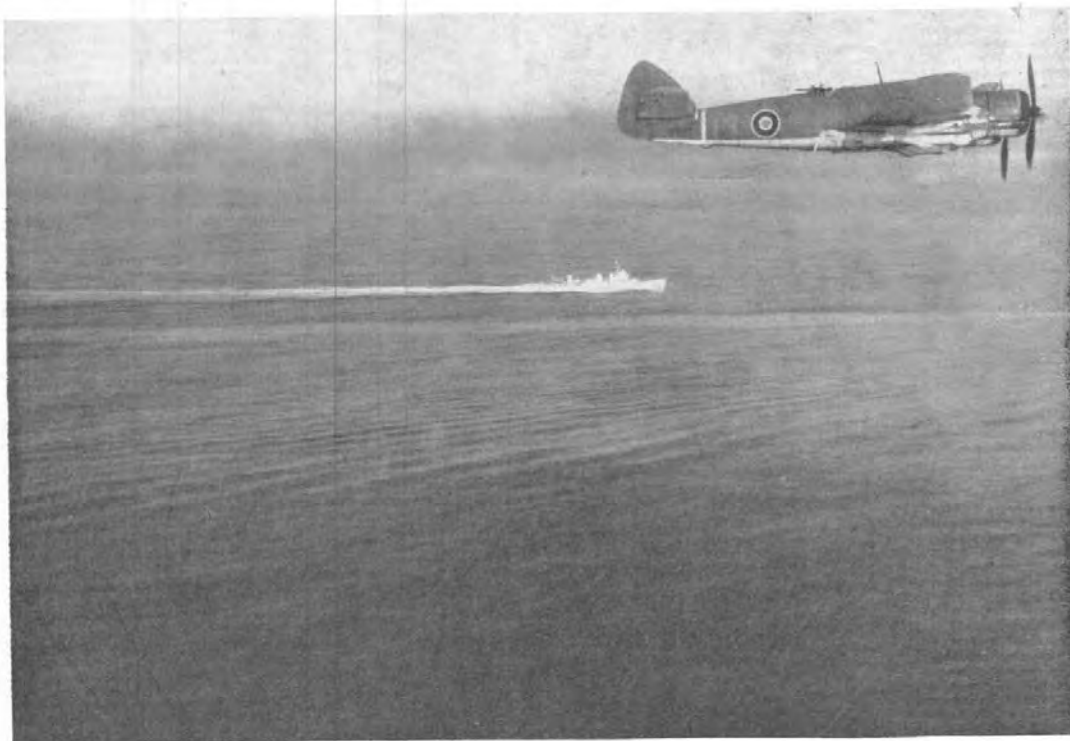
The demands for photography have increased both in number and diversity. Damage assessment photography for the mounting bomber offensive, both day and night, has become an ever growing part of the total work. In the case of very large targets such as Berlin it is most important for Bomber Command to know exactly what areas can be considered devastated in order



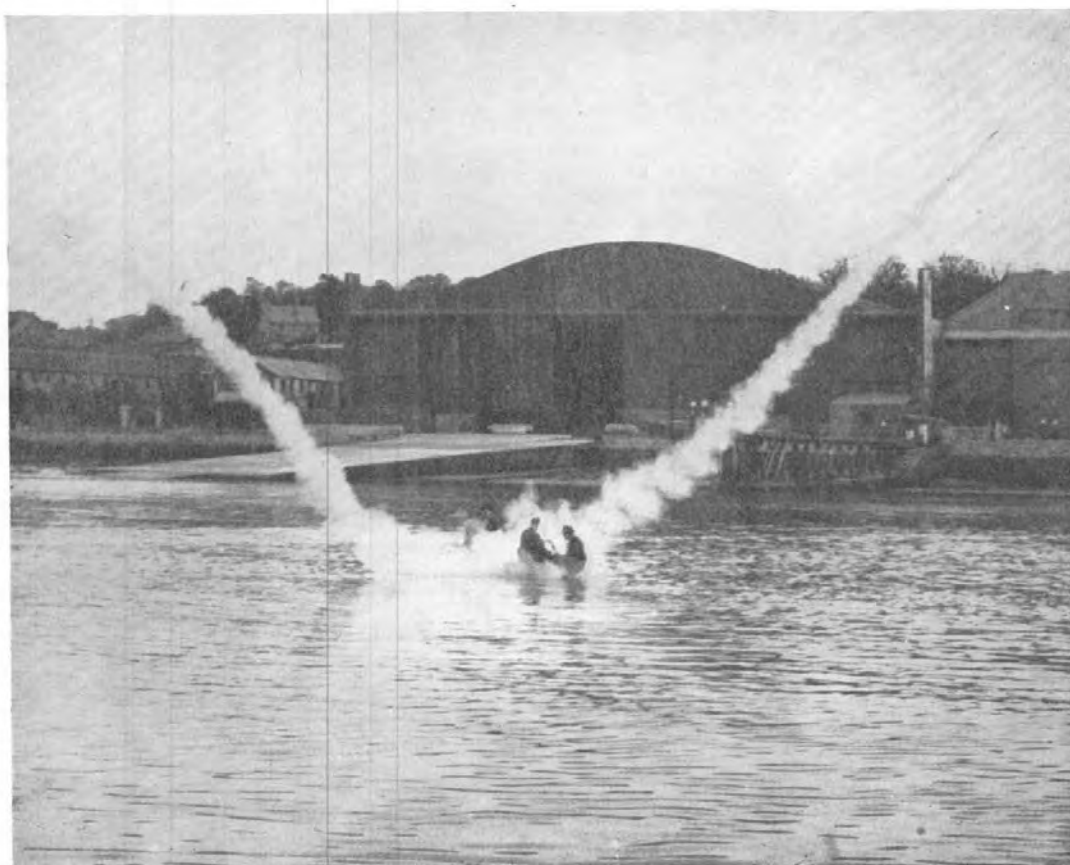
U.S.A.A.F. Fortresses over Germany, photographed by 541 Squadron.



German torpedo boats of the T.1-20 Class proceeding at estimated speed of 20 knots, photographed in the Baltic by 540 Squadron.



A Beaufighter of 143 Squadron escorting H.M.S. *Enterprise*.



An experiment in connection with the airborne lifeboat: 175 yards of orange-coloured buoyant line being fired out on either side of the boat by rockets, directly the lifeboat touches the water. The lines are operated by an immersion switch.

to avoid wasting good bombs where no more are needed. As well as assessing the damage after a raid, much new target data has been required, particularly for the long distance Fortress raids such as those on Gdynia, Marienburg, Anklam, Regensburg, and the other industrial plants in Germany and occupied territory. The need for good target maps covering a considerable area around a target has increased lately owing to the speed with which the enemy start up their smoke screens. If the target itself is completely obliterated it is only by the use of target photographs covering a considerable area from the target that an accurate run up can be made.

In addition to this work for the Allied Bomber Commands, routine photographic reconnaissance is made of all the Continental ports from Bordeaux to Gdynia and of the Norwegian ports as far north as Narvik. These are done at various intervals according to their importance, so that a systematic check can be kept on enemy shipping activity. Similar routine reconnaissance is made of a very great number of enemy airfields so that any major movement of the G.A.F. will be quickly noted. Regular cover is also obtained of all the larger aircraft factories, all types of industrial plants and shipbuilding yards. This has enabled us to make accurate estimates of the type of work done and the output. 106 Wing deal with innumerable other photographic demands such as enemy R.D.F. installations, flak positions, inland barge-building yards, military encampments, tank testing areas, canals, railways and marshalling yards.

No type of flying is so dependent on weather as P.R. work. Berlin is an example of the difficulty of obtaining photographs of distant targets in winter, for it was only after 35 sorties had been flown to the city that any photographs of the recent heavy raids were obtained. The majority of these sorties reached the target area only to find it covered with cloud.

P.R. is not only limited to day work. Much research in night photography has been done during the last year and several successful sorties flown. There has been an undoubted advance in technique and this has, to a great extent, been brought about by the use of a larger and improved

type of American flash bomb. In this type of photography a single exposure is taken with each bomb dropped, so that it is only by accurate timing of the dropping of the bombs that satisfactory stereoscopic pairs of photographs can be obtained. Normally, about six of these bombs are carried. The shutter mechanism of the camera is actuated on the burst of the flash by the use of a photo-electric cell. Many experiments have been carried out to find the correct height in relation to the height of the aircraft at which the bomb is timed to burst. The main advantage of this American bomb is that night photographs can now be taken at a considerably greater height than formerly, it now being possible to get good photographs from as high as 23,000 ft. Several good photographs of ports have been taken, but the greatest skill and experience is needed to navigate and site the camera correctly since only single exposures are taken. The recent installation of certain navigational aids has greatly helped to overcome this difficulty.

As well as operating all these sorties, 106 Wing has the task of installing cameras and modifying and despatching all P.R. aircraft for use in any part of the world. During 1943, pilots of this wing have flown 47 Spitfires and 27 Mosquitoes to the Mediterranean theatre, and 29 Spitfires and 17 Mosquitoes to India.

In July of this year the wing took over the administration and running of No. 8 O.T.U., which deals entirely with the training of Mosquito and Spitfire P.R. and Met. Flight pilots. This has eliminated much of the rather unnecessary training which pilots for this type of work received in the past and given them the specialized training they need. Practically all the instructors are P.R. pilots who have done one or more tour of operations.

To give some idea of the amount of work done, the following figures are of interest. During the year some 2,989 sorties have been flown in all, from Benson and the detached Flights, and of these, 2,252 have obtained photographs. These sorties have involved processing 467,042 negatives and 1,392,756 prints. On one occasion at Benson alone, 5,937 negatives and 18,979 prints were dealt with in a single day.

P.R. Sorties during December

[The following selection of reports of photographic reconnaissance were written by members of the aircrews concerned.]

541 SQUADRON (SPITFIRE)

On the morning of December 20 I was briefed to do a D/A sortie of the docks and town of Hamburg and to return via Bremen because Fortresses of the American Air Force were to bomb it at about 1130 hours. At 1100 hours I took off from the forward base and climbed to 38,000 ft. over the North Sea where there was 5/10ths cirrus at 25,000 ft. Twenty miles west of the enemy coast there was 6-7/10ths strato-cum.

(CS1101)

At 1130 hours I crossed the coast at The Hague where the visibility was good with 3/10ths strato-cum. Shortly after crossing in I saw long persistent contrails north of my track. Later I found that they were made by Fortresses and Lightnings which were part of the force going to Bremen. As I was travelling much faster and well above the bombers I continued on track, switched on my cameras and photographed the formations

D

as I passed. Bremen was only a short distance away when I saw two formations going in to bomb their target. Above the leading formation I saw three single-engined enemy aircraft diving to the attack, but as the Fortresses were close together their concentrated fire power was much greater than that of the fighters which broke away. Thinking that I might get photographs of the bombers letting go their load I turned towards Bremen with my cameras on. There were then at least 100 aircraft over the target which was also covered by flak bursts. The smoke screen on the west side of the town was in operation, but it

did not seem to worry the bombers at all. After finishing my run I altered course for my primary target, Hamburg, but this was unfortunately covered by cloud. As I approached Bremen on the return journey there was smoke billowing up to 15,000 ft. Then I knew that the Americans had not wasted their time since I had left. There were no aircraft over Bremen by this time so I did two runs, feeling much more comfortable than the first time. At 1235 hours I set course for base, landing at 1345 hours after the most interesting operation I have ever done.

541 SQUADRON (SPITFIRE)

I took off from Bradwell Bay on December 20 at 0945 hours for a D/A of Berlin. I was not given any promises by the Met., but I was told that I might see the city. As this had been the regular story for weeks before, I was not very hopeful of getting the long-awaited photographs. On climbing up I found trails very low, so I climbed to 40,000 ft., where I was making no trail at all. Cloud obscured the Dutch coast and the first pin-point I made was the centre of the Ruhr, about 50 miles off track. When I was near Hanover two trails crossed my path, but as I was making no trail the enemy did not see me until they had done a very wide turn and I lost them almost immediately. I realised when I got nearer the city that I might after all have a chance of seeing Berlin, but near Magdeburg the haze thickened and I had great difficulty in map-reading through 3/10th cloud. Just before reaching the city I had a sharp attack of "bends" in my left arm and leg, but emergency oxygen and descent to 38,000 ft. alleviated this a little. I pin-pointed the western lakes and to my great disappointment a big slab of strato-cum. covered the main part of the city, the thick haze making its boundaries very difficult to determine. Anyway, I made two runs over what I thought were the main western factories of the city. As I was turning off my cameras I saw an enemy aircraft in trails about 2,000 ft. below me. It was fortunate for me that I saw him then for I had not enough petrol to increase speed. I came down to 36,000 ft. to get away from him and also to

get rid of my "bends," which were getting quite severe. I was now making a slight trail, but the increased speed from the descent enabled me to lose the enemy and also another which was approaching from the north-west.

I continued unmolested at 36,000 ft. until I saw an immense umbrella of flak on the horizon ahead and slightly to starboard. It was fully five minutes before I realised from the many trails and aircraft that the Fortresses were bombing. Soon I knew it was Bremen and I got near enough to see immense black smoke clouds billowing upwards. An instinct of self-preservation and the proximity of the action prompted me to alter course to the south. I had just done so when two trails appeared ahead in the direction of my original course. I had no option but to climb and increase the revs., but I could only afford 2,650. To my relief the enemy turned off towards Bremen after a very short while. By this time I could see the Forts going in to bomb and a couple of black smoke spirals, which I presumed were doomed F.W.190s. Again two F.W.s came towards me but as they were down sun and I was again making no trails, they had difficulty in seeing me and I drew away again. I had to alter course again and when over the Zuyder Zee two more aircraft appeared making trails about 1,000 ft. to 2,000 ft. below me. My fuel was low so I had to descend to increase speed and after crossing the Dutch coast they fell away. I landed with just enough fuel to take me to the Watch Office.

544 SQUADRON (MOSQUITO)

We were briefed at 1000 hours on December 16 to carry out a photographic reconnaissance of targets in the Trento, Lake Constance and Stuttgart areas and we took off at 1120 hours. We went into cloud at about 500 ft. and came out above 10/10ths stratus at 4,500 ft. We set course and climbed to the condensation trail level, which was 27,500 ft. We crossed out at Beachy Head above 10/10ths, but fortunately the cloud ceased in mid-channel and we were able to pin-point ourselves at Le Touquet whence we set course for Trento. The French countryside seemed to be covered with either a very heavy frost or a light fall of snow, though the towns and railways stood out well and we had no difficulty in map reading. We were keeping a very sharp look-out for enemy fighters as we heard another

member of our Squadron, who was about 30 miles to the south, being warned on the V.H.F. of bandits in his vicinity. Fortunately we saw nothing of the reception committee and flew on until shortly after Chalons, where we again crossed over 10/10ths strato-cumulus. This persisted until broken by the tops of the Alps and the navigator got a pin-point on the Rhine valley, which, although covered by 10/10ths, was clearly outlined by cloud formations. We passed just north of Basle and the contrail height started to decrease until we were forced to fly at 22,000 ft. The weather cleared as we crossed the Alps and we approached Trento from the south-west at 1350 hours. As we were so low we kept a very sharp look-out and started our run at 1355 hours. We first got a line overlap along the valley up to

Bolzano, turned and covered another pin-point in a valley about 30 miles south-east of Bolzano and then returned to Trento to take the town and aerodrome, where aircraft could be plainly seen on the ground. We then set course for Lake Constance and Stuttgart, but unfortunately 10/10ths prevented us from obtaining any results and we set course for Beachy Head.

Half-way across France the weather cleared and I opened up to 400 m.p.h. to give us a fair margin of safety. The contrail level had gone up to 26,000 ft. and the navigator put away his maps and knelt on the seat to look out for enemy fighters. Apart from the fact that once or twice the high cirrus looked very much like fighter contrails, the journey to the French coast was uneventful and as we crossed out at Le Treport I began to reduce height and contacted Tangmere on V.H.F.

Half-way across the Channel 10/10ths stratus appeared but it did not worry us as the V.H.F. and W/T were working satisfactorily. We crossed in at 10,000 ft., and made contact with our own V.H.F. control. We lost height to the cloud top, which was 2,500 ft., and continued on course. I had obtained one V.H.F. vector when the V.H.F. was suddenly blotted out by a Lorenz Beam; but as we were in brilliant sunshine with blue sky and were not aware of surface conditions, we were quite happy. I turned off the V.H.F. as it was quite useless and my navigator got several Q.D.M.s with Q.F.E. and Q.B.B. At 1540 hours we got "Motors Over" and I turned on to a known safe course and started to let down. Our height was then 2,500 ft. As we were descending the navigator was calling "1,500, 1,000, 900, 800, 700, 600, 500, I can see the ground," which was just about all he could see and that must have been almost vertically downwards. A series of

Q.D.M.s then came through and we tried to reach base. Visibility was about 300 yards and I went down to 400 ft. to keep the ground in view. The windscreen had frosted and become blurred and forward visibility was almost nil. The navigator was leaning forward with his head out of the blister trying to spot the aerodrome and at the same time working the W/T set with his left hand. After being given "Motors Over" we received a plain language message to climb immediately. This was in order to avoid high ground south-east of the airfield. So we went up again into the sunshine and clear weather, getting more Q.D.M.s. to bring us back over base. Down again to 500 ft., this time obtaining Q.D.R.s out, and when we were at 400 ft. we received a whole string of Q.D.M.s back to base, but we missed the aerodrome again. We did see an outcircle light flash by, but this gave us no indication as to the direction of the airfield. By this time petrol was getting very low and I decided that I could make only one more attempt before climbing up and baling out. We must have been passing each time within a quarter of a mile of base and it was getting very thick. As a last resort we turned on the V.H.F. and to our great relief the jamming Lorenz Beam was switched off and Flying Control contacted. The whole procedure was repeated on V.H.F. and on our second ZZ we sighted the sodium flare-path from 300 ft., though it vanished again almost immediately. A rate 1 turn brought us back on to the runway and as the fuel shortage was now acute I aligned my gyro, did a rate 1 turn on to the Q.D.R. of the runway, put the wheels down and after one minute another rate 1 turn brought us within sight of the sodium flares and we were able to make an eggshell touch down. We taxied in, greatly relieved, and as we got out of the aircraft we decided that it would be impossible to get a better Turkish bath.

Air Sea Rescue during 1943

The February number of the *Review* (No. 10) contained a history of the Air Sea Rescue Service and illustrations of the trials of the airborne lifeboat. Since then much water has flowed and many more ditchings have occurred.

The airborne lifeboat has been successfully operated on numerous occasions and has been responsible for the saving of 45 lives. The most spectacular rescue was of the crew of a Wellington which ditched almost in the mouth of the Seine. (See page 25.)

Experiments with the airborne lifeboat are being carried out continuously and different numbers and sizes of parachutes are being tried to reduce the force with which the boat alights on the water. It is hoped to introduce the Mark II boat into service very soon. This is a much larger and faster craft than the original. During the past three months, one of these boats, complete with an operational Air Sea Rescue crew, has been touring R.A.F. Stations. The demonstrations have been watched with enthusiasm. Aircrews must become as familiar as possible with this craft. It is being produced in increasing numbers and will soon be available in most theatres of war where Allied aircraft are operating. Application should be made for Air Diagrams 3983, Nos. 1, 2, 3 and 4, which give full details.

A school of Air Sea Rescue has been formed at Blackpool where practical demonstrations of Air Sea Rescue procedure and equipment are given during the course which lasts a fortnight. These demonstrations include the operation of the airborne lifeboat.

An important aid in finding distressed aircrews is a Radar oscillator known as *Walter* which will be carried by every R.A.F. aircraft flying over the sea. If kept switched on this oscillator has an endurance of 23 hours. If it is used as instructed it will last much longer. Its use in the Service should cut down the number of aircraft required for any particular search. Larger areas may thus be covered with fewer aircraft. Its range is approximately 15 miles at 2,000 ft. and the great advantage is that its indication cannot be confused with anything else on the Radar screen.

High speed launches are constantly being improved both as to comfort and communications. The latest addition is the 73 ft. Vosper, powered by two 700 h.p. Thorneycroft engines and two V.8 Fords for cruising. Although slower than some of its predecessors this craft is more seaworthy and comfortable and it is equipped with a much improved sick bay. While on the subject of high speed launches and other Air Sea Rescue surface craft a word should be said of their crews.

On many occasions their task is long and arduous. Searches are often made after the launch has been tossed about at a rendezvous position for hours in high seas and in darkness. Although there may be no result, the crew remain as keen as ever.

By the end of 1942, Coastal Command were responsible for 125 Air Sea Rescue surface craft operated from 43 Air Sea Rescue units. At the end of 1943, the figure had risen to 175 craft, operated from 52 units. The biggest increase is in high speed launches which have increased from 51 to 114.

Other aids for ditched crews have been added to the Service or are being developed. These include the sea water conversion unit mentioned in the February number of the *Review*. This is now being manufactured in quantities and will soon be replacing most of the tins of water carried at present. Fishing tackle is being provided in all emergency packs, together with a new type of Mae West which is less cumbersome and much more buoyant. Another Mae West with back pack designed for use in conjunction with the "K" type single-seater dinghy will soon be in its final trials. A light waterproof suit has also passed its preliminary trials. New emergency packs containing all the latest improvements and more buoyant than their predecessors are being introduced.

It is distressing to note that the dinghy radio, so successful with ditched crews of the U.S.A.A.F., has not yet proved its worth to us. Coastal Command aircraft carry the American model, the importance of which cannot be too strongly stressed, and it is vital that this radio, together with its aerial kites, should be taken aboard the dinghy.

It is disquieting to find that members of crews are sometimes lost in the dark after a successful ditching because they could not be seen by those already in the dinghy. The special floating torch, of which there is an abundant supply, should always be carried.

A synchrophone is now being produced to assist synthetic training. It shows a standard ditching procedure and is adaptable to nearly every type of aircraft. This will soon be available for general distribution and it is hoped that in conjunction with the airborne lifeboat film this will be used by aircrews of all Commands. It is up to crews to do all they can to ensure that, should they have to ditch, they will be thoroughly prepared to carry out their part of the contract

and thereby help all those who will try to rescue them. No saying is more applicable to the Air Sea Rescue Service than "The Lord helps those who help themselves."

Pigeons have been abandoned for Air Sea Rescue purposes in Home Waters so that it is increasingly important to study the use of the dinghy radio and of *Walter*. Both or either of these will home air or surface craft to your assistance if they are operated as instructed.

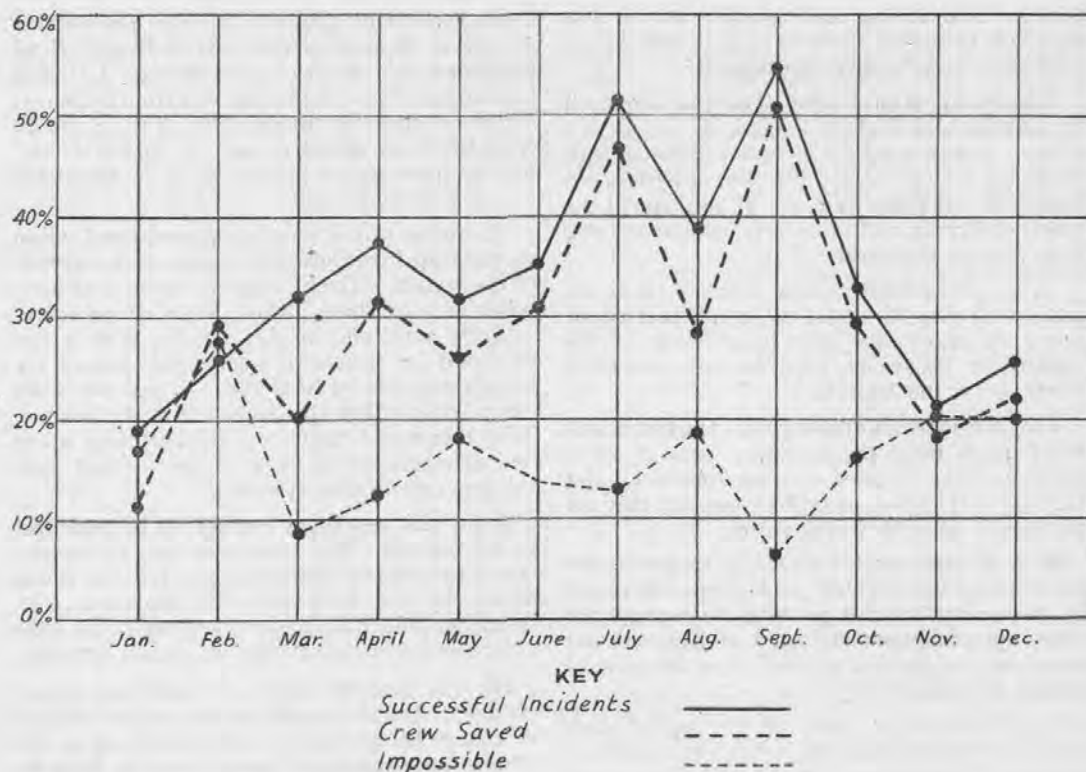
New Air Sea Rescue squadrons are being formed, equipped with Warwicks carrying lifeboats, Lindholme dinghies, and the latest Radar aids.

The division of responsibility mentioned in February's article has been reorganized and will operate about the end of the first quarter of 1944. It has been decided to abandon the old system, whereby Fighter Command was responsible for rescue within 40 miles of the coast and Coastal Command responsible for rescue beyond this area. Under the new scheme, Air Defence of Great Britain (as Fighter Command is now called) will be responsible for an area roughly enclosed by a line from Southwold to the Hook of Holland, through the Channel, and a line from Land's End to Ushant. Coastal Command will take over all Air Sea Rescue outside this area, including Iceland, Gibraltar and the Azores. The exact areas will be promulgated in the new A.S.R. A.M.C.O., succeeding A25/42. The Naval Commanders-in-Chief will still be responsible for the operation of all surface craft.

During 1942, 1,000 aircrew were saved by the Air Sea Rescue service in Home Waters alone. It is interesting to compare the 1942 chart in the *Review* for February (No. 10) with the one for 1943 printed below. The percentages vary but little, although the numbers saved have increased over the twelve months by nearly 700. During the first quarter 164 were saved. In the second, the figure had risen to 442, and in the third to 708. For the same reasons as in the previous year (weather and shorter daylight hours) the numbers saved decreased during the last quarter to 370, making an over-all total of 1,684 for the 12 months. The outstanding achievements of the year were the rescue of 156 Allied airmen, including 121 Americans, in the week July 25-August 1, and the saving of 131 Allied lives in the one day, September 6. Of these, 118 were Americans, one a Hurricane pilot, and 12 the crew of a Sunderland. This makes a total of 3,306 Allied airmen saved in Home Waters since Air Sea Rescue was formed in February, 1941.

Air Sea Rescue, 1943

	Successful Ditchings.	Crew Saved.	Impossible.
	Percentage.	Percentage.	Percentage.
January	19.4	12.4	18.1
February	26	29.8	27.3
March	33.3	20.2	8.7
April	37	33.4	13.6
May	32.6	27.6	18.8
June	35.7	32.5	14.3
July	51.4	48.2	13.8
August	37.6	28.7	18
September	55.8	53.4	7.1
October	33.7	28.9	15.3
November	21	18.9	22
December	26	21.3	20



Some Notes on Air Sea Rescue

Members of the Air Sea Rescue Service see the results of many forced landings on the sea, and they are, therefore, good judges of ditching drill. The majority of ditchings vary from excellent to good, and then the aircraft floats long enough for the crew to make a leisurely get-away in their dinghy. Others are neither excellent nor good. The rescuers know from their experience that if ditching drill were carried out to the letter, the percentage of rescues could be even higher than it is. Unfortunately, however, it is not always possible to ditch according to the examples given in a nicely coloured series of diagrams. This may account for some of the crashes where aircraft go straight in at a steep angle or break up on hitting the water.

In passing, a tribute must be paid to the efficiency of the U.S. airmen's ditching efforts. When a Fortress goes down, almost invariably the crew will be found distributed neatly, five to a dinghy, complete with radio transmitter, food, water and the other accessories designed to expedite their rescue. The Americans themselves give the credit for their efficiency to their Royal Air Force instructors.

One striking example of the value of sticking exactly to instructions occurred when a Wellington on an operational trip over France came down almost in the Seine estuary. Thanks to good ditching drill, the six members of the crew were able to get themselves and their equipment into the dinghy before the aircraft went down. The only injury was to the pilot's nose, which bled as the result of a nasty smack when the Wellington touched down. But the crew were still far from home and the current was carrying them towards the enemy coast.

The position of the Wellington's crew was reported by fighters after the dinghy had been drifting more than 30 hours. It seemed obvious that the only hope of rescuing them from under the nose of the enemy was by the use of an airborne lifeboat. So a Hudson carrying a lifeboat was sent out, with an escort of Typhoons.

The lifeboat was dropped perfectly and the Wellington crew soon scrambled aboard from their dinghy.

In each airborne lifeboat there is a book showing the position of food and gear and giving hints on the operation of the engines. A position eight miles off the enemy coast is not the most suitable place for calm study of a book of instructions, but the Wellington crew read the directions from cover to cover. Then, as promised in the little book, they found food and equipment. They organized watches, set up the compass, prepared a system of rationing, started the engines and set course towards the north, where England lay, 80 miles away.

The escorting Typhoons were doing their share overhead by beating off attacks by F.W.190s.

Meanwhile, High Speed Launches, which had reached a position in mid-channel, had been picked up by Spitfires and led to the lifeboat, in accordance with radio instructions received by the surface craft. Within an hour, the Wellington crew had been taken on board one of the High Speed Launches and were well on their way back to England with an escort of Spitfires which had relieved the Typhoons.

The rescue was a good example of well co-ordinated teamwork by various sections of the

Service. But it was made possible in the first place only because of the level-headed efforts of the Wellington crew to save themselves.

Aircrews know most types of aircraft employed by Coastal and Fighter Commands for air sea rescue. But they are not so well acquainted with the R.A.F.'s own "Navy," the fleet of High Speed Launches and Pinnaces now stationed round the coasts of Britain and in operational and training areas all over the world.

These speedy surface craft (some of them can attain well over 35 knots) are of different types, suited to either the short-range work of the Channel or long-range trips far out across the North Sea or the Atlantic.

They are not comfortable craft. The hull design which gives them the necessary turn of speed does not make for good seagoing qualities. But they are in the hands of expert crews and they get to the spot when they are needed.

Most of their work consists of unspectacular rendezvous during which the high speed launches lie off-shore at selected positions, to reassure aircrews operating over the sea that they will not remain in the ditch very long if they are unlucky enough to crash.

The Launches are seen at the top of their efficiency when a *crash call* is received from their operational controllers, the Navy. This magic phrase indicates that an aircraft crew is in urgent need of help at a given position. Neither weather nor the belligerent interest of the enemy has yet been known to deter the crews as they hurry to the spot.

One High Speed Launch at a south of England base received the electrifying *crash call* just before

dawn on a stormy autumn morning. The position given was 18 miles distant east of Beachy Head and half-a-mile off the coast of Sussex. A Stirling had alighted there on its way back from Germany. Within an hour the first member of the Stirling's crew had been picked up and 30 minutes later, four companions had joined him in the hospitable sick bay of the launch.

The rescue called for good judgment and skilful seamanship from both the skipper and coxswain of the launch. The Stirling was lying in shallow water on a lee shore. There was a strong south-westerly wind and an 8 ft. swell. With a fine disregard for their own safety, the crew of the launch manœuvred their craft—a type not easily controllable at low speed—astern of the bomber. They then nosed right up to the port wing where five members of the crew of the aircraft were waiting, two of them injured.

A line was passed but it could not be made fast to the aircraft. But there was time to transfer one of the injured men to the launch before it was driven by the wind into the dangerous surf. Again the launch nosed cautiously up to the wing and a second injured airman was taken on board.

By this time the depth of water was barely enough to float the launch and her skipper decided to change his tactics. He ran slowly up to the bomber once again and passed over the launch's rubber dinghy into which the three remaining members of the aircrew scrambled. Then, as the dinghy and its passengers drifted clear, the launch ran alongside and picked them up. The weather steadily deteriorated on the trip back to base, and the waves off Beachy Head were 20 ft. high. The injured men had to be secured in their stretchers before the journey was over.

IV.—SPECIALIST AND GENERAL ARTICLES

A Year of Training

The novice finds it easy to criticize the system of training which turns him from a novice into a knowledgeable member of an aircrew. This is no doubt based on the very simple fact that we all like doing something well but are bored by the process of learning how to do it. Training, however, is necessary in all forms of warfare, especially in these days of complicated equipment. A review of the activities of training throughout the Command in 1943 clearly shows the changes and improvements which have been made both in Coastal Command and in its younger branches overseas.

It is unnecessary to explain how pilots, navigators, flight engineers, wireless operators and the rest go individually into O.T.U.s of 17 Group, there to be moulded into crews, and how those bound for overseas then go to a Ferry Training Unit and fly their aircraft overseas. During the greater part of 1943 both O.T.U.s and F.T.U.s were in Coastal Command, but towards the end of the year the landplane F.T.U.s were transferred to their logical position in Transport Command. Through these F.T.U.s went the greater part of the crews trained by the Command for overseas. And of all the crews trained, only one-third went to squadrons within the Command; the rest went to G.R. Squadrons all over the world.

In August, the busiest month, 280 crews of all kinds were trained by 17 Group and 106 Wing, and during the whole year enough crews were trained to form over 100 complete squadrons. Complaints are sometimes received of deficiencies in training, particularly in Flying Boat O.T.U.s. "Not enough flying" is the cry. Everybody agrees that in an ideal world more flying would be desirable at this stage of training, but is more flying essential? The record of 1943 indicates that it is not. The number of flying boats flown overseas by newly trained crews in 1943 ran well into three figures and of the total number, only one crew failed to get to its destination. For this fine record, the O.T.U.s and F.T.U.s deserve great credit.

To carry out this enormous task, a large organization was needed, and at the end of the summer 17 Group was probably the largest group in the Royal Air Force. It controlled 22 airfields and was training aircrews for aircraft ranging in size from Liberators to Spitfires and in vintage from Mosquitoes to Hampdens.

Changing conditions have made it possible to relieve 17 Group of a part of this burden by transferring training units overseas. The beginning of 1944 therefore finds the Group more compact, both in task and in area covered.

This change in the war situation overseas, particularly in the Mediterranean, had other effects on 17 Group. At the beginning of 1943 it was forecast that by the middle of the year 17 Group would have to train 100 crews a month in torpedo dropping. In June over 60 torpedo trained crews were produced. Since then, due partly to the changed conditions and partly to

the formation of torpedo training units overseas, this number has fallen so that the Group now has to train only sufficient crews to provide replacements for our own three squadrons.

The types of aircraft in use in the Command have also changed. No completely new type was introduced into the Command during 1943, but those which had first made their appearance in small numbers in 1942 began to arrive in much greater quantity. Nineteen squadrons re-armed completely and others had to undertake training on entirely new forms of equipment. The anti-U-Boat work of the Command changed from medium range to long range, and the strike squadrons gave up their comparatively old aircraft and converted to more modern types. No. 17 Group also played a part in this re-arming through the work of the Liberator Conversion Unit. In a period of seven or eight months this unit converted 130 crews on to Liberators without a single accident.

Better training is reflected in the improved accident rate in the Command. Each month of 1943 was an improvement on the corresponding month of 1941 and 1942. In the months of June, September and October the accident figures for Coastal were lower than in any other month since the beginning of the war. But even in October, in every 10,000 hours' flying there were 22.9 accidents. No. 17 Group played an important part in this improvement. Their record in October from all causes was 22, which was better than the record of the more experienced pilots in the operational Groups. If the gradual but steady improvement in the accident rate is continued, and if everybody from the Group and Station Commanders to the flight mechanics servicing the aircraft continues to give this subject more and more attention, the figures for 1944 should be even better than those for 1943.

Of the new and more complicated types of equipment introduced in 1943 the most far reaching were Mark III and Mark V Radar. The principles of operation and manipulation were quite different from those of the familiar Mark II, and it was some time before results approached what was expected. Even now there is no doubt that the equipment would give better results if the operators were more efficient. However, the main hurdle has been surmounted in this and, to a lesser extent, in those other forms of scientific equipment with less scientific names. It remains to be certain that 1944 will close the gap between what the theorists say can be done, and what the crews actually do.

Closely associated with Radar was the fitting of Leigh Lights to Catalinas and Liberators as well as to Wellingtons. A number of squadrons have accomplished this conversion and, in the process, have discovered that their Radar training could be improved. Like the others, this change has been accomplished successfully, but, also like the others, there is still some way to go before perfection is reached.

New weapons have been produced and have brought with them new training problems. The introduction of R.P. called for a new flying technique in the Beaufighter, Hudson and Liberator squadrons. But the squadrons rose to the occasion and to-day the ability to use R.P., as well as the Leigh Light is recognized as part of the equipment of the Squadron pilot.

In the space available it is difficult to cover everything. No mention has been made, for

instance, of the Liberator training at Nassau; of the re-arming of Met. Flights with four-engined aircraft; the provision of Air Sea Rescue Warwick crews for overseas, and of many other activities of the Command. But enough has been written to give some indication of the training activities of the year. There is no reason to be complacent, but the way in which everyone in Coastal has played his part, whether in the air, on stations, at Groups, or at Command Headquarters, shows some promise for even greater efficiency in 1944.

Engineering in 1943

During 1943 the outstanding event in the servicing of aircraft was the introduction into Coastal Command of Planned Flying and Planned Maintenance. Before the scheme was adopted the aim of the engineers was to keep as many aircraft of a squadron serviceable as possible with a given number of men. In fact, we talked about the serviceability being so many per cent. Planned Flying and Planned Maintenance has changed this and we now talk in terms of "availability of aircraft." The engineers' task has been made more easy in that they now produce aircraft to maintain a given flying task in hours or number of sorties, whereas in the past, when the flying task was not defined, those responsible for servicing turned the handle and produced aircraft whether they were needed or not. This was most wasteful in men and material.

To-day the Air Staff in Coastal Command state a "Flying Task" which enables the servicing section to state the number of men and aircraft required to maintain this Task. This has resulted not only in economy, particularly in manpower, but has given those responsible for servicing the information necessary for drawing up an efficient Maintenance Plan; for if flying is planned, maintenance can be planned and a "production" programme worked out.

Another result of the new system is the pooling of tradesmen. In the old days squadrons were self-contained units and it was common to find the tradesmen detailed for daily inspections having a slack time while those working on major or minor inspections were swamped with work—or the other way about. Moreover, the rigidity of the self-contained squadron system made it difficult to use technicians when and where they were wanted, for they had to be employed on the aircraft of their own squadrons even though other aircraft might be in greater need of their services. Manpower was thus being wasted in two directions: inside each squadron "daily" tradesmen were overworked while "inspection" men were underworked (or the other way round), and tradesmen of X squadron were having an easy time while Y squadron's aircraft were on the ground for lack of tradesmen to get them into the air. Squadron establishments were therefore re-calculated on the basis of the number of tradesmen required to produce in a month the number of flying hours per squadron laid down in the Air Staff Task. Such establishments provide for any of the men to be employed on any type of servicing work within their trade. But when there was more than one squadron on a station it was possible to economize still further by pooling all the men. Establishments were adjusted to leave on a squadron establishment sufficient

tradesmen for daily servicing, calculated on the number of sorties required per day. The need for men to do minor and major inspections and Category "A" repairs, etc., had then to be satisfied. These were therefore calculated separately on a man-hour basis, and separate units called Servicing Echelons were formed.

For each squadron, therefore, there were two establishments: one for the squadron itself, containing aircrews and men for daily servicing, and one for the Servicing Echelon. As they were separate entities, these echelons were given numbers. In order to retain their connection with the squadrons to which they are appointed for service, they are allotted numbers in the 8000 series with the squadron number included: thus the echelons established to service Nos. 120 and 224 squadrons became Nos. 8120 and 8224 Servicing Echelons.

We then found ourselves with hats (daily servicing section) and coats (echelons) but no pegs, so further re-organization was necessary to co-ordinate and control the work of all engaged in servicing. Servicing wings were therefore introduced.

With the introduction of these servicing wings it became possible not only to improve the technical organization of squadrons and stations, and to provide an instrument for the control of the servicing organization necessary to implement the flying plan, but also to control the employment of the servicing section in the squadrons and echelons to the best advantage of all squadrons on a station. In other words, with the servicing wing came the economical employment of manpower.

We cannot allow 1943 to pass on without saying a few words on the advance that has been made in the development of various types of technical equipment.

Electrical

The year has seen the introduction of several new types of aircraft in the Command and it has certainly been an outstanding year in the development of electrical equipment in operational aircraft.

Our old friend "George," the automatic pilot, who has in the past relied on "suck and blow," has now been joined by his sister "Minnie." She is an advanced lady and relies on electronic operation, using valves (or as our American allies say, tubes), resistors and condensers. To those unfamiliar with her the full name is Minneapolis Honeywell automatic flight control.

The year has also seen a much wider application of the Leigh Light and the introduction of the "all-electric" model.

Bomb release gear has developed a long way from the original Mickey Mouse. To-day the Intervalometer has joined us with various marks and models. Although similar in appearance to the earlier ones, the latest type has an entirely new set of innards—a combination of gas-filled tetrodes, resistors and barreters.

Many navigational aids have been introduced operating from the electrical supply. Of these the D.R. Compass particularly comes to mind. The closing months of 1943 have seen the equipment of some squadrons with the air position indicator and the air mileage unit.

The air gunner and bomb aimer have not been left out of the electrification scheme; they have been presented with the amplidyne turret, the gyro gun sight and two new varieties of bomb sights.

The introduction of these and other new electrical gadgets has called for bigger and still bigger engine-driven generators which are now capable of delivering 200/300 amperes per generator, giving a total electrical output in some aircraft of 24 kilowatts (approximately 32 h.p.).

The "gen" side has moved forward and with the introduction of the new air wiring diagrams a great deal of light has been thrown on the mysteries of the electricians. Although Technical Orders have been somewhat difficult to get, there are better prospects of getting them in 1944.

Throughout the year the electrical and instrument sections have had to maintain an ever-increasing range of equipment and despite the shortage of manpower they have risen to the occasion and delivered the goods.

Engines

One of the most interesting developments was the introduction of the Bristol Hercules XVII sleeve valve engine, a type introduced solely to meet the Command's needs. It is a development of the Hercules VI, originally installed in the Beaufighter VI, but its performance as the Hercules VI was inferior at the altitude at which it was usually operated by this Command, since its rated altitude in low supercharger gear was 5,500 feet. To make the engine suitable for low-altitude work the supercharger impeller was cropped, i.e. its diameter was reduced from 13½ inches to 12 inches. This increased the power at low altitudes. The Hercules VI engine then became the Hercules VII, but before any Mark VII's were put into service it was decided to fit Claudel Hobson AIT.132 ME/A single-lever control carburettors. This change made it necessary to alter the mark number again and it became the Hercules XVII.

As it is usually unnecessary to use the supercharger high gear for normal Command work, this gear is permanently locked in "low." This and the introduction of the single-lever control carburettor have relieved the pilot of the necessity of watching mixture controls and of exercising the high supercharger gear periodically. The Hercules XVII engine is now used in Coastal Command Beaufighter and Wellington aircraft.

The later marks of Rolls Royce Merlin engines are now being fitted with the two-piece cylinder block and large quantities of these engines were put into service during 1943. This type of block has practically eliminated forced landings and flying accidents due to internal coolant leaks,

which frequently occurred on the older type one-piece block engines. It can be said that this type of cylinder block has contributed largely to the decrease in operational failure of Mosquito, Spitfire and Halifax aircraft.

The year has seen the design and development of a feathering propeller for Sunderland-Pegasus XVIII. This was long overdue and very necessary. It was anticipated that these propellers would be issued during September 1943 but owing to unforeseen snags the prototypes, now undergoing flight trials, have not been accepted as satisfactory. Small modifications are necessary but it is hoped that they will be available in the near future. The propellers are in production and it is understood that a number have already been delivered to Maintenance Units.

De Havilland's hydromatic fully feathering propellers, type 55/14, and fully feathering equipment are now being fitted to all new Beaufighters. These propellers supersede the bracket and hydromatic non-feathering type used previously. The type 55/14 propellers are being fitted to existing Beaufighters by contractors' working parties, and it is anticipated that all Beaufighter VI, X and XI will be completed during the first quarter of 1944.

Airframes

There has been a steady introduction of later types of aircraft during the year, although these have been mainly later marks of existing types. Chief among these have been the Beaufighters, Wellingtons and Liberators, which have steadily replaced the Hampdens and Hudsons. New types in the Command have been the Venturas, for Met. work, Warwicks for Air Sea Rescue, Halifaxes and Mosquitos. The year was also notable for the efforts made to increase the range at which Coastal Command could operate in the Atlantic. This called for drastic slimming of many aircraft and the installation of as much overload fuel as could be got on without entirely eliminating the bomb load. In order to make the necessary reduction in weight, many squadrons dispensed with mid-upper turrets, quantities of ammunition and many personal comforts in the way of rest bunks, cooking gear, sacks of potatoes, etc. It also became necessary to make very close checks on engine fuel consumptions and engine handling to ensure that aircraft were giving their best. There is no doubt that there was an effective increase in the range of Coastal Command aircraft during 1943.

During the year U-Boats became bolder and began to fight back from the surface. This made attacks more difficult and dangerous, particularly as we had very little in the way of forward armament. Hurried modifications were made to almost all aircraft in order to provide at least one free forward firing gun, mostly American .5s. The scheme to equip the dear old Sunderland with something in the nature of Spitfire front armament was developed towards the end of the year. It consisted of four fixed forward firing Browning guns, together with installation of beam guns at the galley hatches.

In order to produce photographic evidence of the results of attacks many aircraft have been fitted with cameras under Command modification procedure. The results have induced us to fit cameras on all aircraft, according to their duties.

Continuously during the year changes have been made in signals, radar and navigational equipment, and most of these have called for fairly extensive modifications to aircraft. Both service and civilian fitting parties have been busy on this work. Members of units have developed many minor modifications, which have increased the efficiency of their aircraft. In a

short review such as this it is impossible to go into detail, but it can be said quite honestly that all ranks responsible for servicing and maintenance of aircraft have had a busy and arduous year. Taking into account the many difficulties created by war-time conditions, the results reflect great credit on all concerned.

Armament in 1943

For almost the whole of the war the depth charge has been the main anti U-Boat weapon and its achievements in 1943 make us believe that the 250-lb. Torpex-filled Mark XI depth charge is still the most efficient weapon we use. The percentage of kills to attacks rose steadily throughout the year in spite of greater opposition and the continuously changing tactics of the U-Boat. This improvement can be attributed to a number of inter-dependent factors, among them improved accuracy in attack, better maintenance, greater attention to technical detail and, in the later part of the year, the increased use of the Mark III Low Level Bombsight in Liberators, Catalinas and Sunderlands. It is notable that during the year there was no report of a depth charge dropped in operations failing to explode; there was also a substantial reduction in the percentage of hang-ups.

Notwithstanding the efficiency of the depth charge several new weapons came into use during 1943. This was mainly a result of the impetus given to development by the "fighting back" tactics adopted by the U-Boats in the early part of the year, tactics which emphasized the need for weapons which could be released while the aircraft was out of range of the U-Boat's flak. Of the many weapons suggested or tried, the R.P. and the 600-lb. A.S. bomb were brought into operational use by the Command, the R.P. as a secondary weapon, since it is effective only against visible U-Boats, and the 600 A.S. Bombs as a primary weapon to be used from medium altitude in conjunction with the Mark XIV Bombsight. Both weapons have proved effective and have a number of kills to their credit. In the months of May to August, when the R.P. was first used by Hudsons and Liberators, there were a number of spectacular successes, but during the latter part of the year the scarcity of visible targets meant fewer opportunities for its use. Similarly the scarcity of targets for medium altitude bombing has prevented the two Squadrons who use the 600-lb. A/S Bombs from accumulating sufficient data for comparing its merits and those of the Mark XIV Bombsight with the results from low-level attacks with Mark XI depth charges.

Opposition from U-Boats and enemy aircraft, which increased steadily during the year, led to the installation of additional defensive armament on all aircraft employed on anti U-Boat operations. The provision and fitting of additional guns to aircraft in service presented a number of problems of supply and manufacture which, taken in conjunction with aircraft weight limitations and effects on performance, made it impracticable to meet all the requirements of individual squadrons. Nevertheless some measure of improvement was made by the addition of .5-inch guns in the nose of Liberators, Fortresses and Sunderlands and .303-inch guns in aircraft where the

.5-inch installation was impracticable. Further improvements may be expected as a result of production modifications which meet the Command's requirement that the maximum defensive armament must be provided initially, but must be easily removable in order that aircraft used in areas where opposition is unlikely can operate at maximum range with the minimum of armament.

Developments in armament were not restricted only to anti U-Boat weapons. In anti-shipping operations R.P. with the 60-lb. H.E. head was used extensively by Beaufighters. The weapon, however, has not proved as effective as might have been expected from the early trials, and results in 1943 were on the whole disappointing. It was thought at first that its primary use would be as an anti-flak weapon to give cover for a torpedo attack, but it was quickly realized that owing to its very big gravity drop and to the rigid flight conditions for release, accurate results in operations could only be obtained at ranges under 600 yards. Furthermore, it was not possible to match the trajectory with that of the 20-mm. shell, with the result that in attack, the combined use of R.P. and 20-mm. guns from the same aircraft was impracticable and led to ineffective results from both weapons. This brought about a change in tactics and the R.P. as a primary sinking weapon, anti-flak cover being provided by supporting Beaufighters using 20-mm. guns. Tactically this had some success, but the effect of above water hits with the 60-lb. R.P. shell made it doubtful whether the weapon was capable of sinking a ship unless a large number of hits were made. Consequently towards the end of the year, after the Naval Constructors had assessed probable damage, it was decided to change over to the 25-lb. solid head and aim at underwater hits. As yet there has been no opportunity to prove the effectiveness of this form of attack.

Even a brief review of the armament events of 1943 would not be complete without some mention of the all-important question of maintenance, which, though less advertised than the results achieved with the weapons, is nevertheless the basis of successful operations. 1943 saw a major change, as far as operational squadrons were concerned, in the maintenance organization by the introduction of the Servicing Wing scheme, which includes the servicing and maintenance of armament equipment. As might be expected with so big a change it will be some time before all the difficulties are ironed out, but the end of 1943 indicated that the teething troubles were being overcome and that there had been substantial improvement in armament maintenance and some economy in the use of armament personnel. There is every reason to suppose that this improvement will be carried on in 1944, and it is confidently expected that operational results will be the effective proof of the new maintenance policy.