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COASTAL COMMAND REVIEW

July, 1943

Vol. II, No. 3

HEADQUARTERS,
COASTAL COMMAND
ROYAL AIR FORCE

COASTAL COMMAND REVIEW

Vol. II, No. 3—July, 1943

CONTENTS

	<i>Page</i>
Summary of the Month's Work : July, 1943	1
I.—ANTI U-BOAT	
Anti U-Boat scores, June, 1943	4
Anti U-Boat scores, January-June, 1943	4
Attacks on U-Boats : notes on the scores	5
Official Admiralty assessments	5
Summary of U-Boat operations, July, 1943	6
Summary continued: assessments and analyses	7
Squadron results	7
Recent attacks on U-Boats	8
Mock turtles	13
II.—ANTI-SHIPING	
Use of R.P. as an anti-shipping weapon	14
Attacks	15
The first torpedo from the first submarine... .. .	16
III.—OTHER OPERATIONAL FLYING	
Enemy Attacks on anti-submarine aircraft	17
Fighter combats	18
Air-Sea Rescue	19
Photographic reconnaissance	21
U-Whales	22
IV.—SPECIALIST AND GENERAL ARTICLES	
A submersible training target	23
Tribute from Ministry of Economic Warfare	24
The last Hudson	25
Escape exercises	27
Training in Canada	29
Leaves from a Navigator's Log—VIII	30
Those Below Us	31
With apologies to Gdynia, a letter to the editor	32

PLATES

<i>Plate</i>	<i>Opp. Page</i>
1. U-Boat sunk by Q/172 and V/547	2
2. Rescue by airborne lifeboat	3
3. Attack by E/58, following attack by U.S. Liberator	8
4. Attack by 201 Squadron	9
5. R.P. attack by Hudson F/48	10
6. { Survivors from U-Boat destroyed by N/228	11
{ U-Boats manœuvring on surface	11
7. { Bombing of Trondheim	12
{ Convoy SC 135	12
8. Destruction of enemy aircraft	13
9. Attack on enemy shipping at Den Helder	14
10. Shipping attack by 404 Squadron	15
11. The U-Boat base at Bordeaux, photographed in August, 1942, and July, 1943	22
12. Submersible target	23
13. { A Hudson carrying an airborne lifeboat	26
{ Hudson presented by Lockheed employees to R.A.F.	26
14. Three photographs of Hudsons	27

CHART

<i>Chart</i>	<i>facing page</i>
1. Anti U-Boat activities, July	6

Summary of the Month's Work—July, 1943

1. Once again we are able to summarize a record month for shore-based anti-submarine operations in the Eastern Atlantic and another catastrophic month for the U-Boats. Provisional assessments amount to 13 sunk or probably sunk and five damaged by United Kingdom, Dominion and American A/S Squadrons based in the British Isles, and four more sunk or probably sunk by U.S. aircraft in the approaches to Gibraltar. The total killings of German U-Boats by British and Allied air and naval forces in July have exceeded the total sunk in the last record month of May.

2. July has indeed been a black month for the Axis. The devastating bombing of German cities, particularly of Hamburg which is of immense importance to the U-Boat war; the collapse of the Fascist regime in Italy; the seizure of most of Sicily, and the enemy defeats in Russia—all these add up to a cumulative total far grimmer, on a long view, than we had to face three years ago. Add to that a third month of disaster to the U-Boats on which so many hopes have been pinned, and the German High Command must be taking a very poor view of their chances of averting a crash of hitherto undreamt of proportions. All ranks of Coastal Command, whether in the first line or training units, can be confident that they are playing a part of an importance second to none in hastening the inevitable end.

3. An interesting and significant contrast may be found in the wording of the following signal from the Admiralty, dated August 2, and the extract from a broadcast by Admiral Doenitz on August 15. The Admiralty signal read as follows:—

"In May U-Boats suffered a severe defeat in their endeavour to attack the North Atlantic convoys. Their losses were so heavy that they were forced to withdraw from this route to others which they know must be less productive but which they hoped would be less dangerous. At the same time, every effort was made to re-arm the U-Boats with A.A. weapons with which to drive off our aircraft."

2. During June our shipping losses were almost the lowest on record, but the U-Boat sinkings, though substantial, were also considerably reduced.

3. Allied counter measures to enemy strategy have borne fruit in July, and the Admiralty congratulate all concerned on the heavy punishment inflicted on the U-Boats. Particular credit is due to Coastal Command and to Allied aircraft from Gibraltar area for the vigour of the offensive against U-Boats on passage and for the determination and gallantry shown by Captains of aircraft and their crews against the powerful armament of the U-Boats.

4. The effective A/S measures in the Mediterranean have greatly contributed to the success of the amphibious operations and are highly creditable to the Commands concerned and to the surface and Air Forces.

5. All in the United Kingdom concerned with the conduct of the U-Boat war have noted with admiration the results obtained by the carrier-borne aircraft of the U.S. Fleet and the successful manner in which U.S. Forces have taken the offensive against U-Boats operating in American waters."

Admiral Doenitz's broadcast included the following passage "... the sailor must know his job and must be steadfast. The young sailor must be able to hold out. There must be no vacillating; he must not give way to some mood of the moment. . . ." The fact that it should be considered necessary or desirable to broadcast this sort of exhortation is an interesting commentary on the morale of the U-Boat Service.

4. Of the 115 U-Boats sighted by Coastal Command during July, 88 were in transit through the Bay of Biscay, where a total of 13 were killed and five seriously damaged by aircraft plus one sunk by sloops of the surface hunting groups. This is eloquent testimony of the truth that the Bay offensive is the key to the U-Boat war. It is a question of balance between the defensive and the offensive. We, the British and Americans between us, must keep enough aircraft at the focal areas in the Atlantic and covering the convoys to deal with the U-Boats who evade the Bay patrols. But almost every U-Boat that operates in the whole Atlantic Ocean has to come out through the Bay and back into the Bay ports when he reaches his P.L.E.—the remainder have to pass through the Northern Passage. In July for the first time we have come somewhere near the minimum numbers of aircraft in the Bay that we have always estimated as being necessary, with results that speak for themselves.

5. Iceland and 18 Group have had a dull time in the Northern Passage. Very few new U-Boats have passed through into the Atlantic recently; it seems probable that the enemy are fitting out their new boats in Hamburg and the Baltic ports before they come out on their first patrol with the new scale of light Flak which we have encountered on the older hands operating from the Biscay ports. No doubt the time will soon come when trade in the Northern Passage area will revive, and Iceland and 18 Group will be presented with opportunities similar to those of which the other Groups have taken such good advantage in the Bay. There is no reason to suppose that the new U-Boats, when they do come out, will have armament more formidable than those of which we have killed so many in the Bay.

6. In the last issue of the *Review* we recorded the arrival of the advanced parties of Nos. 4 and 19 Anti-Submarine Squadrons of the U.S. Army Air Force. They went into action for the first time on July 13, since when they have given a singularly good account of themselves, having possibly sunk one themselves, shared with R.A.F. aircraft in the sinking of two more and probably damaged one out of a total of 76 sorties. Towards the end of July they were joined in the Bay by No. 63 Squadron (PBY) of the U.S. Navy who are sharing the base at Pembroke Dock with Nos. 461 and 228 Squadrons.

7. Since the middle of June a number of surface hunting groups have been operating in the Bay in co-operation with our Bay patrols. The efficacy of these combined tactics depends in the main on good signals, carefully thought-out procedure and a thorough understanding by airmen and sailors of the combined plan. Based on some weeks of practical experience, detailed tactical instructions have now been issued, and the value of this combined action has been amply illustrated by the action on July 30, described in detail on page 12 of this issue, when a whole pack of three U-Boats, including two of the specially valuable supply boats, was wiped out by aircraft and sloops working together.

C.C.T.I. No. 41 has been substantially amended to incorporate the lessons learned from experience in the Bay. The collaboration of the surface hunting groups is of first-class value, but it must be clear to all captains that the rule is "attack first and home afterwards." After their recent experiences there will probably be an increasing tendency on the part of U-Boats to dive the moment they see a chance of getting away with it; and a bird in the hand on the surface is worth three at a depth of 600 ft.

8. Curiously enough, experience has proved that the Flak defence of a group of three U-Boats is not more formidable than that of a single one. The deflection shot with a heavy multiple Oerlikon mounting on a U-Boat in a sea is an extremely difficult one; and experienced British submarine captains confirm that a U-Boat Commander is likely to be too fully preoccupied with looking after his own safety to give much attention to covering fire for another in a group. On two occasions during July two out of a pack of three were destroyed by aircraft alone and one whole pack of three was wiped out by combined action of aircraft and sloops. So, although group transits tend slightly to reduce our percentage of sightings, they have led to so many more kills that there seems some danger of the enemy deciding that they are too expensive a game.

9. A development which should not go unrecorded in this summary for July was that during the month, five aircraft from Newfoundland—three R.C.A.F., 1 U.S.A.A.F. and one U.S. Navy—on operational sorties covering convoys in the North Atlantic, were diverted to the United Kingdom, and did another operational job on their return to base several days later.

10. The big map in the Operations Room at H.Q.C.C. has been repainted for the third time in this war—we started in 1939 with one showing the British Isles and Home Waters. That was later enlarged to include Cape Farewell and the whole of the Bay: today convoys and sorties are plotted from Canadian Home waters to Jan Mayen and the Cape Verde Islands.

11. No. 10 O.T.U. (Bomber Command) have now left us after a period of fine operational work for which we are greatly indebted to them. Between August 12, 1942, and July 19, 1943, aircraft of 10 O.T.U. made over 1,800 sorties and flew nearly 17,000 miles in operations over the Bay. Their aircrews sighted 89 U-Boats and attacked 55.

The First Sea Lord paid a tribute to the work of No. 10 O.T.U., in the following signal:—

"On the withdrawal of No. 10 O.T.U. from service with Coastal Command in the Bay offensive, I wish to express my sincere appreciation of their most valuable services.

"In all weather they have maintained their patrol in the Bay, often without the encouragement of sighting or attacking a U-boat. But this constant and strenuous endeavour has very materially added to the difficulties of the U-boat in passing the Bay, and thus directly contributed to the subsequent U-boat sightings and sinkings.

"The alertness and gallantry of these crews under training has been beyond praise, and all in the Navy will share my expression of thanks and admiration."

A



B



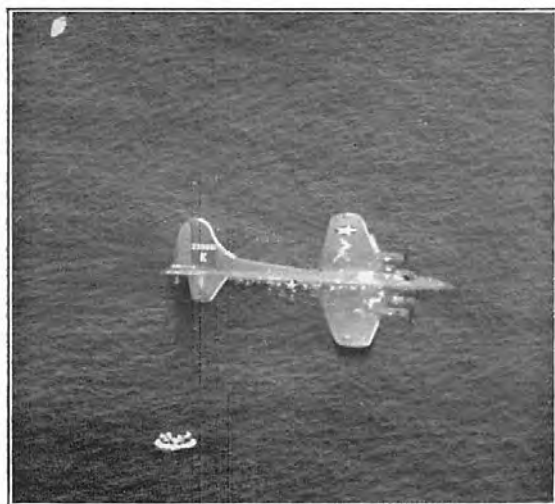
C



D



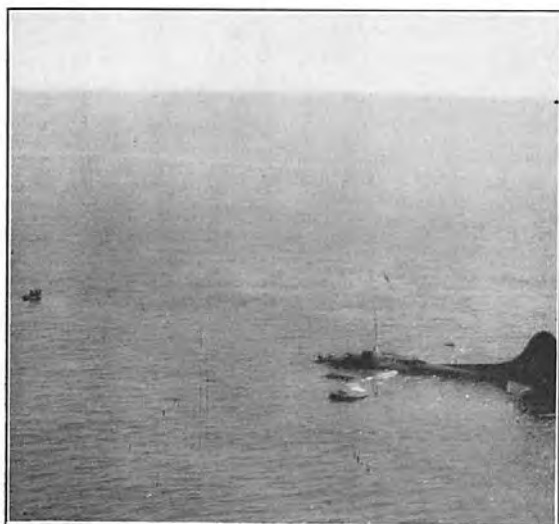
SINKING OF U-BOAT BY Q/172 and V/547 on July 24. A and B.—The U-Boat settling by the stern. C.—Demolition charges exploding. D.—Survivors from U-Boat in dinghies. See letterpress p. 11.



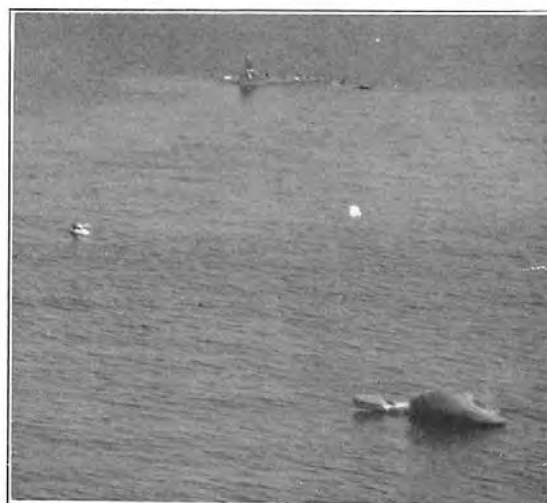
A perfect ditching.



Manna from heaven.



The Fortress still afloat.



The successful drop.



Under way.



The H.S.L. keeps its appointment.

12. The work of Air-Sea Rescue for the month of July is summarized on pages 19-21; work which is a record and reason for pride to all concerned. In the midst of a war in which aircraft are pledged to assault and destruction, it is reassuring to watch the development of a constructive service for saving life often carried out in the face of enemy opposition. Airmen naturally pause now and then to consider the shape of things to come: when aviation will once more contribute to the progress and happiness of life and not merely to its destruction. Air-Sea Rescue will be one of the great contributions the Royal Air Force will hand on to the new era of civil aviation and to all who go to sea.

The airborne lifeboat, first used only three months ago, has more than justified itself.

During the month of July, 250 aircrews were saved. In the closing week alone, 156 men were rescued from the sea—of these, 121 were members of United States aircrews: a reassuring sign to those who know how well the pilots and aircrews of the Allied countries are working together for a victory far beyond their own pride or self-satisfaction.

A Tribute from the Enemy

"The enemy defence in the Atlantic has got the better of us. Mind you, I say at present, and I add, this superiority is temporary."

"We shall overcome it. Our Command (German Submarine Headquarters) which deeply feels its responsibility, will order new operations at the moment it deems most likely to yield success compatible with the maximum of security for our ships and their crews."

"Never before have we worked more zealously and intensely in the laboratories, workshops, at the bases and at headquarters than during the past few weeks to speed up developments against this temporary superiority of the enemy defences."

"There (in the Mediterranean) our enemies have concentrated air and naval defences in a degree never seen before. Consequently the conditions of fighting are very hard."

"Generally speaking, we are in a period when the defences of our enemies have become stronger and stronger."

"True, we sank more ships in July last than in the previous month. It would be wrong however, to conclude that, whatever may come, from now on the figure of sinkings will increase."

"Success is not measured by the published figures alone. As conditions are, our U-Boats have not always the possibility or the opportunity to make sure of the success of their torpedoes."

"Many U-Boats return home without victory flags flying from the topmast. They went out minelaying, and their successes will be known only after the war."

Heinrich Schweich, in a broadcast over the German Radio, August 4, 1943.

I.—ANTI U-BOAT

ANTI-U-BOAT SCORES—JUNE, 1943
PERCENTAGE FIGURES OF MERIT IN BIG NUMERALS

10 O.T.U.	10 Sq.	48 Sq.	53 Sq.	58 Sq.	59 Sq.	86 Sq.	120 Sq.
10 0 3 0 0 0 0	0 0	3 R.P. 10 R.P. 10 0	0	0	3 3	0 0 0 10 0	3 3 10
18½	0	57½	0	0	30	20	53
172 Sq.	179 Sq.	190 Sq.	201 Sq.	202 Sq.	206 Sq.	210 Sq.	220 Sq.
—	—	—	3 0	—	10 0 10	—	10
—	—	—	30	—	66½	—	100
224 Sq.	228 Sq.	233 Sq.	269 Sq.	304 Sq.	311 Sq.	330 Sq.	333 Sq.
0	0	—	3 10 0 3	—	—	—	—
0	0	—	40	—	—	—	—
407 Sq.	423 Sq.	461 Sq.	502 Sq.	547 Sq.	612 Sq.	236 (R.P.).	
10	—	—	0 0	3 3 0	—	10 R.P.	—
100	—	—	0	20	—	100	—

ANTI U-BOAT SCORES FROM JANUARY TO JUNE, 1943
**PERCENTAGE FIGURES OF MERIT
IN BIG NUMERALS**

10 O.T.U.	10 Sq.	48 Sq.	53 Sq.	58 Sq.	59 Sq.	86 Sq.	120 Sq.
$\frac{65}{420} = 15\frac{1}{2}$	$\frac{36}{150} = 24$	$\frac{71}{150} = 47\frac{1}{4}$	0	$\frac{95}{190} = 50$	$\frac{25}{80} = 31\frac{1}{4}$	$\frac{88}{320} = 27\frac{1}{2}$	$\frac{182}{460} = 39\frac{1}{2}$
172 Sq.	179 Sq.	190 Sq.	201 Sq.	202 Sq.	206 Sq.	210 Sq.	220 Sq.
$\frac{115}{240} = 48$	$\frac{28}{90} = 31$	$\frac{48}{110} = 43\frac{1}{2}$	$\frac{25}{70} = 36$	$\frac{23}{60} = 38$	$\frac{91}{180} = 50$	$\frac{6}{20} = 30$	$\frac{46}{80} = 57\frac{1}{2}$
224 Sq.	228 Sq.	233 Sq.	269 Sq.	304 Sq.	311 Sq.	330 Sq.	333 Sq.
$\frac{32}{240} = 13\frac{1}{3}$	$\frac{20}{30} = 66\frac{2}{3}$	$\frac{84}{190} = 44$	$\frac{86}{240} = 36$	$\frac{19}{50} = 38$	$\frac{19}{40} = 47\frac{1}{2}$	—	—
407 Sq.	423 Sq.	461 Sq.	502 Sq.	547 Sq.	612 Sq.	236 (R.P.)	
$\frac{16}{40} = 40$	$\frac{36}{70} = 51\frac{1}{2}$	$\frac{23}{50} = 46$	$\frac{25}{130} = 19\frac{1}{2}$	$\frac{6}{30} = 20$	$\frac{26}{90} = 29$	$\frac{10}{20} = 50$	—

Attacks on U-Boats

Note on Tables on Opposite Page showing Squadron Scores for June, 1943, and for the Half-Year ending June 30

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	10

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

In the chart for the half year the points scored out of the points possible are expressed as a percentage figure of merit.

Hudson squadrons have again proved their mettle during June, although they have the shortest endurance of all the A/S squadrons and carry a smaller load.

No. 48 Squadron carried out two excellent R.P. attacks, one of which was assessed as "probably sunk," and two attacks with depth-charges, one of which was assessed as "probably seriously damaged, unable to return to base."

No. 269 Squadron carried out four depth-charge attacks during the month, three of which obtained scores.

Leigh Light Wellington squadrons had a poor month, as might have been expected during the very short nights in July. Nevertheless, there is no doubt that the numbers of sightings by day in the Bay is directly attributable to the excellent work of these squadrons.

Outstanding scores, taking into consideration the number of attacks, have been put up by 48 and 206 Squadrons. The story of the attack by the C.O. of 206 appears on another page, the result being a known kill. Their second attack gained the assessment "probably damaged 'B'."

Official Admiralty Assessments

Following are the official letters used in showing Admiralty assessments of the results of attacks on U-Boats :—

- A.—Known sunk.
- B.—Probably sunk.
- C.—Probably damaged A. (Probably seriously damaged, may have sunk.)
- D.—Probably damaged B. (Probably damaged sufficiently to force U-Boat to return to harbour.)
- E.—Probably slightly damaged.
- F.—U-Boat present. Insufficient evidence of damage.
- G.—U-Boat present. Attack unsuccessful or no damage.
- H.—Insufficient evidence of the presence of a U-Boat.
- I.—Non-sub.

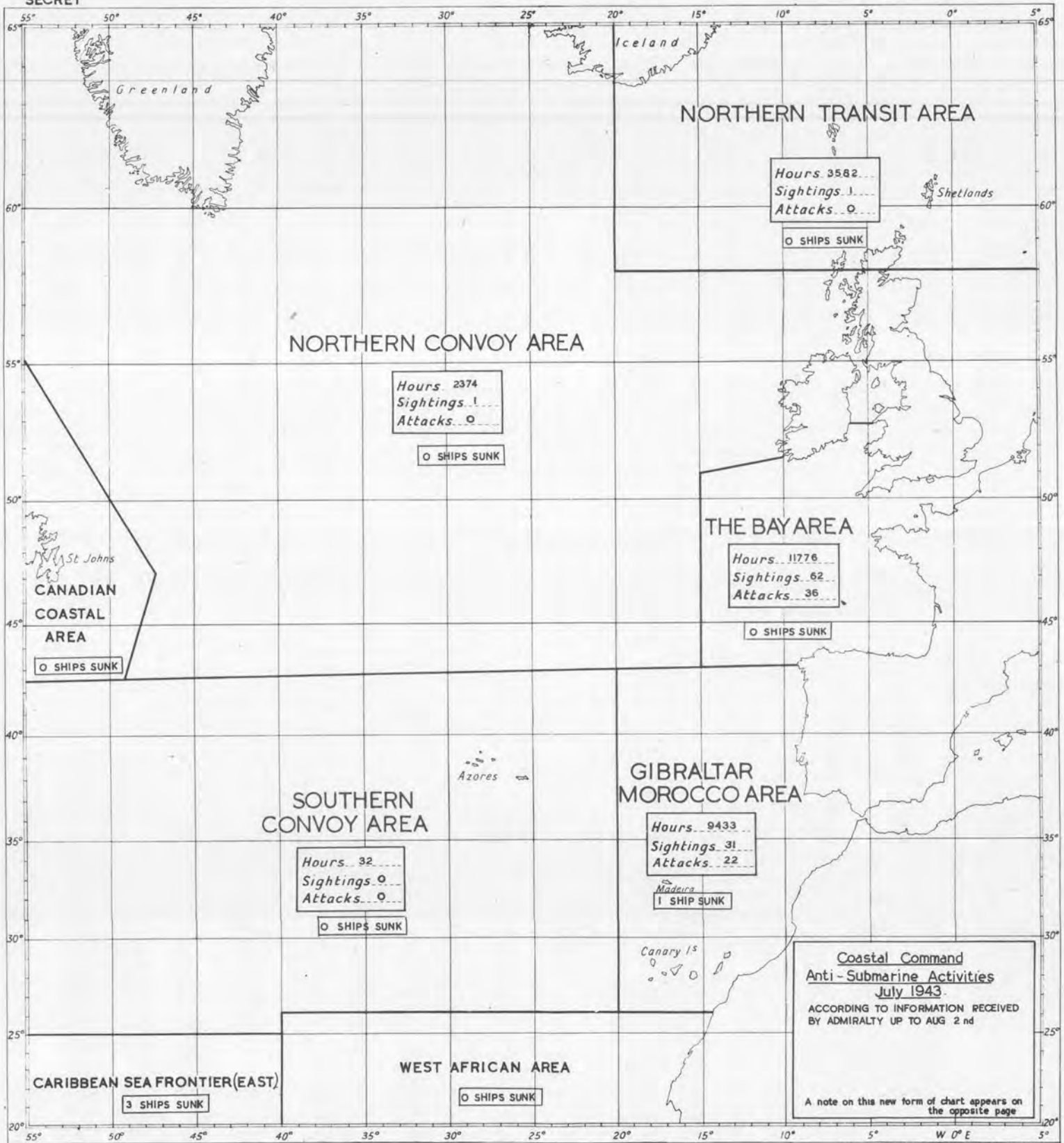
SUMMARY OF U-BOAT OPERATIONS BY COASTAL COMMAND AIRCRAFT
(Together with Iceland, Gibraltar and U.S. Aircraft from Agadir and Port Lyautey)

SECRET

JULY, 1943.

Duty and Base or Area.	Total Sorties.	Hours Flown.		U-Boats Sighted.		U-Boats Attacked.		Hours per Sighting.		No. of Sorties when U-Boat Sighted.	Percentage of Attacks to col. 10 Sorties.	Col. 10 Sorties with Flak.
		Base to Base.	On Patrol.	Day.	Night.	Day.	Night.	Base to Base.	On Patrol.			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Close Cover to Convoys</i>												
United Kingdom	146	1,862	792	—	—	—	—	2,612	1,242	1	0	0
Iceland	72	750	450	1	—	—	—					
Gibraltar and Agadir	375	2,760	2,000	3	—	2	—	949	690	3	80	No details.
Port Lyautey (see Note)	—	1,984	1,450	2	—	2	—					
TOTALS	593	7,356	4,692	6	—	4	—	1,226	782	6	66	0
<i>A/U Patrols</i>												
North Transit (North of 58° N. and East of 20° W.)											%	
United Kingdom	189	2,134	1,169	1	—	—	—	3,544	2,169	1	0	0
Iceland	180	1,410	1,000	—	—	—	—					
Northern Convoy (North of 43° N.)												
United Kingdom	—	—	—	—	—	—	—	—	—	—	—	—
Iceland	20	190	140	—	—	—	—	—	—	—	—	—
Southern Convoy (South of 43° N.)	—	—	—	—	—	—	—	—	—	—	—	—
Bay of Biscay (East of 15° W.)	1,194	11,539	6,069	61	1	35	1	186	98	51	70	33
Gibraltar and Agadir	342	3,040	2,600	10	—	8	—	176	150	10	69	No details.
Port Lyautey (see Note)	—	1,528	1,300	16	—	10	—					
TOTALS	1,925	19,841	12,278	88	1	53	1	223	138	78	69	33
Add Convoy Effort	593	7,356	4,692	6	—	4	—	—	—	6	—	—
TOTAL A/U EFFORT	2,518	27,197	16,970	94	1	57	1	286	118	84	69	33
Chance Sightings (Transit, P.R., etc.)	—	—	—	17	3	—	—	—	—	—	—	—
GRAND TOTAL	—	—	—	111	4	57	1	—	—	—	—	—
				115	U-Boats Sighted	58	U-Boats Attacked					

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Summary—continued.

Assessments

Month,	Known Sunk,	Probably Sunk,	Damaged. A.	Damaged. B.	Slight Damage.	No Damage.	Insufficient Evidence Damage.
May	6	11	3	5	7	31	73
June	3	2	3	3	2	9	33
July (provisional)	9	5	1	5	(38 unas- sessed—see	Note 2.)	

Assessments for U.S. Aircraft at Agadir and Port Lyautey

July (provisional)	3	1	0	2	(8 unas- sessed—see	Note 2.)	
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Notes.—(1) The flying hours for Port Lyautey are approximate. (2) The 46 assessments outstanding for July are unlikely to produce further results.

Analysis of Multiple Sightings

(By aircraft with Major Wpns.)

No. of U-Boats in Company.	No. of Occurrences.		Total U-Boats Sighted.	No. of Aircraft Sighting.			No. of Aircraft Sighting same Target.	No. of U-Boats in Target.	No. of Occurrences.
	Day.	Night.		C.C. with Maj. Wpn.— Positive Sorties.	Others.	Total.			
3	6	—	18	13	—	13	7	3	1
2	9	—	18	11	1	12	3	2	1
1	75	4	79	60	19	79	3	1	2
							2	3	1
							2	1	3
Totals ..	—	—	115	84	20	104	Total multiple sight- ings		8

Squadron Results

				No. of sorties in which U-Boats sighted.	Attacks made.	No. of sightings.
(i) Home and Iceland based						
4	(U.S.A.A.F.)	Liberators	St. Eval	3	5	4
19	(U.S.A.A.F.)	Liberators	St. Eval	3	1	7
53		Liberators	Thorney Island	7	5	15
59		Liberators	Aldergrove	2	3	2
86		Liberators	Aldergrove	3	3	5
120		Liberators	Iceland	1	—	1
224		Liberators	St. Eval	6	10	7
58		Halifax	Holmesley South	2	2	4
502		Halifax	Holmesley South	4	6	9
10		Sunderland	Mount Batten	4	2	7
201		Sunderland	Castle Archdale	1	1	2
228		Sunderland	Pembroke Dock	3	1	8
422		Sunderland	Castle Archdale	1	—	2
423		Sunderland	Castle Archdale	1	—	3
461		Sunderland	Pembroke Dock	3	2	6
63	(U.S.N.)	Catalina	Pembroke Dock	1	1	2
210		Catalina	Hamworthy	2	—	4
206		Fortress	Benbecula	1	—	1
172		S/L Wellington	Chivenor	3	3	3
304		Wellington	Davidstow Moor	1	1	1
547		Wellington	Davidstow Moor	1	1	1
Non-A/S Fighters						
248		Beaufighters	Predannack	4	—	3
(ii) Gibraltar and Agadir based						
210		Catalinas	Gibraltar	5	4	5
202		Catalinas	3	2	3
179		S/L Wellington	3	2	3
92	(U.S.N.)	Catalina	2	2	2
(iii) Pt. Lyautey and Casablanca based						
				18	12	18
(iv) Chance sightings						
				—	—	20
(C49790)						

Recent Attacks on U-Boats

The following accounts of attacks on U-Boats made in June and July were not assessed in time to be printed in the last number of the "Review." The attacks were so numerous that it is impossible to print more than a selection of the more interesting reports.

Fortress versus U-Boat

The full narrative of the attack by **Fortress R/206** on June 11 is now available. This most determined attack in the face of accurate A.A. fire resulted in the definite "kill" of a large U-Boat, probably a 740-tonner. The Fortress was later forced to ditch, but all the crew were rescued. In the Form UBAT for this attack, in reply to the question, "How long did you remain in the vicinity after the attack," the Captain had the pleasure of replying, "3 days, 2 hours, 24 minutes!"

R/206 was carrying out patrol between Iceland and the Faeroes when, at 1110 hours on June 11, the pilot sighted, with the naked eye, the wake of a U-Boat, 7 miles ahead. The U-Boat had probably sighted the aircraft first because its speed was approximately 7 knots, and it was taking violent evasive action, turning at right angles at high speed during the approach. When the attack was made, it had already completed one starboard turn and was heeling over under port helm, making a considerable wake, and was shrouded in spray. The Captain decided that the best way to counter the U-Boat's violent evasive action and to ensure accuracy of aim with the depth-charges was by a low approach. He therefore lost height and went in from 50 ft. The U-Boat opened fire when the aircraft was between six and eight hundred yards away. Aim was very accurate and hits were scored on main planes, engines, cockpit, nose, bomb-bay and tail planes. The attack was nevertheless pressed home with determination from approximately 150° Red, with Mark XI Torpex depth-charges. Owing to flak damage, only four of the six depth-charges were released, but a perfect straddle was obtained with 100 ft. spacing and a ground speed of approximately 200 m.p.h., height 50-60 ft., depth-charge setting, 25 ft. The explosion seemed to envelop the U-Boat and the rear gunner fired about 100 rounds as the aircraft passed over. About 30 seconds after the attack the U-Boat's bows were seen to rise vertically out of the water. The vessel sank, stern first, a few seconds later. The aircraft flew over the scene of the attack and saw between 20 and 30 survivors in the water, some covered in oil, some shaking their fists at the aircraft. But the majority were prone. Some were wearing green overall life jackets. At the time the oil patch was not very big.

No. 2 engine was vibrating very badly, and two other engines were giving trouble. The aircraft could not climb higher than 200 ft., but S.O.S. and position were transmitted and within three minutes, the aircraft ditched, approximately 5 miles from the scene of the attack. The aircraft sank in 90 seconds. All the crew got into the dinghy, and they were rescued by a Catalina three days later. This rescue was described in the Summary of the month's work, *Coastal Command Review*, Vol. II, No. 2, June (page 3).

Very Good S/E Work

On July 3, **Liberator J/224** was on "Musketry" patrol, flying on a track of 259° at 500 ft. The weather was hazy and cloudless; the visibility 3 miles and the sea moderate.

At 1402 hours an S.E. contact was obtained at 10 miles almost dead ahead. At 1404 hours a surfaced U-Boat was sighted 3 miles ahead in position 44° 11' N., 08° 45' W.: course was 125°, speed 10 knots. The U-Boat was large and painted light grey. A line of vents was seen along the whole length of the hull, and there was a fairly large gun aft, possibly a 37-mm. The pilot altered course a few degrees to port and went in to attack. The U-Boat opened fire with the after gun when the aircraft was nearly a mile away, and during the run in it was hit several times in the mainplane, the starboard petrol tank and the tail plane. Tracer was seen coming from the conning-tower. The aircraft attacked from the port beam, releasing from 250 ft., 24 35-lb. A/S bombs with contact fuzes spaced at 15 ft. The U-Boat was still on the surface, and the Mark III bomb sight was used. At least one bomb was seen to hit the U-Boat abaft the conning-tower, bursting with a puff of black smoke: a distinct jar felt in the aircraft is believed to have been caused by this hit. As the aircraft passed over, two men were seen in the conning-tower. The rear gunner opened fire and one of them fell. The aircraft flew on and was again fired at. The pilot took evasive action and made a wide circuit as his controls were shuddering. It was then seen that white spray, possibly high pressure air, was shooting from the port side of the U-Boat. As the aircraft came in for a second attack, the 37-mm. gun again opened fire, but during the approach a sudden spurt of water came from abaft the conning-tower close to the gun, and fire ceased. From 70 ft. the aircraft released six Mark XI Torpex depth-charges, set to shallow depth, spaced at 100 ft. Two explosions were seen on the U-Boat's starboard side, and the rest to port: No. 3 depth-charge was estimated to be close alongside on the port side. A very distinctive dark-brown oily patch appeared, which the crew were certain was not depth-charge scum. Several bodies suddenly came to the surface, six of them alive and swimming. As the aircraft had been badly hit and as petrol was pouring out close to the starboard inner engine exhaust, this engine was feathered and the aircraft set course for base at 1410 hours.

Naval Staff's Remarks

Very good S/E work and a good range to get contact when flying at 500 ft. A very good attack with the 35-lb. bombs. Photographs show that at least one secured a hit. Photographs also show oil in the wake of the U-Boat before the depth-charges exploded. It is impossible to say how serious this hit was, because the excellent low-level depth-charge



THREE STAGES of the attack by *E/58* on a U-Boat already seriously damaged by an aircraft of No. 19 Squadron, U.S. Army VIII Air Force Anti-Submarine Command.
The U-Boat's crew had already begun to abandon ship before the attack started.



ATTACK by 201 Squadron : The U-Boat surfacing after the first attack.



ATTACK by 201 Squadron : The front gunner's final burst during the run in for the second attack.

attack which followed straddled the U-Boat. (This is also confirmed by photographs.) The final evidence of bodies was visual. Photographs confirm that smoke was coming up in the edge of the explosion mark, where the U-Boat had disappeared. Severe damage to the aircraft prevented further observation and photographs. Enough is available to substantiate the narrative and to indicate a kill.

A Complete Surprise

On July 9, Searchlight Wellington R/179 was on anti-submarine patrol, flying at 1,300 ft. just below cloud base. Cloud was 4-5/10ths, sea moderate, visibility 20 miles. At 1812 hours, in position 39° 48' N., 14° 22' W., a U-Boat was sighted 6 miles away on the starboard bow, steering 360° at 9 knots. The conning-tower was high, with a step aft, and was painted dark grey. One large gun was seen abaft the conning-tower. The aircraft made its approach in and out of cloud until within two miles of the target. The captain then lost height and went straight in to attack, with his front gun firing. The enemy took no evasive action, and three men were seen on the conning-tower: one was very distinctly seen to be wearing a peaked cap, grey tunic, white sweater, with binoculars slung from his neck. The aircraft attacked from the port bow and released, from 50 ft., four Torpex depth-charges spaced at 90 ft. The U-Boat was still on the surface. One depth-charge is stated to have exploded on the port bow 20 yards from the hull, and one on the starboard quarter 3 yards from the hull. The other explosions were not seen. When the aircraft turned, the U-Boat was low in the water and almost stationary. The bow then began to settle with increasing speed. About 30 seconds after the attack the stern was sticking up at an angle of 50°, and two explosions occurred, originating below water level, slightly aft of the conning-tower. Oil and debris were thrown 50 ft. into the air. The stern then settled down and the U-Boat rolled over on its starboard side. It was not seen again. Among the debris solid brown objects, like slats of wood, 4 to 5 ft. long, were seen to fly into the air, and a large patch of oil formed round the U-Boat before it disappeared. No air bubbles were seen.

Result

A good approach, making full use of cloud cover, which resulted in the U-Boat being surprised on the surface and making no attempt to fire at the aircraft. An excellent attack, which, on visual evidence of a very steep angle and two explosions, followed by wreckage and oil, indicates the destruction of the U-Boat. The presence of floating wreckage is confirmed by photographs.

An Effective Attack with Cannon

On July 12, three Beaufighters of No. 248 Squadron were on offensive patrol in position 45° 06' N., 08° 00' W., when a fully surfaced 740-ton U-Boat was sighted two miles to port. The enemy's course and speed were 180°, 12 knots. All three aircraft immediately turned into line astern and went in to attack. Their approach was watched by about 18 men standing on deck. The enemy at once opened fire on the leading aircraft, B, with a light gun abaft the conning-tower. Tracer was seen coming up over the port wing. When return fire was opened with cannon, the U-Boat's heavy gun forward was manned, and

the pilot of B saw something the size of a cricket ball fly over the cockpit. Brown puffs of smoke about 2 ft. across were also seen. Aircraft V then came in to attack with a long burst of cannon fire, and hits were seen on the conning-tower. The U-Boat was now firing continuously and the aircraft had to break away and take evasive action. Aircraft A then took up the attack, and was soon hitting the conning-tower with cannon shells. This decided the U-Boat to take evasive action by zigzagging violently, firing all the time. All three aircraft repeated their attacks, and most of the 18 men originally on deck seemed to have left. At least one was in the water and another lying on the deck. The U-Boat's guns were silenced. The Beaufighters now pressed home their attacks from a lower level, and during aircraft B's third attack an explosion was seen abaft the conning-tower. The next attack was aimed at the same spot and produced a very much better explosion. The flame was an intense, brilliant red, and it seemed to linger for two or three seconds. Afterwards a column of thick black smoke was given off. After 15 attacks the U-Boat dived, apparently under control, and aircraft V fired at the swirl. Some debris was seen, but no bubbles or oil.

Remarks

An effective attack which certainly inflicted damage. It appears that the ready-use ammunition was destroyed, and the explosion of this must have damaged the superstructure. The effect of such an attack on the crew's morale must also have been considerable.

A Faultless Attack

On July 13, Sunderland N/228 was on "Musketry" patrol, flying on track 158° at 300 ft. Cloud was 8/10ths, base 3,000 ft., sea moderate, visibility 10-20 miles, wind 310° 5 knots: position 45° 02' N., 09° 14' W. Three surfaced U-Boats were sighted nine miles away on the port bow; their course was 206°, speed 13 knots. The S.E. was not in use. The U-Boats were probably of the 517-ton type, with no gun visible forward of the conning-tower. Aft of the conning-tower, which was large and light grey in colour, was a gun which seemed to be of the Bofors type.

The U-Boats were sighted at 0753 hours, and while the aircraft was circling at 100 ft., a Halifax approached on a course of 200° and joined the circle. Sighting reports were sent to base, and at 0825 hours the Halifax reported by R/T that it could stay only 10 minutes.

The U-Boats were in arrow-head formation and were putting up heavy A.A. fire. After the aircraft had been circling for some time in opposite directions, "N" succeeded in separating one U-Boat from its formation and attacked it from fine on the port quarter. Seven Mark XI Torpex depth-charges, set to shallow depth, spaced at 60 ft., were released from 50 ft. Evidence states that three charges fell close to the port side aft, one on the conning-tower and three close to the starboard side forward. The attack was made under heavy flak. The pilot had to jink over the conning-tower after release. The tail gunner and at least one other member of the crew saw the conning-tower blown into the air. A large part of the bow moved forward, stood on end, went over the vertical and slid under the surface.

What was left of the U-Boat rocked violently, capsized and sank. Big pieces of wreckage and about 25 survivors were seen in the sea. The aircraft dropped a dinghy and later saw that six men had got into it. A large patch of oil was visible, measuring about a mile long and half a mile wide.

Analysis

Good combination between the aircraft in spite of severe R/T difficulty. The tactics initiated on the spot were successful in confusing the flak and in ultimately causing the U-Boat formation to split up. Close contact by the aircraft enabled them to take instant advantage and the attack was well pressed home in face of flak. An excellent low level depth-charge attack was made resulting in an outright kill. Good judgment in dropping a dinghy to secure prisoners for interrogation. This successful action against a surfaced group of U-Boats has proved the necessity of going in against flak so as to obtain a Class I surfaced target which may be killed outright by a low level D.C. attack.

Very Good Tactics

On July 13, Halifax 0/58 on "Musketry patrol" was flying on a track of 333° at 500 ft.; cloud was 1/10, base 4,000 ft., sea moderate, visibility over 20 miles and wind velocity 290° 13 m.p.h. 6-7 miles away two white streaks, then two U-Boats, were sighted on the surface bearing green 30° in position 45° 09' N., 08° 54' W., course 140°, speed 8 knots. The aircraft turned slightly to starboard in order to get up sun, when a third U-Boat was seen; the three boats were in tight V formation proceeding at high speed. No S.E. contact was made until after the visual sighting. The U-Boats were light grey, with streamlined conning towers whose shape suggested armour-plate protection for the gun-platform abaft the bridge. They are described as similar in some respects to the Italian *Foca* class with the addition of a black object aft of the conning-tower, the shape of which was not observed in detail.

At 0759 a Sunderland appeared from the North on a course of 170°, and turned to port to circle the U-Boats clockwise. 0/58 followed in the circuit keeping five to eight hundred yards from the enemy. All three U-Boats immediately opened fire at both aircraft. The fire seemed to come from abaft the conning tower and was estimated to be 20 mm. At no time during the engagement were forward guns seen. The U-Boats took evasive action by making tight turns at high speed, the outside boat nearest the aircraft continually drawing away and turning stern on so that the stern fire of the whole formation could always be brought to bear. The flak was accurate for elevation and bearing but short for range, so that it gave the impression that the enemy gunners were attempting a box barrage between themselves and the aircraft. No tracer was seen. The aircraft took evasive action by gentle switchback flying but did not open fire.

Eventually "O" succeeded in getting in touch with the Sunderland by flying alongside and the

Captain told the other aircraft that he was going to fly on a reciprocal. "O" then turned and began to circle the U-Boats anti-clockwise. This manoeuvre was successful in splitting the fire of the U-Boats' gunners, who slackened off and finally ceased fire after the aircraft had made two more circuits. "O" intercepted words on R/T in a foreign language assumed to be German, and immediately afterwards the starboard U-Boat of the formation broke away and began to submerge. This boat was attacked by the Sunderland. The remaining two U-Boats then turned to port, the outside one submerging, the inner one remaining on the surface and reopening fire as if to cover his colleague's dive. "O" was on a course of approximately 360° when the last U-Boat was seen to be diving on a course of 180°. The aircraft turned to starboard and flew straight in. The attack was made from the U-Boat's starboard beam from a height of 50 ft. Eight Mark XI Torpex depth-charges were released, set to shallow depth, spaced 60 ft., five seconds after the U-Boat had disappeared. The periscope feather was visible about 50 ft. ahead of the swirl at the time of release. Evidence states that the depth-charges straddled the U-Boat's track 100 ft. ahead of the swirl, three under-shooting, two exploding on or near the U-Boat itself and producing a considerably larger plume, and the remaining two overshooting and exploding with smaller plumes. The aircraft made a tight turn to starboard and on tracking over the explosion mark again saw the brown explosion scum with black bubbles beginning to form in the centre. On the next circuit eight men were seen swimming in the centre of a spreading patch of black oil 200 ft. across. On circling a third time a number of other men were seen swimming through the oil patch towards the rim of bubbles that ringed the area. The aircraft was close enough to see that one man appeared to be naked. "O" was asked by the Sunderland to photograph the explosion mark of the Sunderland's attack, but no photographs were taken as only a patch of lightish green water was visible.

Analysis

The evidence was that at time of release the periscope feather was visible about 50 ft. ahead of apex of swirl and that conning-tower had dipped about 5 secs. Interval 5 secs + 2 secs. time of flight + 3 secs. to reach depth = 10 secs. During this time C.T. advanced 100 ft. from apex of swirl. Photographs disclose that the centre line of stick of explosions was 150-200 ft. ahead of apex of swirl and the stick spaced at 60 ft. straddled the line of advance. If, as is most likely, this was a 740-ton U-Boat the stick exploded across U-Boat between C.T. and bows and should have been lethal.

Remarks

The captain of the aircraft showed commendable initiative and the co-ordinated tactics of the two aircraft were excellent. The eventual attack was made with courage and accuracy.



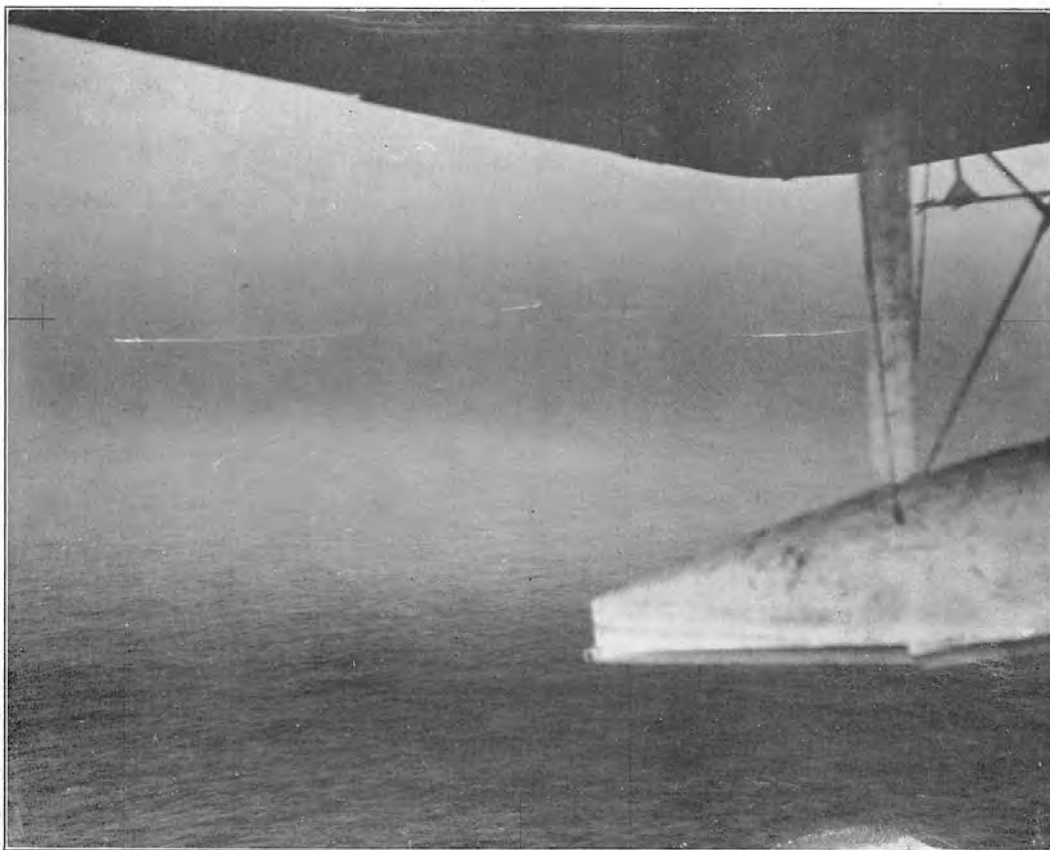
R.P. ATTACK by Hudson *F/48*, on June 4, showing release of the first pair of rockets.



The same ATTACK by Hudson *F/48*, showing the third release, of four rockets. The attack was assessed as "probably sunk."



SURVIVORS from a U-Boat destroyed by *N/228* on July 13.



U-BOATS manoeuvring on the surface, in a group of three. Photographed by *H/10*.

R.A.F. and U.S.A.A.F.

On July 28, 1943, **Liberator N/4**, U.S.A., when on "Musketry" patrol, sighted a U-Boat on the surface at a range of 5 miles. It immediately attacked from out of the sun. In spite of violent evasive action and flak from the U-Boat, the pilot pressed home his attack while firing nose gun and upper turret with good effect. Eight depth-charges were dropped and were seen to straddle. The gunnery was so effective that it silenced the U-Boat's guns and killed at least two of the gunners. The aircraft was not hit. A second attack was made immediately afterwards. By this time the U-Boat had replaced the crews of his guns. The upper turret of the aircraft was then found to be jammed and the nose gun had used all its ammunition. Four depth-charges were dropped, all of which were seen to fall short, with number four very close to side of the U-Boat. The aircraft was hit in the left outboard engine and made unserviceable.

In the meantime, **Liberator W/224** had sighted the depth-charge plumes from both these attacks

and the pilot immediately turned to investigate. Shortly afterwards, a U-Boat was sighted on the surface with N/4 circling. The pilot attacked from 150 ft. in fierce flak, dropping seven depth-charges which straddled. The aircraft was hit at about 400 yards on the run in and number four engine was set on fire. After this attack the U-Boat disappeared and then re-appeared momentarily on an even keel. It finally disappeared "not in the normal diving manner." Ten bodies were seen to be floating after the depth-charge plumes had subsided.

In the first attack, N/4, U.S.A., obtained hits with the front gun at 1,000 yards and quickly killed the guns' crews. She herself was not hit. In the second attack, when no fire was possible from the aircraft, she was hit and one engine rendered unserviceable.

The splendid look-out kept in W/224 made certain of a quick follow-up. This U-Boat, which is "known sunk," is shared equally between the two aircraft.

A Very Gallant Attack

On July 24, **Wellington Q/172** was lost in action after mortally damaging a large U-Boat, which was subsequently sunk by another Wellington. At about 1715 hours Q/172 was at the end of its patrol when an S/E contact was gained 6 miles to starboard. The aircraft was flying at 1,000 ft., in cloud. Five miles from the U-Boat the aircraft broke cloud and sighted the target, which was fully surfaced. The captain realized that the U-Boat was going to fight and told his crew that he was going straight in to attack. Very heavy and accurate fire was immediately brought to bear on the Wellington. When still 1,000 yards away the rear gunner saw pieces of the fuselage being shot away and later felt an explosion within the aircraft. The captain maintained his attacking course and the aircraft crashed aft on the deck of the U-Boat. The Wellington's crew were all killed except the rear gunner. He found himself under water, held by the feet. He kicked himself free, came to the surface, and reached the dinghy. He saw two fires on the water which marked the wreckage of the aircraft. The crew of the U-Boat were by now on deck and their boat was circling slowly, with black smoke pouring from the stern. She was later finished off by another aircraft. The rear gunner of Q/172 was subsequently picked up by a destroyer and landed at Plymouth. He had only superficial

injuries. Photographs show that the U-Boat was a 1,600-ton supply vessel.

The second Wellington was **V/547**, which sighted the damaged U-Boat 8 miles away dead ahead at 1759 hours on the same day. It was circling and almost stationary. The aircraft turned slightly to port and opened fire with its forward guns. The attack was made from the starboard quarter, and seven Torpex depth-charges, spaced at 60 ft., were released from 50 ft. The explosion of the first depth-charge forced the U-Boat up and over to port, after which she settled by the stern. The crew started to dive off the hull, which had completely disappeared within two minutes. During the approach ineffective fire had been opened on the aircraft. A second run was made over the scene of the attack, and a yellowy-brown discharge was seen from the U-Boat's stern, followed by a large quantity of iridescent oil. Twenty to 30 seconds after the U-Boat had disappeared, a very violent underwater explosion occurred, bodies being blown into the air. At 1801 hours the aircraft passed over a dinghy containing one man. This was the survivor of Q/172, and supplies were dropped to him. On returning to the scene of the attack about 1½ miles away, the survivors of the U-Boat were seen to have launched about 20 small aircraft type dinghies which they had tied together to form a kind of large raft.

Naval Staff's Remarks

On the approach the U-Boat's flak was smothered by the aircraft's front gunfire and casualties appear to have been inflicted on the U-Boat's crew, many of whom were on the upper deck. Q/172's attack at about 1715 hours had already mortally damaged this U-Boat which was very low in water aft and leaking oil heavily. The advent of a fresh aircraft on the scene no doubt filled the U-Boat's crew with despair. V/547's depth-charge attack overshot

(confirmed by photographs) but the moral effect of a fresh aircraft, plus the inability of the U-Boat to escape by either diving or fast surface evasion, seems to have caused the final abandonment of the U-Boat and the firing of the demolition charges (see photograph, plate 6). Very good photographs were secured. Photographs disclose that the last two depth-charges ricochelled a long way and finally exploded 250-300 ft. away from the remainder of the stick.

Mortal Damage by a U.S. Liberator

On July 20, **Liberator F of No. 19 U.S. Squadron** was on "Musketry" patrol flying on a track of 180° at 2,000 ft. The cloud was 10/10ths, base 1,000 ft., sea slight to moderate, visibility 6 miles below cloud, wind 010° 31 m.p.h. At 1025 hours two U-Boats were sighted on the surface, and at 1050 hours, in conjunction with an R.A.F. Liberator, an attack was attempted. The aircraft, however, ran into a rain squall, and when they came through it, the U-Boats had dived and the swirl could not be seen. At 1204 hours F gained another S/E contact at 13 miles, bearing green 90°. The pilot homed and sighted a surfaced U-Boat 5 miles ahead in position 45° 10' N., 09° 10' W., on a course of 090°, speed 10 knots. The U-Boat appeared to be a German type. The conning-tower, which was grey, had two steps, and there were at least two guns aft and one heavy gun forward. The pilot immediately went in to attack from the port quarter. The U-Boat altered course to starboard and opened intense and accurate flak as the aircraft ran in. The navigator, top gunner and waist gunner returned the fire and scored hits. The aircraft was hit in several places, the port waist gunner being wounded. The aircraft attacked from red 160° and released from 100 ft., seven Mark XI Torpex depth-charges, set to shallow depth, spaced 54 ft. The U-Boat was still surfaced, and again altered course to starboard. The stick was seen to explode close along the port side. The aircraft circled to port for a second attack, but the port inner engine cut out and could not be feathered. At this moment a Halifax appeared. The U-Boat was doing a tight circle to port, rolling heavily,

and down by the stern. At 1235 hours, having been relieved by the Halifax, the Liberator set course for base.

The **Halifax, E/58**, circled the U-Boat at 1,500 yards and engaged with gunfire. At 1245 hours the U-Boat's crew were seen to be climbing on to the foredeck, and 3 minutes later the U-Boat began to settle lower in the water. E/58 then went into attack from the starboard bow releasing from 50 ft., eight Mark XI Torpex depth-charges, set to shallow depth, spaced at 60 ft. Just before the aircraft reached the U-Boat a raft-type dinghy containing three men was seen leaving the side. Evidence states that three charges fell to starboard and five to port. The U-Boat heeled over on its port side, and 10-12 ft. of the bows suddenly appeared out of the water before being obscured by spray. When the depth charges exploded, bodies were thrown into the air, and 40-50 men, dead and alive, were seen in the water. More men were seen to enter the dinghy or cling to it. Bodies were spread over an area about a quarter of a mile square. No wreckage was seen.

Naval Staff's Remarks

Very good Radar results throughout. A determined approach under accurate flak and an excellent low level attack which the U-Boat was unable to evade. From the visual evidence backed up and confirmed by E/58 the U-Boat was mortally damaged by this attack and after a few evasive turns to try and avoid E/58's attack, the crew began to abandon ship. E/58 hastened the end by straddling the dying U-Boat.

An Entire Pack Destroyed

On the morning of July 30, the Germans received an emphatic answer to their new U-Boat pack tactics. Surface craft co-operated with seven anti-submarine aircraft, six British and one American, to sink all three U-Boats of a pack. The story begins shortly before 1000 hours when patrolling aircraft intercepted a sighting report from **Liberator O/53**. In less than half an hour a **Sunderland, R/228**, was on the scene circling the three surfaced U-Boats which were in V formation steering south-west. The arrival of a Ju.88, which forced the Sunderland to jettison his depth-charges and make for cloud, threatened to spoil the battle. Contact, however, was maintained and soon a Catalina arrived and then left again to guide some naval sloops to the scene. Meanwhile,

other aircraft had been diverted to the position, and shortly before 11 o'clock two **Halifaxes, B/502** and **S/502**, another **Sunderland, U/461**, and another **Liberator A of 19 Squadron, U.S. Army**, were all present.

By one of the most extraordinary coincidences of the war, worth mentioning at this point, the U-Boat No. U.461, which was the first to be sunk, was killed by aircraft U/461, in the captain's first attack on a U-Boat.

The attack was opened by Halifax B/502 on the starboard wing U-Boat. The aircraft dropped from 1,600 ft. three 600 lb. A/S bombs, spaced at 100 ft. The attack was made from the U-Boat's port quarter and the stick fell about 70 yards over the starboard beam. No evidence of damage



This photograph (taken by 520 Squadron) is of the naval base at Trondheim immediately after an attack by the U.S.A.A.F. on July 24. Fires can still be seen burning on the north side of the LADEHAMMEREN Basin, where 3 of the 6 workshops are nearly gutted. In addition to damage to other waterside buildings, a Narvik class destroyer was also hit. The concrete U-Boat shelters can be seen towards the left lower part of the picture.



CONVOY SC135 photographed by 423 Squadron.



A Bv.138 destroyed by Beaufighters of 404 Squadron. (See letterpress p. 18.)



A F.W.200 destroyed by Beaufighters of 248 Squadron. (See letterpress p. 19.)



A Ju.88 destroyed by Beaufighters of 248 Squadron. (See letterpress p. 19.)

was seen. In making the attack the Halifax had been met with a heavy concentration of flak from all boats, and was hit in the starboard elevator. Fire was returned and bullet splashes straddled the conning-tower. B/502 then set course for base.

The second Halifax, S/502, then attacked the same U-Boat, dropping singly three 600 lb. A/S bombs from 3,000 ft. The attack was made from dead astern, and the first bomb fell close to the stern of the target. The damaged U-Boat circled slowly to starboard with dark smoke pouring from abaft the conning-tower. Intense flak was experienced during the run up. The other two A/S bombs failed to hit. About 15 minutes after the first attack the damaged U-Boat slowed down, stopped, and began to settle on an even keel. Some 40 men were seen abandoning ship. Just as the conning-tower was sinking, with smoke still pouring out, shells splashed near, and the sloops were seen firing about five miles away.

Before this U-Boat had been finally disposed of, it had been unsuccessfully attacked by the U.S. Liberator A. This aircraft had already made one attempt to get in an attack in company with Sunderland U/461, but neither aircraft could get through the intense flak. The Sunderland then attacked the port wing U-Boat, while the Americans pressed home another attack on the already damaged starboard wing boat. After penetrating intense flak they tracked over the

U-Boat—confirming that smoke was coming from it—but their bomb release was shot away and the attack was abortive.

The Sunderland's attack was an outright kill. The U-Boat had been previously attacked ineffectively by Liberator O/53 and the aircraft was subjected to a very intense barrage of fire from all the U-Boats. This gave U/461 his chance. While the enemy gunners were concentrating on O/53, the Sunderland came in on the port quarter at 50 ft. and dropped seven depth-charges spaced at 60 ft. The stick straddled and the bows gave off quantities of orange-coloured froth. When the aircraft came round again about 30 men were seen in the water and a dinghy was dropped to them.

There is no doubt that this very accurate attack by U/461 was made possible by the fine effort of Liberator O/53. But in drawing upon itself such heavy fire, this aircraft was badly damaged and did not return to base. It has since been learned that it was able to make a successful forced landing in Portugal.

Seeing two of his colleagues thus disposed of despite heavy defensive fire, the captain of the third U-Boat decided that his only hope was to dive. This did indeed save him from air attack, but not from eventual destruction. The sloops were rapidly closing the scene of the action, and soon gained contact. Depth-charge attacks were carried out, and the third U-Boat joined the others on the bottom.

Mock Turtles

At 1215 hours on August 3, 1943, Sunderland Z/461 was on Musketry Patrol, in position 48° 57' N., 09° 20' W., when a raft, yellow in colour and about 8 feet by 6 feet, was sighted. On investigation from 200 feet directly overhead, it was seen that there was on board the raft a body, which, from its flat-white colour was deduced to be nude and, possibly, dead.

The Captain of the aircraft dropped a marine marker at the spot and made a signal "AM OVER RAFT—ONE PERSON ABOARD." He circled around the raft and when about half-a-mile away from it, saw the body dive overboard. When he passed over the raft for the second time it was empty.

The obvious deduction was that the man on the raft was a Hun who did not want to be shot up by the Sunderland.

Determined to save the diver from his own folly, the Captain of the aircraft went over to an Escort Group, which was known to be a few miles away, and informed the S.N.O. by V/S that there was a "RAFT WITH MAN ABOARD." A destroyer dutifully followed the aircraft to the raft. While engaged on this errand of mercy the Sunderland twice flew over the raft and each time the man was seen swimming alongside; but whenever the aircraft approached, he went underneath the raft so as to escape attention.

At 1300 hours the destroyer reached the raft and reported to the aircraft by V/S "NO MAN ON BOARD RAFT." The aircraft replied "MAN IS UNDERNEATH RAFT." After again investigating the raft the destroyer flashed to the aircraft "MAN ON RAFT WAS A TURTLE."

These are the facts. It is not possible to doubt the word of the aircrew, who are all experienced and who of course were all sober at the time. And yet it must be admitted that the crew of the destroyer was in a better position to judge the species of the body than was the crew of the Sunderland.

Turtles do get about, of course. One hears of them at Lord Mayors' Banquets, and in 1937 or 1938 one beached himself at Tenby, having, presumably, crossed under his own power from the Sargasso Sea, or wherever he usually resided. This one might have been a tripper to the War Zone, who had become so tired (or short of fuel) that he decided to rest on the raft. It is difficult to say, as he is not available for interrogation.

Something of the sort has happened before. A Walrus pilot was searching south-east of Sardinia when he suddenly saw a dinghy. It was greenish in colour and was paddling along. He prepared to alight and pick it up, but when he got down below 200 feet the dinghy and paddles were suddenly transformed into a large turtle moving its legs.

Thus we cannot entirely rule out the supernatural—gremlins could, we imagine, change men, even ex U-Boat crews, into turtles.

II.—ANTI-SHIPPING

Use of R.P. as an Anti-shipping Weapon

In anti-shipping operations off the Dutch and Norwegian coasts we have to contend with the fact that the enemy's shipping lanes are within easy range of his single-seater fighters. In this Command we have no high or medium level bombers capable of beating off fighter attacks, so that low level attacks are a necessity. Unfortunately low level bombing, though effective, has proved costly in the face of the enemy's increased flak defences. The only weapon therefore which we had left was the torpedo carrying aircraft, where approach could be covered by smothering the escort vessels with cannon and machine-gun fire.

The advent of the R.P. weapon gave us another possible means of attacking shipping from a comparatively low level. The weapon in its present form can consist of either a 25-lb. solid head or a 60-lb. S.A.P. explosive head, eight of which could be fired either in pairs or in salvo or in a combination of the two. It was decided that the most suitable R.P. head for anti-shipping operations was the 60-lb. explosive head, since the damage from the solid 25-lb. head would be insufficient, even under water, to sink enemy vessels, nor would it have such a deterrent effect upon enemy flak-gunners.

The anti-shipping problem with R.P. was a dual one. There were two roles to be considered, the first of these was the use of R.P. as a primary weapon with which to sink enemy merchant shipping, and the second to use it as a secondary weapon to the torpedo to keep down the fire of enemy escort vessels and to cause as much damage to the escort vessels as possible.

The next question to be solved was that of the range at which the R.P. should be sighted and fired. In previous anti-shipping operations with cannon the tactics followed were to open fire at 1,000 yards or over and to press home the attack to close range, relying on the long range inaccurate fire to keep down the gunners' heads until the range could be closed sufficiently to ensure hitting the enemy hard. With R.P. we were faced with the following limitations—firstly, an outside range of about 1,200 yards *provided* range could be accurately judged, and secondly, an inside range of 600 yards to allow the Beaufighters to turn away outside the range of the 60-lb. head explosion, for the Beaufighter turning circle at high speed is large.

It was considered that to hold fire to 600 yards when attacking a well-armed ship would probably be to court disaster from the ship's gunners, who would have nothing to distract their attention. It was thought that cannon fire up to 600 yards was impracticable as the trajectory of R.P. was so much worse than that of cannon, and to pull the aircraft up to fire the R.P. resulted in a bad undershoot. (But this is now in doubt and may prove possible.) It was therefore decided to open fire from between 1,200 and 1,000 yards and to fire four pairs in quick succession. The sight was set mid-way between the ranges of opening fire and closing fire so that the effect

would be a vertical stick of which two-four R.P.s should strike the target.

Three Beaufighter Squadrons, Nos. 143, 235, 236, have been equipped with the R.P. weapon for anti-shipping duties. Nos. 143 and 236 Squadrons form part of the North Coates Beaufighter wing, whereas No. 235 Squadron has been operating independently in No. 18 Group. The operations of these squadrons should be considered independently.

No. 235 Squadron, it was decided, was to be used with R.P. as a primary weapon to sink shipping on the Norwegian coast. The squadron was taken out of the line to train for one month, a decision which has definitely proved its worth.

The first problem confronting No. 235 was that they would be operating on the Norwegian Coast without single seater protection and in all probability with cloud cover at about 1,000 ft. Hence, if they were to get a dive to pick up speed and open fire at 1,000 yards it was obvious that a steeper dive than 10° was impossible. In consequence the aircraft R.P. installation was harmonized for a 10° dive and the sight set for 1,000 yards at about 240 knots. The intention was to open fire at this range and fire four pairs in very quick succession breaking off at 800 yards.

So far the squadron has made three R.P. attacks. The first was against a stranded merchant vessel and 24 R.P. were fired, six hits being estimated. The vessel caught fire but subsequently the fire went out. The second attack was against a single large armed trawler when 20 R.P. were fired and 10 hits were estimated. When last seen the trawler was stopped and on fire astern.

The third attack was against a medium sized unescorted vessel and three aircraft made the attack. Of the 16 R.P. fired 12 direct hits were estimated and a tremendous explosion resulted which blew the third aircraft off its aim at 1,000 yards and completely covered the ship in smoke. Owing to the proximity of the enemy coast and enemy fighters, it was impossible to stay and see results, but a P.R.U. aircraft could see no sign of the ship two hours later. It appears likely that this ship was sunk.

These results are encouraging and show that with a well-trained squadron, and without heavy flak opposition, the R.P. has proved accurate and effective at a range of 1,000 yards.

The work of 143 and 236 Squadrons must be considered next. These squadrons are operating with the North Coates wing and have used the R.P. both as a primary and as a secondary weapon.

Owing to the heavy flak opposition a range of 1,200 yards was selected, four pairs being fired between 1,200 and 800 yards, with a sight setting of 1,000 yards. The aircraft installation is harmonized for a 20° dive at 265 knots as the wing normally operates in good weather conditions with fighter escort.

The results of the firing have been disappointing, three strikes having been carried out. On the



R.P. AND CANNON ATTACK by 143 and 236 Squadrons on an armed trawler in the anchorage at Den Helder on July 18. The above photograph by 143 Squadron.



THE SAME ATTACK : photograph by 236 Squadron of a near miss on a small sperrbrecher and an armed coaster.



SHIPPING ATTACK by 404 Squadron, July 10 : Photograph by *M/404.*



THE SAME ATTACK : another photograph by *M/404.*



THE SAME ATTACK : Photograph by *J/404.*

first the R.P. aircraft were detailed to attack escort vessels and fired 192 R.P.s. It is impossible to estimate the number of hits, but after assessment the final damage was given as two escort vessels damaged, although it is believed that five were hit. The second strike was carried out with R.P. aircraft only, the aircraft being divided between the main merchant vessels targets and the escort vessels. 164 R.P.s were fired and hits were estimated as probable on three escorts and possible on one merchant vessel. In the third strike 64 R.P.s were fired at a convoy leaving Den Helder, but, owing to the intense flak from ship and shore, results were difficult to observe.

These results cannot fairly be compared with those of the Norwegian coast squadron. To maintain the steady aim and to judge range accurately as required for an R.P. attack is a difficult matter with some 30 aircraft attacking at one time in face of very intense flak. Furthermore, owing to the uncertainty of enemy shipping movements, standing by is bound to affect training and to prevent squadrons being taken out of the line to train. Photographs and camera gun evidence point to R.P.s being released out of range and in the turn, etc. It is hoped, however, that the shooting will improve with practice.

It has also been shown that, as an anti-flak measure, R.P. is less effective than cannon fire, which, if pressed well home by three aircraft against an escort vessel, is devastating in

its effect on the morale of gun crews, and undoubtedly causes numerous casualties. The value of R.P. lies in the fact that a well aimed salvo will in all probability sink an escort vessel, which is even better than killing the gun crews and damaging the ship with cannon.

Hence, in order to get the maximum effect from the torpedo aircraft, cannon should be used to destroy the enemy's flak positions, but, in order to sink the enemy's flak ships, R.P. is a valuable weapon. The problem is how to do both, and the solution lies in one of two methods:—

- (i) The first method is to put two cannon aircraft and an R.P. aircraft on the same escort vessel and to trust to the effect of the cannon to allow the R.P. aircraft to close to 600 yards and fire a salvo.
- (ii) The second method is for all three aircraft to fire cannon down to 600 yards and then to pull up the nose and fire a salvo of four very close pairs of R.P.

It is impossible yet to tell which is likely to be more effective. The advantage of the first method is that one aircraft has a definitely steady aim, but, conversely as R.P. is not 100 per cent. accurate and three salvos aimed quickly at 600 yards may very well get as many or more hits as one salvo aimed steadily, as well as giving an extra cannon attack.

Attacks

The No. 16 Group Beaufighter Wing carried out a daylight attack on a convoy between The Hague and Vlieland on 27 June. The convoy was first sighted by an aircraft of No. 254 Squadron, on the morning of 27 June, heading south. It consisted of four merchant vessels of about 2,000 tons, disposed in two columns, preceded by five "M" Class minesweepers and escorted on both beams and astern by seven armed trawlers and one vessel thought to be a gun coaster. It was again sighted by Mustangs of Army Co-operation Command five hours later.

The striking force consisted of nine aircraft of No. 236 Squadron and 12 aircraft of No. 143 Squadron, all armed with R.P. and cannon. The usual fighter escort was provided by No. 12 Group.

It was decided to attack the rear of the convoy. The rearmost trawler on the starboard side of the convoy, the suspected gun coaster and the trawler at the rear of the convoy, were to be attacked by No. 236 Squadron; the last trawler but one on the starboard side, the last merchant vessel in each column and the last trawler on the port side to be attacked by No. 143 Squadron.

The Wing made a landfall at the Dutch coast off the Hook, having previously climbed to 1,000 ft., and turned northwards up the convoy route. While the turn was being executed the convoy was sighted eight miles away, fine on the port bow and the Wing was manoeuvred so as to approach from the seaward side. No element of surprise was achieved, heavy anti-aircraft fire being met at extreme range. But the aircraft attacked as briefed. Photographs taken during the attack show two armed trawlers to have been seriously damaged, whilst a number of

other vessels must, to say the least, have had a frightening time. Two aircraft failed to return from this operation.

Beaufighters T, R and O of No. 235 Squadron, armed with eight R.P. and cannon, escorted by K, N, R of No. 404 Squadron, carried out a Rover patrol off the Norge coast on 4 July.

After making a landfall at Hano the Beaufighters turned north-east, proceeded along the coast and almost immediately shore-based guns opened up with continuous light flak which was especially accurate at Vevang. A small convoy of two 1,000-ton merchantmen, escorted by three escort vessels, opened fire when sighted off Bremsnes, but at the same time the target was sighted: a stranded merchant vessel of 4,000 tons. The R.P. aircraft attacked through heavy and light flak from Kristiansund (N) and released their R.P. in pairs in quick succession, in a 10° dive at 1,000 yards range (estimated), while the escorting aircraft were circling above to give cover. Two Me.109's appeared and attacked the Beaufighters, causing damage to T/235 and slightly wounding the observer. This aircraft crash landed on reaching base. During the attack one Beaufighter, K/404, was seen to be flying towards the coast, pouring smoke. It did not return to base.

Photographs show the vessel with a considerable list to starboard and slightly down by the stern. The list was more pronounced after the attack had taken place.

Beaughters O, E and R of No. 235 Squadron armed with 8 R.P. and cannon, escorted by B, D, M, O, N and J, 404 Squadron, carried out a Rover patrol off the Norge coast on 10 July.

While passing Fedje Island, an almost stationary armed vessel was sighted and the R.P. aircraft climbed to 1,000 ft. to attack. Hits and near misses were scored and a fire was started in the stern of the vessel, shown by photographs to be an 800-ton armed trawler. Beaughter O/235 was seen to crash into the sea with port engine on fire.

Beaughters S, E1 and C1 of No. 235 Squadron, armed with R.P. and cannon, were escorted by Beaughters E, N, B, M, F of No. 404 Squadron on a Rover off the Norwegian coast on 17 July. Landfall was made three miles south of Fedje, when the formation turned north, flying at approximately 50 ft. A 3,000-ton merchant vessel was sighted four miles ahead, accompanied by a smaller ship—possibly an escort vessel. The

aircraft of No. 235 Squadron immediately climbed to about 1,000 ft. and attacked the M/V from the port quarter, with R.P. and cannon. The aircraft opened fire at ranges between 1,000 and 1,500 yards estimated, closing to 200 yards at 50 ft. S scored four direct hits between the aft well and the stern; E1, attacking immediately after and releasing eight R.P. in quick succession. It is claimed that all were direct hits amidships. Immediately afterwards a heavy explosion occurred in the ship, which was enveloped in a sheet of flame followed by clouds of grey smoke. As C1 approached to attack, the aircraft was thrown violently to port by the explosion and the pilot was unable to reposition himself to release his R.P.s. No damage was caused to the crew or the aircraft.

The Beaughters of No. 404 Squadron provided cover for the R.P. Beaughters by attacking both vessels with cannon fire. The aircraft experienced light flak from the merchant ship and the shore.

Aircraft N was damaged and the pilot wounded, but the aircraft was brought back to base where it crash landed.

The First Torpedo from the First Submarine

One day in the summer of 1863, when the Federal fleet was hammering Charleston, South Carolina, Dr. St. Julien Ravenel, a physician and agricultural chemist, had a discarded locomotive boiler loaded on a wagon and sent to his plantation, 30 miles inland.

There, unseen by Northern agents who by night floated information down the harbour in bottles to the blockading Yankees, Dr. Ravenel supervised the transformation of the ancient boiler into a strange-looking boat, conceived and designed by himself.

It was cigar-shaped, 30 ft. long by 5½ ft. wide, driven by a small steam engine. From the bow a hollow 14-ft. shaft projected forward below the water-line. When taken secretly to Charleston and launched, the boat was submerged, except for a 10-in. coaming around the hatch and a small smokestack. It was christened the "David," because it was going out to attack Goliath.

On the night of 5 October, 1863, Lieutenant W. T. Glassell of the Confederate navy and a crew of three took the "David" unseen down Charleston harbour, to the flagship "New Ironsides," then probably the most powerful warship in the world. Running at full speed, the "David" drove her projecting shaft, at whose end was affixed a contact torpedo, against the flagship's armoured flank. As the torpedo struck there was a thunderous explosion. The battleship was seriously damaged.

The "David" was almost swamped, but she got clear and returned safely to Charleston after delivering the first successful torpedo attack in history.

III.—OTHER OPERATIONAL FLYING

Enemy Attacks on Anti-Submarine Aircraft

Hudson U/233 was engaged on anti-aircraft and anti-submarine escort to a convoy off Cape St. Vincent on June 18. At 0705 hours, while flying on a northerly course at 4,500 ft., the Hudson sighted a four-engined aircraft low over the water two miles on the starboard beam, approaching the convoy. U/233 increased speed and dived to intercept. When the range had decreased to 1,000 yards, the aircraft was identified as a F.W.200. The enemy aircraft made a feint turn to port and then a wide turn to starboard round the convoy, hotly pursued by U/233, who managed to close the range to 800 yards and to open fire at this range with the front guns. The enemy aircraft returned the fire from the rear and top gun positions with cannon, using self-destroying ammunition. The F.W. was now on a north-westerly course and it gradually drew away from the Hudson. The Hudson returned to the convoy and contacted the S.N.O. At 0720 hours the convoy was seen to open fire. A F.W.200 was again seen approaching low over the water from the same direction. The Hudson again increased speed and dived to intercept. The enemy aircraft immediately turned away and again made off at high speed in a north-westerly direction. The Hudson gave chase for two minutes, but the range could not be closed, so U/233 returned to the convoy and awaited the relieving aircraft.

Wellington S/407 (R.C.A.F.) while on night A/S patrol in the Bay of Biscay on June 29, made two or more contacts on S.E., approximately four miles to port. The contacts were closing quickly and the rear gunner was warned to keep a sharp lookout. The weather was clear and bright, with stars. Shortly after the warning the rear gunner saw an aircraft approaching astern at 400 yards. The aircraft opened fire with cannons and machine gun which went 30 yards astern of the Wellington. The rear gunner was able to get in a short burst. This aircraft had orange and white lights on the wing tips. The S.E. operator now acted as fire controller. Number two enemy aircraft, with an orange light in the nose, now attacked from astern, and the rear gunner of S fired long bursts at point-blank range. The enemy aircraft was seen to be on fire as it broke away. Three enemy aircraft were now seen; one to port and one to starboard, both with an orange light in the nose, and one astern with wing tip lights. An aircraft on fire was also seen in the distance. Aircraft S took evasive action by making diving turns towards the attacks, but the enemy aircraft, although often closing right in, did not always open fire. The enemy aircraft disappeared after about one and a half hours. The crew of S thought the enemy aircraft were able to follow easily on account of two streams of sparks from the exhausts of S. Neither crew nor aircraft suffered mishap or damage.

Liberator B/53, while on anti-submarine patrol on July 8, sighted seven Ju.88's. One aircraft was leading, followed by two loose Vics of three. The aircraft turned behind B, split up, and began

to attack from the port and starboard quarters and on the bow, diving from 500 ft. above B. The enemy aircraft opened fire at 1,500 to 1,000 yards, breaking away when return fire was met at 800 yards. Two enemy aircraft then closed in to 300 yards and succeeded in disabling the starboard outer engine, wounding the starboard beam gunner and killing the port beam gunner. B's speed now dropped from 200 m.p.h. to 180 m.p.h., but the pilot carried out evasive action by turning in to attacks, diving, climbing, and tight turns. The enemy attacks were well co-ordinated, being made simultaneously from either bow. But they were pressed home by only three of the aircraft. Thirty minutes after the first attack, 6/10ths cloud cover at 2,000 ft. was reached and good use was made of this. Only three enemy aircraft now remained, and ten minutes later these were lost in cloud. One enemy aircraft was last seen about two miles astern, and although the rear gunner again manned his gun, there was no attack. Thirty to forty attacks were made in all by the enemy aircraft. In spite of serious damage to our aircraft and crew, the pilot succeeded in making base.

Catalina R/190, was on A/S patrol on July 8 when a Bv.138 was sighted. R/190 climbed to cloud base at 2,000 ft., and approached the enemy aircraft which had apparently not seen R. At 800 yards range, both aircraft opened fire, R/190 with front guns and starboard blister guns, and the enemy aircraft from the rear turret. The enemy appeared to be using self-destroying ammunition. Both aircraft circled to starboard at first. Then R/190 turned to port and a head-on attack was made. The gunner manning the port blister gun of R/190, allowing large deflection, fired long bursts at 600 yards range. The enemy aircraft passed through this cone of fire and smoke appeared from the centre nacelle. After ten minutes the Bv.138 jettisoned its bombs, which exploded on hitting the sea. The enemy aircraft then fired a red star cartridge and began climbing, at the same time attempting a head-on attack. As the enemy aircraft passed below R/190, members of the crew saw that the rear turret gun was not manned and that the gun was pointing vertically in the air. A streak across the port mainplane outboard of the engine, resembling a gash, about three to four feet long, was also seen. The enemy aircraft broke off the combat, which had lasted 35 minutes, by climbing into cloud. Aircraft R resumed patrol although practically all ammunition had been exhausted. Sixteen minutes later a Bv.138 was sighted 1,000 ft. above, diving from the port quarter. R/190 took evasive action, during which the port blister gun fired the remaining ammunition. The enemy aircraft again attempted a head-on attack, but R/190 evaded by climbing into cloud.

Hudson B/233 flying at 2,500 ft., was on A/S escort to a convoy on July 9, when it sighted dead ahead a formation of four F.W.200's flying at 100 ft. The pilot of B increased speed and at the same time fired a red Very light to attract the attention of two Beaufighters also escorting

the convoy. Aircraft B then dived to attack, opening fire at 600 yards on the F.W.200 on the extreme left and breaking away at 400 yards. Many hits were seen on the enemy aircraft, whose port inner engine began smoking furiously. During this action a Beaufighter was seen to destroy an enemy aircraft on the extreme right of the formation. Aircraft B then resumed escort to the convoy. Forty-five minutes later a bomb burst was seen 40 yards on the port beam of a merchant vessel and a F.W.200 was sighted 8,000 ft. above the convoy. The pilot of B immediately climbed to intercept at full throttle, and four minutes later was 600 yards astern and slightly below the enemy aircraft. Fire was opened with all guns as and when they could be brought to bear, during a series of skidding turns. The enemy aircraft returned the fire and B was hit repeatedly and had to break away out of control. During this engagement many hits were scored on the enemy aircraft and bits were seen to break off the wings and nose. Smoke was issuing from the bottom of the fuselage and the F.W. jettisoned its bombs. Aircraft B lost 5,000 ft. before the pilot was able to regain control and fly back 200 miles to base, on one engine.

Mosquito E of 333 Norwegian Squadron was carrying out a weather and shipping reconnaissance off the Norwegian coast on July 9 when it sighted a Ju.88 flying on a reciprocal course at 600 yards range. The enemy aircraft fired a multi-red star cartridge. The Mosquito turned after the enemy aircraft, and opened fire when 250 yards astern. On breaking away underneath the enemy aircraft, the port engine was seen to be on fire, and on turning round, the enemy aircraft was seen to crash into the sea. As there was no return fire, the crew of E/333 considered that the Ju.88 did not recognize the Mosquito as an enemy aircraft.

Halifax V of No. 502 Squadron, flying at 2,500 ft. on A/S patrol in the Bay of Biscay, sighted a Ju.88 diving out of the sun on the starboard beam. Aircraft V immediately took evasive action with a steep diving turn to starboard. During this manoeuvre it was seen that there were three more enemy aircraft following in line astern. The enemy aircraft now positioned themselves two on the port quarter and two on the starboard quarter. Aircraft V jettisoned its bombs and set course for the nearest cloud cover, which was 2/10 St. Cu. This did not provide

much cover, and one enemy aircraft positioned itself immediately above V apparently shadowing and directing the attack of the others. The captain of V/502 decided that the cloud cover was ineffective and started to climb at maximum boost and revs. One enemy aircraft was now on each bow, and one on each quarter at approximately 600 to 800 yards range. While one enemy aircraft made a feint attack, the other carried out the real attack. These were counteracted by violent corkscrew evasive action. One Ju.88 closed to 100 yards and the tail gunner of V got in a long burst from 500 yards. When the enemy aircraft broke away black smoke was seen. Two of the Ju.88's turned away and circled the damaged aircraft. The remaining Ju.88 now carried out an attack on the starboard bow. V countered with a steep diving turn to starboard and the enemy aircraft passed ahead at point-blank range. The front and tail gunners of the Halifax opened fire and succeeded in obtaining many hits. As the Ju.88 passed astern towards the other three enemy aircraft, black smoke was seen pouring from it. A few moments later the navigator and tail gunner of V saw white objects in the sky which appeared to be parachutes, and the Ju.88 was seen to dive through the clouds. It was almost certainly destroyed. The three remaining Ju.88's then set course eastwards. The Halifax received one bullet hole in the port aileron.

Sunderland "E" of No. 10. R.A.A.F. Squadron, at 1605 hours flying at 2,500 ft. in unlimited visibility, sighted three Ju.88's in line astern 8 miles on the starboard bow, and another Ju.88 8 miles to port. The depth-charges were jettisoned and action stations taken up. The enemy aircraft attacked from all angles, singly and in pairs, but their attacks were not co-ordinated, and E/10 was able to frustrate most of them by diving turns in the direction of the attack. The First Pilot was hit in the heel but was able to carry on. Three of the enemy aircraft were hit by return fire and two of them were leaving trails of black smoke. After three-quarters of an hour's combat, the outer starboard engine was hit and this put the midships turret out of action. Hits were also received in the dinghy, radio, and just above the keel. After one hour three of the Ju.88's made off. The fourth carried out one more attack and then followed the others. E/10 returned safely to base.

Fighter Combats

The month of July has been very satisfactory for the Beaufighter Squadrons operating as fighters, and for the fighter reconnaissance Mosquitoes of No. 333 (Norwegian) Squadron. In all 11 enemy aircraft have been sighted by these squadrons, and all were attacked. The result—eight destroyed and three probably destroyed or damaged—is a great credit to the shooting of these squadrons, who have had little experience, and whose success can be due only to determination and training. A comparison between these results and those of the Ju.88 heavy fighters operating in the Bay of Biscay, shows that the standard of fixed and free gun shooting by our fighters and anti-submarine aircraft respectively is definitely superior.

Beaufighters P and D of No. 404 Squadron were escorting a Naval force when they sighted a Bv.138 on the starboard bow. The enemy aircraft turned and headed towards the Beaufighters. P/404 carried out a head-on attack, closing to 200 yards, and opened fire with a 2-second burst. Hits were scored on the engines and wings. Aircraft P broke away to port, and while turning for a stern attack, saw aircraft D

open fire from 800 yards, closing to 200 yards. The enemy aircraft burst into flames and after carrying on for a short distance, crashed into the sea. One survivor was seen standing near the rear of the fuselage, firing a five star red cartridge. An excellent photograph of the ditched Bv. was taken [plate 8]. The survivor was picked up later by a destroyer. Our aircraft then resumed their escort duties. Thirty minutes later

an aircraft was sighted 2 miles on the starboard bow, and was identified as another Bv.138. P/404 closed the range and opened fire astern of the enemy aircraft at 800 yards, closing to 600 yards, following this with a second burst from 400 yards to 200 yards. The enemy aircraft burst into flames and crashed into the sea. Small pieces of wreckage were seen but no survivors. D/404 was flying parallel to the enemy aircraft, and confirmed its total destruction. No damage was received by either of the Beaufighters.

Beaufighters A, J and S of No. 248 Squadron, on offensive patrol in the Bay of Biscay, sighted a F.W.200 flying across their bows from starboard to port. The leader, closely followed by J and S, came in to attack on the port quarter and fired a long burst of cannon at 300 yards. Strikes were seen on the F.W.200's port wing root. After this manoeuvre A found himself dead astern at 150 yards and fired another burst, during which both port engines caught fire. At the same time J came in on the port quarter, firing a long burst of cannon, the results of which were not seen owing to the smoke from A's attack. By this time the F.W.200 was gliding, and a burst from S, who came in from the starboard quarter, set the starboard inner engine on fire. After this the F.W. ditched successfully, and the crew of eight were seen swimming near the floating aircraft.

Beaufighters A, U, J and S, of No. 248 Squadron, patrolling in the Bay, sighted a Ju.88. Aircraft A turned towards the Ju.88, which made for thin cloud cover. Aircraft C cut it off and delivered a full beam attack in a climbing turn from 600 to 300 yards. The port engine of the Ju.88 burst into flames and it crashed into the sea in a blazing mass. U's port engine was hit by return fire and the whole aircraft began to vibrate violently. The damaged engine caught fire and the pilot was unable to feather his propeller, but switched off the petrol and ignition, and extinguished the fire with the Gravinier switch. The starboard engine kept cutting, but the pilot coaxed his aircraft over the cliffs near base and crash landed, the crew being injured.

Beaufighter V/254 on reconnaissance over the Dutch Coast, sighted a Do.24 above and on the port bow. Aircraft V got on to the enemy's tail, opened fire, and despite damage to the port mainplane from return fire closed to 200 yards. At this range the enemy aircraft burst into flames and crashed into the sea.

Mosquito J/333 on shipping reconnaissance, sighted a F.W.200 which he did not attack as he was ordered not to be diverted from his patrol. At the very end of the reconnaissance, during which he sighted nothing, his restraint was rewarded by seeing a Ju.88 below and to starboard. He attacked from 100 to 30 yards and saw strikes from cockpit to tail. The Ju.88 started to dive seawards and passed under the Mosquito. On looking round the pilot saw no sign of the Ju.88 either in the air or on the water.

Beaufighters H and E of No. 404 R.C.A.F. Squadron, engaged on A/A escort to a Naval force, sighted two Bv. 138's in line astern on the starboard side, 1,200 yards away. Aircraft "H" turned to starboard and carried out a beam to quarter attack, opening fire at 600 yards and closing to 200 yards. Pieces were seen to fall off the tail of the enemy aircraft. The Bv.'s then went into line abreast. H/404 then made a stern attack on the Bv. that was previously leading, opening fire at 500 yards closing to 300 yards. No hits were seen. Both enemy aircraft returned the fire with cannon, using self-destroying ammunition. Beaufighter "H" again attacked from astern the same Bv. as attacked previously, opening fire at 300 yards closing to 100 yards. The port engine of the enemy aircraft burst into flames, and the hull caught fire. As H/404 broke away it was found that the port engine was out of action. The Beaufighter climbed on one engine and made base successfully. The final results of the combat were not seen.

Aircraft U2 of No. 2 Beaufighter O.T.U. was on a navigation exercise in the North Sea at 1000 hours on July 14, when a twin-engined aircraft was sighted, flying up sun. As the range closed, the aircraft was identified as a He.111. The enemy aircraft turned away to the east. The Beaufighter followed, and at 400 yards range, opened fire at the starboard engine with a one and a half seconds' burst of cannon. The enemy aircraft appeared to be hit, and it lurched to starboard. The Beaufighter then closed to 250 yards and fired a three to four seconds' burst. The enemy aircraft broke in half, the forward part of the fuselage diving straight under the sea, while the tail stayed afloat for some 30 seconds. The pilot of the enemy aircraft seemed to be very inexperienced. His only return fire, from the dorsal gun position, was spasmodic and inaccurate. No damage was done to the Beaufighter, nor harm to the crew.

Air-Sea Rescue

During July the Air-Sea Rescue Service experienced its most successful and spectacular month since its inception.

A total of 248 aircrew were rescued; the most intensive period being the 50 hours between 1730 hours on the 25th and 1930 hours on the 27th, during which 101 aircrew were rescued and landed at various ports around the coast.

The airborne lifeboat was successfully dropped four times to crews in their dinghies.

On July 15, a dinghy containing six men had twice been reported by pilots of Fighter Command, approximately 10 miles north of Le Havre. It

was, therefore, decided to despatch an A.S.R. Hudson of 279 Squadron carrying an airborne lifeboat, with fighter escort, to attempt the rescue. Rendezvous was made with Typhoons of 11 Group over Tangmere at 1147 hours, and course was set for Le Havre. After a short search, the dinghy was sighted and the lifeboat successfully dropped at 1237 hours. The crew were seen to clamber aboard, engines were started and course set for home. Meantime, two H.S.Ls. had set out from Newhaven and the lifeboat was intercepted at 1730 hours, half-way across the Channel. Fighter cover was provided by Typhoons and Spitfires throughout the operation, during which

two F.W.190s were destroyed and two damaged, without loss to our own fighters. The rescued crew of a Wellington of 12 O.T.U. from Chipping Warden which had ditched two nights previously after being hit by flak whilst returning from operations, were landed at Newhaven, little the worse for their adventure.

The work of rescue was carried on until 1730 hours on July 25 when an S O S was received from one of the Fortresses which had been attacking Hamburg by daylight, following Bomber Command's massive attack the previous night. From then and for the following 50 hours, distress signals, reports from returning aircraft, sightings by search aircraft, automatic transmissions on 500 kc/s from dinghy radios, reports from the Royal Observer Corps and coastguards, all came in thick and fast. Air-Sea Rescue aircraft, supplemented by those of Bomber Command and the U.S.A.A.F., were called upon to help and the largest Air-Sea Rescue operation since the Battle of Britain was soon in full swing. As many as 70 long-range aircraft were in the air at one time, covering large areas of the North Sea.

Then came the rescues. The Cromer lifeboat reported that it had picked up the crew of a Wellington. This was followed by reports from aircraft that they were orbiting dinghies in five different positions, as far as 200 miles apart. Positions were signalled to H.S.Ls., R.M.Ls. and other surface rescue craft which were at rendezvous positions, and they were soon on their way. The Cromer lifeboat reported that it had picked up the crew of 10 of a Fortress; then came news that a fishing vessel from Sheringham had done likewise. Fighter Command reported that, following the sighting of two dinghies, 12 miles off Cromer, two Walrus aircraft had landed and picked up a further 10 Americans. However, they were unable to take off again with their additional load, so the survivors were transferred to an H.S.L.

In the meantime, a Hudson carrying an airborne lifeboat witnessed the ditching of another Fortress. Seeing that the crew were having some difficulty in getting into their dinghies the Hudson dropped the lifeboat to them (see plate 2). Within five minutes of ditching, the crew were on board and soon on their way to friendly shores. They were met by H.S.Ls. and R.M.Ls., taken off and landed at Yarmouth.

While this was taking place, another Hudson was dropping a similar lifeboat to a crew in position 54° 33' N., 05° 47' E., 185 miles N.E. of the first one. Nine American airmen were soon aboard and proceeding merrily along on the second stage of their return trip from Hamburg. After covering approximately 65 miles, a report was received from one of the aircraft which had been shadowing them, that the crew and lifeboat had been taken aboard a Danish trawler, fishing off the Dogger Bank. H.S.Ls. which had been sent out to intercept them were signalled to get the crew at all costs. Area Combined Headquarters had signalled the escorting aircraft to persuade (the method was left to the Captain) the trawler to steer due west. This was done, and at 2000 hours on July 27, they were intercepted by two H.S.Ls. One of them took

off the airmen while the other persuaded the trawler crew to continue the journey to England, with the lifeboat on board. The Danes agreed, and the two vessels continued their journey in company. When almost in sight of land the H.S.L. broke down, and was towed into Yarmouth next morning by the trawler.

Reports of sightings continued to be received by Flying Control at Area Combined Headquarters, who were organising the searches. H.S.Ls. raced to a fresh position and another complete Fortress crew were picked up. Then came a message from an aircraft that another Danish trawler had picked up 10 more American airmen from their dinghies. R.M.Ls. in that area were given the position; the circling aircraft homed them, the vessel was found, and the crew taken off.

It was now nearing dusk on the same day—the 27th—when two Spitfire pilots were reported in their dinghies close to the French coast. Out went two Walrus with fighter cover, and both pilots were rescued. Thus in a little over 48 hours, since the first S O S had been received, over 100 airmen had been rescued.

From first light on the 28th, the great work continued. Two dinghies had been sighted in position 54° 30' N., 05° 30' E. Off went another Hudson, plus lifeboat. The dinghies were located and another successful drop completed. This crew were soon under way, but after covering 40 miles of their journey, they were seen to be stationary. An aircraft from the squadron which had dropped the boat immediately took off with fresh supplies of petrol and oil. For the first time an airborne lifeboat was refuelled from the air. Tins of petrol were dropped in Thornaby bags, attached to the parachutes, which are customarily used for dropping dinghy radios. The crew were seen to collect them and they were soon under way again. At 1815 hours on the 29th, still under its own power, the lifeboat was met by H.S.Ls., and the entire party docked at Yarmouth late that night.

At 1200 hours on the 29th a message was received that North Foreland Radio had picked up an automatic S O S on 500 kc/s., bearing 003.5° from them. This tied up with a report from Flying Control, U.S.A.A.F., 4th Bombardment Wing, of a Fortress in distress approximately 069° 73 miles from Thornaby. Further bearings were soon reported from Cupar and Portrush, giving a fix of 54° 20' N., 01° 25' E. By 1420 hours, two dinghies containing 10 men were located by a search aircraft. An H.S.L. homed to it and by 2000 hours the 10 airmen had docked at Blyth.

Fresh sightings and positions continued to be received, together with reports of successful rescues. By dusk on the 29th, a further 135 aircraft had searched that day in the North Sea alone.

At dawn on the 30th, six searches were airborne, carrying on from the previous night's reports. By dusk that evening a further 39 had been rescued; 26 in the North Sea alone. Another attempt had been made to drop a lifeboat to a crew in position 54° 40' N., 05° 30' E., but enemy opposition was met. One search aircraft was shot down and the attempt at rescue had to be

abandoned. During this day, 111 aircraft searched the North Sea.

On the 31st, three Hudsons with lifeboats accompanied by 18 Beaufighters, set off to positions as far as 54° 40' N., 05° 30' E. Only one dinghy containing three men was found. A lifeboat was again successfully dropped and the crew seen to climb aboard.

The success of this closing week of the month was helped by good weather. It proved also the

value of co-operation between Flying Control at the Area Combined Headquarters, the U.S.A.A.F., Bomber and Fighter Commands and the Navy. The standard of flying and navigation was high and full use was made of the latest aids to navigation. With equal success, the Air-Sea Rescue squadrons proved the value of their latest apparatus.

This co-operation between the services brought about the record: 156 airmen rescued during one week from waters around the British Isles, 121 of whom were Americans.

Photographic Reconnaissance

Photographic reconnaissance aircraft have done important and successful work during July, especially in sorties to photograph bomb damage. In this they have fulfilled every request made by Headquarters, Bomber Command.

Out of a total of 240 sorties, 201 were successful: an increase of 22 over the number of successful sorties in June. The variety of the tasks reveals the breadth of interests and duties now falling to the pilots of the P.R. Squadrons. Sorties have been flown over Rome, Turin, Milan, Bologna, Narvik, Trondheim, Bergen, Swinemunde, Stettin, Rostock, Danzig, Gdynia, Lubeck, Kiel, Aachen, Bochum, Frederickshaven, Geneva, Innsbruck, Paderborn, Remscheid, Solingen, Wuppertal, Duisberg, Dusseldorf, Huls, Gelsenkirchen, Ham-born, Mulheim, Munster, Osnabruck, Augsburg, Brunswick, Cologne, Hamburg, Hanover, Kassel and Zeitz.

Following are three reports by P.R. pilots who flew over enemy country on sorties during the month.

542 Squadron. Target: Aachen

I was airborne at 0645 hours on July 7, a few hours after the bombers returned from their raid on Aachen. I climbed out over Dungeness and was rather startled to see some 50 Fortresses going down channel, about 10,000 ft. below me: all of them making four trails, the combination of which drew a curtain over the sea. I had a good look at my tail to see if I was messing up the sky as well. But all was clear up to 32,000 ft. I crossed the enemy coast with cameras running on track south of Calais and headed straight for Aachen. The cloud had conveniently broken along my track, almost like a corridor.

Just beyond Lille, I could see what looked like a big towering cumulus in the distance and estimated it to be on my track. I headed for it without bothering about a course and concentrated on my tail and trying to dodge R.D.F. As I approached the cloud it turned out to be smoke from Aachen rising up to 20,000 ft. and dispersing to the north-east in a wedge shape, as far as I could see, and eventually merging with another cloud layer.

The whole town appeared to be on fire. Apart from black billowy smoke all I could see were a few streets on the south-west edge. After a few minutes look round and some photography, I set course for the east coast of the Zuyder Zee where I expected trouble, judging by the R.D.F. noises. But there was no opposition. At Zuyder Zee I set course for Ijmuiden and crossed out with no incidents. I experienced no flak from Aachen or from the western Ruhr, which was covered with cloud. I landed at base at 0940 hours.

(C49790)

542 Squadron. Targets: Bielefeld, Paderborn, Gelsenkirchen, Wuppertal and Remscheid

I was airborne at 1740 hours on July 15 and climbed on to 31,000 ft. over the east coast. I made trails so I continued on track to Den Helder. I made one run over Den Helder at 30,000 ft. and saw a convoy of eight medium-sized and six smaller M/Vs, about 2 miles N.N.E. I continued over 5-8/10ths medium and in 5/10ths cloud to Bielefeld. I covered Bielefeld and set course for Paderborn, which was under cloud. I then made one run over Hamm when the engine cut on wing tanks (the port showed 30 gallons and the star-board nil), so I switched on to main tanks. I then made a second run and set course for base.

At this moment I saw two trails approaching from the direction of Dusseldorf, so I opened up and altered course slightly to north. I then reduced revs. to 2,750 and boost to between +6 to +8 and maintained a distance of approximately 1½ miles from the enemy aircraft, which appeared to be F.W.190s. The chase continued for about 15 minutes during which the enemy aircraft kept their distance, preventing me from turning south on to track for base. After 15 minutes, two more trails appeared from the south, forcing me to steer 315° M, and maintain revs. and boost. The chase continued with these two aircraft and the other two broke off. The second pair chased me for about 10 minutes and then broke away.

I continued at the same revs. for another two or three minutes and then set course for Ludham. Petrol was low so after a few minutes I called Control and obtained vector of 255, which I was already steering. I obtained vectors and fixes every few minutes, reducing height all the time until I was at 3,500 ft. I was then about 30 miles out from the English coast, with only five gallons left. I had run the wing tanks dry. I then ran the main tanks dry and told Control I was going to bale out as I could see land but could not make it. I made three attempts to get out and succeeded on the fourth attempt, at 800 ft. My parachute opened O.K. and I then hit the water. I inflated my Mae West, hauled in and inflated the dinghy. After releasing my parachute harness I got into the dinghy. I was seen by an aircraft sent out by Control, who brought a coaster to my rescue. I was taken aboard the coaster after being in the water for about 45 minutes.

542 Squadron. Targets: Gelsenkirchen, Bochum and Huls

I took off at 1543 hours to cover targets in the Ruhr, for Bomber Command. These included Gelsenkirchen, Bochum, and damage assessment of Huls.

I crossed out over Clacton at 31,000 ft. having found trail height at 31,500 ft. The North Sea was covered in 9/10ths strato cumulus, which cleared as I approached the Dutch coast near Flushing. The weather became worse over land, with increasing cumulus and cumulo nimbus, towering to over 31,000 ft. The Ruhr was covered in cloud so I decided to turn for home. At 1635 hours, when just north of the Ruhr, I saw two trails approaching from the north-east, about 6 to 10 miles away. My new course soon put these at a disadvantage and they disappeared behind me.

At 1645 hours, the cloud dispersed near Apeldoorn and I turned on to 270° M. to cross out over Amsterdam. I then saw two enemy aircraft approaching at roughly the same height from the north. They appeared to be about 1 mile distant but were not leaving trails. I immediately increased to full revs. and boost and a minute or two later I was warned of bandits in my vicinity. I continued with full revs. across the Zuyder Zee, keeping a weather eye open and turned on my cameras over Amsterdam and Haarlem. Whilst

over Haarlem, at 1655 hours, two enemy aircraft attacked suddenly from three-quarter starboard beam. They were diving slightly and opened fire from approximately 300 to 400 yards range, failing to score hits. One aircraft passed over me and one under my tail. The aircraft had in-line engines and were painted pale green. A few seconds later two further enemy aircraft attacked from the port quarter, firing wildly from 400 yards.

I then decided that I had been played with enough and pulled the aircraft into a steep climb. My speed carried me up to 38,500 ft. Here I levelled off, leaving a huge billowing trail, which spoiled any chance of my seeing the Hun again.

After a few minutes I called on my V.H.F. and was informed that the bandits had fallen behind. I throttled back and heaved a sigh of relief. Fighter Command took a fatherly interest in me and sent up a plane to escort me in over our own coast.

I landed safely at base, at 1815 hours, with photographs of Amsterdam and some Dutch countryside.

U-Whales

At 1145 hours on August 6, an aircraft on convoy escort sighted a U-Boat and attacked with four 250 lb. Torpex depth-charges from the U-Boat's port quarter six seconds after disappearance of the U-Boat. Depth-charges entered the water 50 yards ahead of the U-Boat. A possible patch of oil 40 yards diameter was seen immediately after the attack.

GIB. OPSUM No. 8 states:—Attack by X/48, target now known to be a whale.

For further information on whales being confused with U-Boats, see the article "Whales, not submarines" in *Coastal Command Review*, No. 4, July-August, 1942.



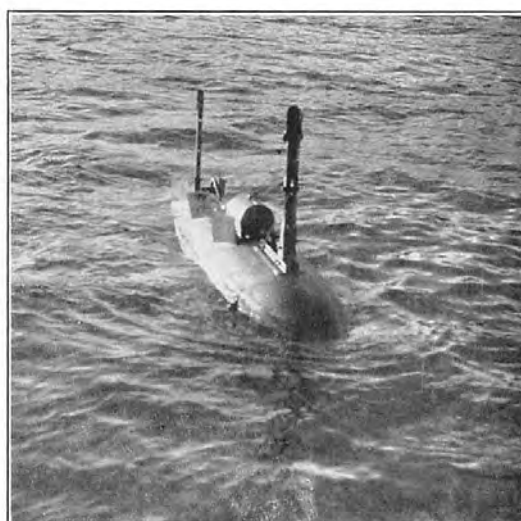
The U-Boat base at Bordeaux, photographed by No. P.R.U. in August, 1942.



Two photographs of the U-Boat base at Bordeaux, the top one taken in August, 1942, and the lower one (by 540 Squadron) nearly eleven months later. The U-Boat shelters shown in the lower picture as completed, had only just been started when the first photograph was taken. In the right foreground of the upper photograph, three U-boats can be seen lying alongside the quay in No. 1 Basin. The lower photograph shows the quay collapsed after a daylight attack a few days previously by U.S.A.A.F.



35-FOOT Submersible Target.



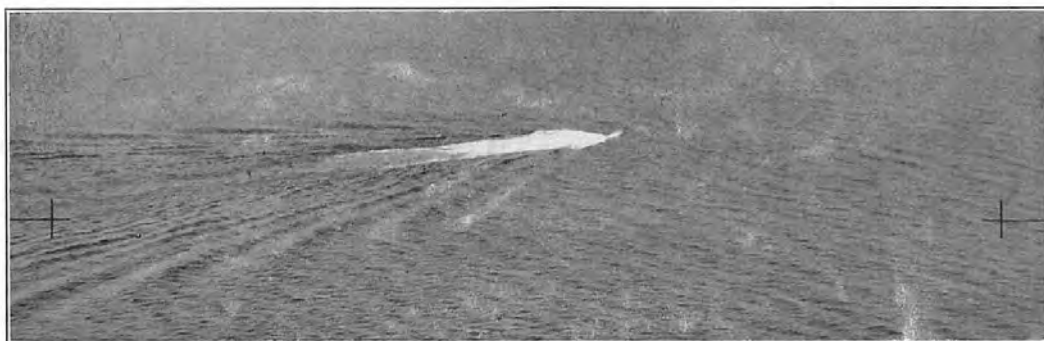
SUBMERSIBLE TARGET, Mark II. Length, 15 ft. 6 in. Note wash flutings and diving tow half-way up forward periscope.



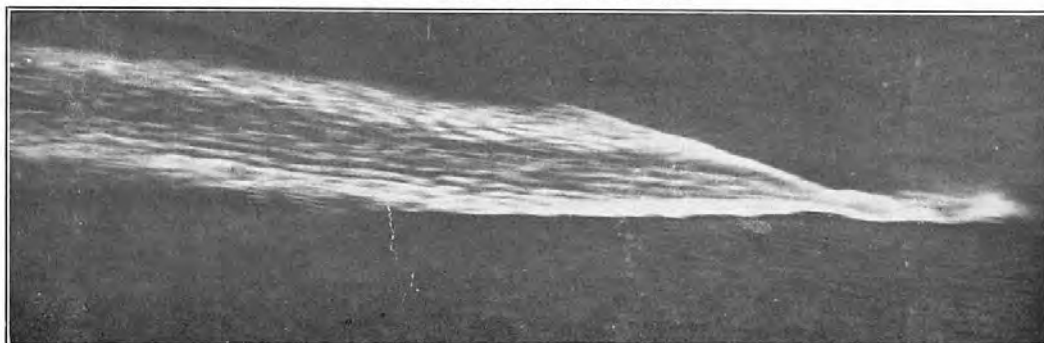
TARGET on surface at 10 knots.



TARGET surfacing as bombs hit water, showing correct line but incorrect range.



H.M.S. *Graph* diving, showing swirl.



TARGET diving, as seen from air at 10 knots.

IV.—SPECIALIST AND GENERAL ARTICLES

A Submersible Training Target

Most things that prove of some value in one walk of life or another usually start haphazardly; and the submersible target proved no exception, causing in its embryonic stages, as is only natural, whispered comment, smiling scepticism, and sometimes a feeling of inimitable irony—sidelights to the conviction of the few that it was worth pursuing.

It began life as the smaller of two standard size Orpesa floats, trundled on a lorry from Falmouth to St. Eval. It developed, in due course, growing ballast weights to destroy its surplus buoyancy; hydroplanes fore and aft to assist diving and give longitudinal stability when submerged; a fore periscope to which a top tow was secured, and a second tow at the nose. Little calculation was made, except to ascertain the original displacement of the float and its initial positive buoyancy, all the fittings being variable and adjustable; for often empirical results rout the demons of the drawing board, and confound the danger of hopeless thralldom to theory—one of the greatest dangers of our age.

The first trials were held at Padstow on May 13, 1942, the target being towed by a small steam launch. Though the superstitious crossed their thumbs—they had some justification later—the target, to everyone's surprise, dived and surfaced without difficulty, and proved far less fractious than anticipated.

These trials, the first of many, resulted in several minor improvements and a more important one—the fitting of a pump worked by the top tow, and returned by a spring when the tension was released, designed to pump out fluorescene on diving to simulate the swirl of a submarine.

Then came ideas too grandiose—the construction of a 35 ft. target by Devonport Dockyard. It looked rather like a prehistoric monster, was a Titan in strength, and took a good deal of taming, sometimes threatening to take charge of the towing craft. However, with the right use of a curb rein it was eventually broken in, subdued, and turned into a docile performer, though it was too big for day in, day out practices, requiring nothing less than a drifter to tow it, and powerful winches to absorb the strains. The smaller target, still being improved, was obviously the model to develop, on a rather larger scale, replacing the 11 ft. 6 in. Orpesa by a 15 ft. 3 in. model—the largest standard float made.

However, suddenly and for reasons best unstated, while we stood fettered, like Prometheus who stole fire from heaven, everything disappeared into Limbo, though in reality it was only wrapped in a silken cocoon while the winds of controversy swirled round it, to emerge again into the light of freedom in the autumn.

Further minor improvements followed, including wash plates or flutings to increase the surface wake; then a major one—a new and simpler pump which discharged a greater quantity of fluorescene, the work of an L.A.C. at St. Eval, the target finally being accepted by Coastal Command and the Fleet Air Arm as a Service requirement, and going into production in the spring of 1943.

Unfortunately, final stages are rarely reached, unless the staunchest discipline is enforced; and to-day, as time allows, several minor modifications are still in the offing, including the discharge of the fluorescene by compressed air instead of by a pump, one advantage being that more ebullition and swirl may be left on diving. Whether or not this eventually matures is, at the moment, of no particular import.

In practice, the main target, which has been used by 19 Group for several months, is towed astern of a 63 ft. General Purpose Launch, fitted with two power Balloon Barrage winches, the average length of tow varying between 300 and 400 yards, though considerably greater distances are possible with small adjustments to allow for the weight of the towing wire. The speed of diving is usually 10 knots; but greater and lesser speeds are possible, the target having been dived at speeds as low as 6 knots and as high as 14 knots. Though power Balloon winches are the best, two good hand winches, with broad drums, and band brakes worked by a wheel, form a reasonably efficient substitute. These winches, however, must be of adequate dimensions and should not stand any higher than the power ones without suitable leads. Trials have been carried out with Naval Kite Balloon hand winches, but these are not sufficiently strong to take the tension of the tows with any measure of certainty.

The method of working is simple. To dive the target, the nose tow is veered, the strain then coming on the top tow, with the result that the target tilts, the hydroplanes grip, and the target submerges, levelling off at a point where the downward resultant pressure is balanced by the growing upward tension of the tow. The depth reached on diving depends upon the target settings, the length of tow, and the speed of the launch; but by adjusting the tensions on the two tows the target can be kept at any required depth up to its maximum, independently of the first three factors. As the tension comes on the top tow, the piston of a pump fed by a gravity tank is pulled forward, discharging a strong solution of fluorescene mixed with water. To surface, the top tow is veered, the strain then coming on the nose tow, the surplus buoyancy of the target then bringing it to the surface. As an alternative, both tows can be surged. Once the tension is released from the top tow, a spring on the pump comes into action and pushes the piston back, ready for its next stroke.

Efficient working of the target needs close collaboration between the crews of the launch and the aircraft; and if efficient working is not achieved the practices lose much of their value. Dependent upon the three factors: speed of the launch, length of tow and target settings (but once the target is adjusted, a standard setting covers a range of speed between 6 and 14 knots and a range of tow between 300 and 400 yards)—the launch crew know how long the target takes to dive and surface—a matter of seconds.

Once the Green is given by the launch, to indicate the range is clear, the target is dived between 5 and 25 seconds before the aircraft

reaches it, experience soon giving a good launch crew proficiency in timing. Its surfacing is judged by experience, too, the timing being adjusted so that the target breaks surface as the practice bombs hit the water. A spotter in the launch, who knows the stick spacing, judges by eye the distances the bombs are out in line and range, noting them on an analysis sheet. He is sometimes assisted by a camera, and a rake can also be used to obtain exact errors in line.

From the aircraft the target is first sighted on the surface, and the run in started. As the target dives, the fluorescence patch spreads, representing the swirl of a submarine. Thenceforth, the procedure becomes similar to an operational attack, the distance ahead of the swirl at which the practice bombs should fall being governed by the time that has elapsed (timed by a stop watch) between the target submerging and the aircraft reaching its final bomb release position. With the help of a mirror camera a permanent record can be kept of the results. T.R.9 fitted in the launch also enables a running commentary to be made and results passed through immediately.

As the target is only 15 ft. in length, compared to the 240 ft. of a 700-ton U-Boat, and the 206-213 ft. of a 500-ton U-Boat, what appears

to be an over or an under shoot from attacks astern or ahead, or at a small angle to the track, may be, when assessed, excellent ones. Attacks can be made from all angles, though ones from dead astern require a safety length of tow of not less than 300 yards, unless the attacking aircraft crew rival Bisley marksmen—quite often the case after practice; and it is most heartening to see the improvement that frequently develops after a series of attacks—direct hits not being unknown.

Nothing is perfect; but the submersible target does give, taken all in all, conditions of attack which are as realistic as possible within the scope of practical limitations, thereby fulfilling the needs of final training. The wash might be larger on the surface, advantageous in choppy weather; the target could be made responsive to R.D.F.; but in each case its size would have to be increased, with resultant complications in towing ship, gear and handling not worthwhile—anyway at present.

Soon, it is hoped, submersible targets will be available for all Coastal Command and Fleet Air Arm Stations, playing their part in helping to master a menace that has cost such dire and irretrievable loss in lives, ships and aircraft—the enemy submarine.

Tribute from Ministry of Economic Warfare

We knew in the late summer of 1941 that there were a number of Axis ships outside the Mediterranean and northern waters which were capable of making the whole journey to Europe or the other way without refuelling, and we were quite certain then that, in view of the supply position in both Germany and Japan, there would be a series of attempts to run the blockade. When the time came, as it inevitably did, it was by no means easy to stop those attempts. No one could tell in advance whether the ships were going to sail round the Cape of Good Hope or round Cape Horn. They would come up the Atlantic, but at its narrowest points the Southern Atlantic is 1,600 miles wide. Those ships used no wireless, they used no lights at night, and the last lap of their journey, when they were making for French Atlantic ports, was always calculated to coincide with the very darkest nights and the most unfavourable weather. Interception of vessels in those circumstances was surely one of the most difficult tasks with which the Navy and the Royal Air Force can ever have been confronted. I think that the Committee knows that in the spring and early summer of last year a certain number of those vessels got through, but I am glad to be able to say that in the last eight months this traffic has been brought practically to a standstill. In spite of the vast expanse of the Atlantic, in spite of the dark nights, in spite of the many subterfuges the enemy adopts, these ships have in almost every case since November last year been spotted and intercepted, and I should like to emphasize that this was only achieved by the closest possible co-operation, first between the Allied navies in more distant waters and, secondly, in waters nearer home, between the Royal Navy and Coastal Command.

We have been accustomed in the past to think of the blockade merely as a naval operation, but in the conditions of this war the blockade could hardly be maintained without the consistent assistance of the Royal Air Force. I do not think that this has been sufficiently recognized. I should like to express, not only on behalf of my colleagues of the Ministry of Economic Warfare but, I think, on behalf of everyone who is familiar with the facts of this matter, our great admiration for the work which is being done in this connection by Coastal Command. Their efforts have seldom been rewarded with a kill or even the sight of a kill, but they have resulted in the subsequent interception and destruction of these vessels by the surface craft of the Royal Navy, and I think the blockade possibilities of the air arm are illustrated by the fact that when these vessels are coming on to their last lap, making for French Atlantic ports, or when they are coming out from French Atlantic ports, they need never come within 500 miles radius of any British air base. In spite of that, Coastal Command have succeeded in the last year not only in spotting but also in identifying nine out of every 10 of these ships. As a result of these combined efforts the enemy has lost at sea during the last year, not less than 30,000 tons of rubber, 5,000 tons of tin, 25,000 tons of edible oils and smaller but hardly less important quantities of tungsten and quinine. The cargoes which have been lost to Japan consist of heavy machinery, machine tools and engineering equipment. In the circumstances, I am sure the Committee will agree that that does represent a very considerable achievement on the part of all the Forces engaged.

[Mr. Dingle Foot, Parliamentary Secretary to Ministry of Economic Warfare, in a speech in the House of Commons, 8 July, 1943.]

The Last Hudson

The R.A.F. has taken over from Lockheed the last Hudson allotted to Coastal Command. This is an inevitable result of the progress and development of the Command, but few of those who know the Hudson will view its passing without some regrets. Although not a British machine it is in the great tradition of versatility which so many British types have established. It is difficult to think of any aspect of air warfare to which Hudsons have not been able to adapt themselves. They have been everywhere, seen everything and done everything. They have fought with fighters, bombed, depth-charged, patrolled, photographed, rescued, ferried and trained. On every front from Iceland to West Africa and from the Denmark Strait to the Bismarck Sea, Hudsons have been to the fore. Squadrons from Great Britain, Canada, the U.S.A., Holland, Australia and other countries, have at various times been equipped with Hudsons, and their pilots and crews have grown to like and trust their machines. Their reliability was exceptional. Whether operating from the grass and mud of Bircham Newton, the deserts of North Africa or the mountains and valleys which made up the old runway at Aldergrove, the Hudsons could always stand the strain. Even the antics sometimes seen at Sillioth did not seem to knock them about unduly. They have struggled home with almost everything shot away; they have bounced off the sea, off rocks, and off the masts of enemy ships. Their loads were steadily increased and gadgets hung all over them, so that their recent appearance with a complete motor lifeboat slung underneath occasioned no surprise.

When first introduced into the Service the Hudson was regarded with some suspicion. It was, people said, a dangerous aircraft, and could be entrusted only to pilots who had flown thousands of hours and who did not mind being the centre of an occasional bonfire. Gradually this prejudice, which may have had more than a touch of British insularity about it, was overcome. It was found that with careful instruction pupils with less than 200 hours and a certain amount of intelligence could comfortably cope. Many Hudsons were in fact ferried safely across the Atlantic by crews drawn from Canadian training schools. The man who swung and collapsed his undercarriage, or forgot to change his fuel tanks would have done something similar on any other type of aircraft. Such difficulty or novelty as there was in flying the Hudson proved valuable experience when many squadrons later converted to Fortresses and Liberators. Moreover, it is certain that the tacit agreement that it was permissible to do a "wheeler" was a great source of relief to many a pupil to whom the insistence on three-point landings seemed an unnecessary refinement.

The Hudson was the first American aircraft to go into service with the R.A.F. It was an adaptation of the Lockheed B.14 civil air liner and was fitted with a British Boulton & Paul gun turret. The purchase was recommended by the mission which visited the U.S.A. in the spring of 1938, and the name "Hudson" was officially adopted in August. The aircraft began to arrive in this country at the beginning of 1939, and the first

squadron to receive them was No. 224, in the spring of that year. Two days before the outbreak of war Hudsons became operational. They now began to come across the Atlantic in a steady flow, until by the autumn of 1941, 11 Hudson squadrons were operational in Coastal Command. This was the greatest number at any one time.

In all there have been six marks of Hudson: the first three with Wright Cyclone engines, and the last three with Pratt & Whitney Twin Wasps. Although pilots seem to have preferred the Mark III as an aircraft to fly, the various types marked a general improvement. The main additions were the provision of self-sealing fuel tanks, fully feathering airscrews, side and belly guns.

To handle the Hudson is extremely pleasant. For a comparatively big and heavy aircraft it is very manoeuvrable—rudders, ailerons and elevators all being light and effective. This made the Hudson very suitable for low-level bomb or depth-charge attacks. The view from the pilot's seat was good in all directions, and the clear view panel in the windscreen was invaluable in bad weather. The cockpit layout was comfortable and convenient, as is the case with most American aircraft. The landing speed was considered rather high, and this, combined with the extremely effective flaps, made three-point landings difficult: outside O.T.U.s, good, safe wheelers were the general rule. The original tendency to swing was largely overcome by the tail wheel lock. The Hudson's bomb-load was decidedly low, but this was somewhat offset by the large gun armament. The turret, in particular, had a really good field of fire.

All Hudson pilots have particular cause to thank "George," whose reliability and accuracy in this aircraft obviated much fatigue, and enabled pilots to spend much more time searching the sea or the sky.

The early days of the war, so boring to so many, were full of activity for Hudsons. Constant patrols, reconnaissances and escorts were flown over the North Sea, and a very large number of the early air skirmishes were fought by Hudsons. Their opponents were usually Dornier flying boats and Heinkel III's, with occasional brushes with Me.109s. From these battles the Luftwaffe gained considerable respect for the aggressiveness of the Hudson pilots and the capabilities of their aircraft. One Dornier lasted just 35 seconds against a Hudson's guns, and on another occasion eight Me.109s were insufficient to dispose of a Hudson which got safely home in spite of being seriously damaged.

Many warships and convoys owed their survival to the activities of these East Coast Hudsons. The escort of the damaged destroyer *Kelly*, which they successfully defended against repeated attacks by Heinkels, and the discovery of the *Altmark* slipping along the Norwegian coast with 400 British prisoners, are only two of the exploits of these ubiquitous machines. It was at this time also that there began the intimate and unfriendly association between the Hudsons and the German battle-cruisers *Scharnhorst* and *Gneisenau*, which were shadowed, bombed and blockaded until their escape in bad weather from Brest in February, 1942.

The opening of the campaign in Norway brought more work for the Hudsons. On the morning of 9 April, 1940, one of their wireless operators succumbed to the temptation of listening to the 8 o'clock news in preference to Group, and was able to tell the captain that the coast off which they were patrolling was well on the way to becoming enemy-occupied territory. A Hudson thus became the first British aircraft to visit the new battle ground. Henceforth the coastline was ceaselessly patrolled, and the bombing trip to Stavanger became a routine run. The versatility of the Hudson was beginning to be appreciated.

The German attack on Holland and Belgium called for an all-round effort. The usual uneventful patrol off Dutch territorial waters was abruptly transformed into a highly unsafe mission which could, and frequently did, involve battles with Me.109s, night and day bombing, as well as escort and reconnaissance. The oil storage tanks at Rotterdam became as well-known to the Hudson crews as the airfield at Stavanger. In all these operations the Hudsons were accompanied by other Coastal aircraft, as well as by Swordfish, Skuas and Albacores of the Fleet Air Arm. Many are the stories of mutual aid and rescue. One small force of Skuas and Albacores, out of ammunition and running for home, was attacked by 15 Messerschmitts. The chase was seen by three patrolling Hudsons who drew off the fighters, shot one of them down, and enabled the naval machines to escape: the Hudsons too got safely home.

As the attack on the Low Countries swiftly developed towards the evacuation from Dunkirk, an ever-increasing strain was laid on the aircraft of Coastal Command, and the Hudsons took their full share. They were constantly on patrol over the stream of shipping, fighting off bombers and dive-bombers, doing a job for which the pilots had not been trained, and for which the Lockheed B.14 air liner had most certainly not been designed. The "Sands Patrol" became a daily routine, almost always involving an unequal battle. One patrol of three Hudsons attacked a formation of 40 German bombers heading for the ships. The formation was turned back with two of its number shot down and five badly damaged. The Hudsons then resumed their patrol. Drifting, bomb-shattered ships, struggling life-boats and rafts were covered from the air and rescuers guided to their help. When the evacuation was completed Coastal Command's first American aircraft had played a worthy part.

Filling in their time with bombing missions to the invasion ports, factories and installations on the long enemy coastline, as well as with their everlasting patrols, the Hudsons began to work up to the great anti-shipping offensive. To ease the strain on their overworked railways the Germans introduced coastal convoys between ports in Norway, Denmark, Holland, Belgium and France. This long line of communication was clearly asking to be hit. The Hudsons hit it. In company with Blenheims and Beauforts they harried the convoys day and night, at sea and in harbour. Increases in anti-aircraft armament and escort vessels failed to stop the Hudsons coming in from 50 ft. to plant their 250 pounders into the sides and decks of the enemy merchantmen. At

least one pilot found on the wings of his Hudson some small bits of wood which the Germans had recently been using on one of their ships masts. Sometimes losses were severe, but frequently the attackers would all arrive safely back at base—a great tribute not only to the crews, but also to the Lockheed designers and the workers. Incidentally these workers were not content with putting their best into the job during working hours, but even gave up their spare time to build a Hudson which they presented to the R.A.F., and which the present A.O.C.-in-C. Coastal Command officially accepted in December, 1940.

The climax of the Hudsons' anti-shipping activities came in the late autumn of 1941. British, Canadian and Dutch Hudson squadrons were responsible for by far the greater part of the destruction, and the brilliant attack on Aalesund, where five ships were hit, two factories set on fire, and a barracks and W/T station bombed, was carried out unaided by only nine Hudsons.

Meanwhile on the other side of the British Isles a less spectacular but equally vital battle was going on; the Battle of the Atlantic. It was natural for the Hudsons to play their part in this struggle also, and they did so with equal distinction. Instead of comparatively short trips with plenty of excitement, the anti-submarine Hudsons had to undertake long trips over the ocean through very bad weather. In this theatre their great reliability at once won the trust of all who flew in them. Hour after hour their engines would perform faultlessly, whatever the conditions, and the majority of crews never experienced a failure. Their comfort and roominess was another great asset in this type of work.

Occasionally the Atlantic Hudsons were called upon for anti-aircraft as well as anti-submarine escort duties, and the battle between the Hudson and the Kurier, ending in the destruction of the latter in full view of the convoy it had come to bomb, is a well-known page in the history of the Hudson. The Kurier too was an adaptation of a civil machine, but apparently Lockheed's produced the better job. Perhaps the most famous exploit ever performed by a Hudson was in August, 1941, when for the first time in history a ship was captured by an aeroplane. A Hudson depth-charged a German submarine, the "U 570," forced her to the surface, and received her surrender.

Their patrols and escorts in the Atlantic took the Hudsons to a wide variety of climates. Iceland, Scotland, the Western Isles, Ireland, Cornwall, Gibraltar, North Africa and West Africa were normal Hudson bases, while in times of stress they operated from the U.S.A. and even Greenland. As is usual with this type of work there are few high lights or epic deeds. But it is an important chapter in the story of the Hudson; a chapter which might indeed have been more exciting had the aircraft been less dependable. The high average of serviceability and the very large number of flying hours which the A/S squadrons were able to keep up month after month was an eloquent tribute to their aircraft. Ground crews and maintenance personnel grew very fond of their charges and took pride in keeping up their reputation for reliability.



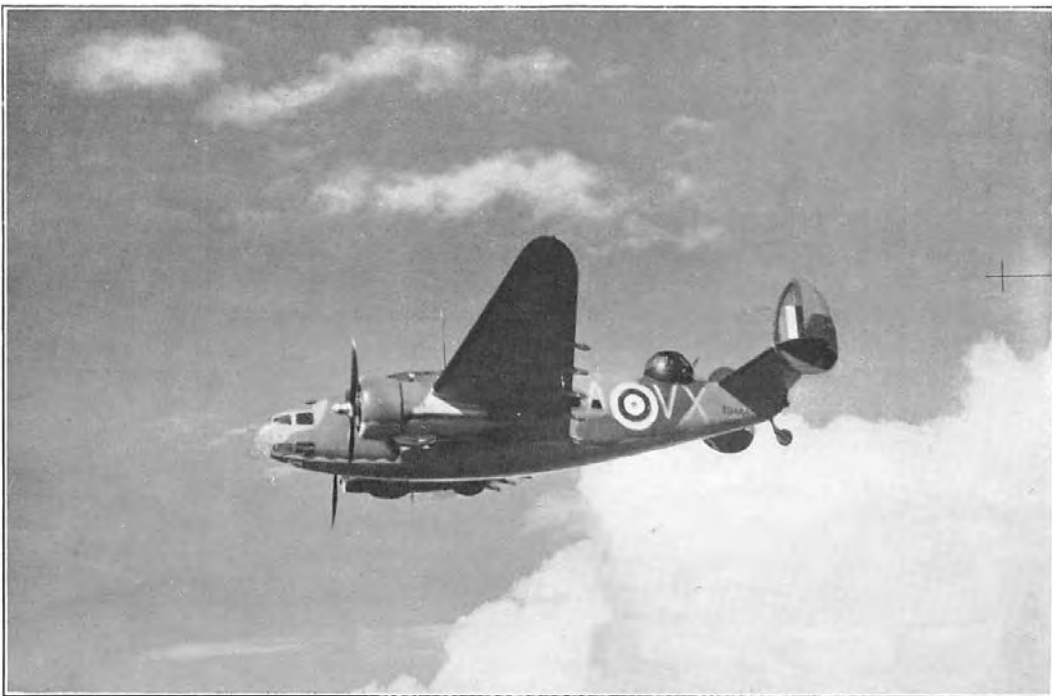
Air/Sea Rescue Hudson in flight, with an airborne lifeboat attached.



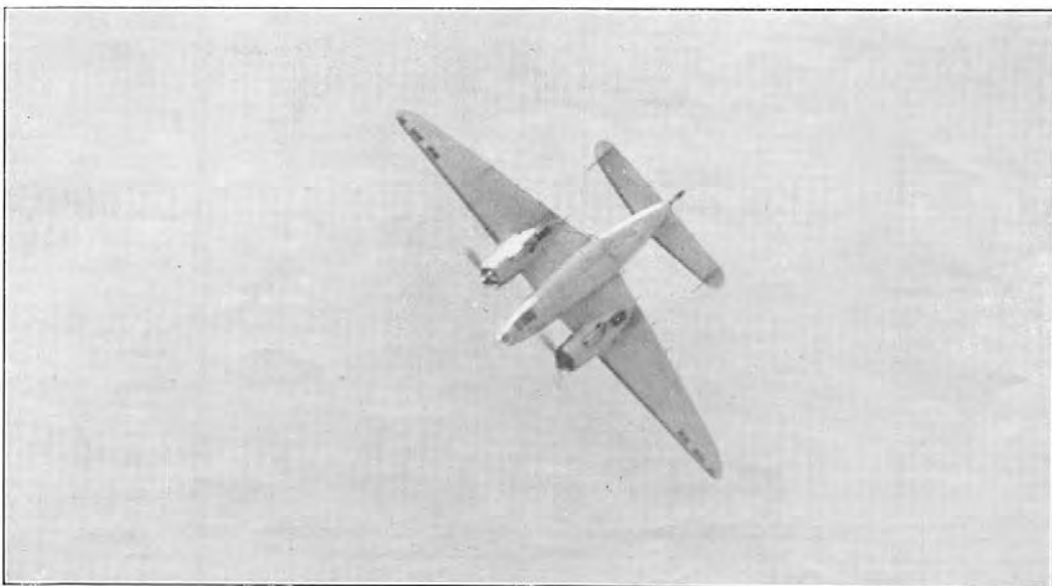
A HUDSON OVER ICELAND. The aircraft made by the Lockheed employees in their spare time, of material given by the firm, and presented to the R.A.F. See letterpress, pages 25-27.



This Hudson hit the sea during a night bombing raid in the Bay. The pilot flew it 260 miles back to base in the dark without an A.S.I., and both aircrews damaged. Three bombs were torn out of the bomb bay and the tail unit of a fourth was washed away by the sea while the bomb remained on the rack.



A Hudson III flying above cloud.



A Hudson diving to attack.

For a long time Hudsons were the mainstay of the Meteorological Flights. Every day, almost without a break, they would take off in any weather, fly far out to sea and through thousands of feet of cloud and ice, to bring back vital information. Air/sea rescue is another important Hudson department; indeed, their reputation for saving life is almost as great as for extinguishing it.

It is not only in Coastal Command that the Hudsons have distinguished themselves. Operating with Bomber Command, many Hudsons took part in the 1,000-bomber raids, and in the Mediterranean theatre their versatility was invaluable. They even reverted to their original civil purpose, and Generals have been photographed at ease in the cabin of a Hudson as it flew them comfortably across the Western Desert.

The year 1942 marked the beginning of the end of Hudsons. In January one squadron began to re-equip with Fortresses, and heavy four-engined G.R. aircraft were delivered in increasing quantities. Many Hudsons are still successfully operating from Iceland, Gibraltar and elsewhere, and before our reserves are finally exhausted, the enemy will assuredly see more

determined-looking Hudsons diving down without warning.

The necessity of replacing Hudsons is the measure of their success. On the west coast they had so harried the U-Boats that the enemy was forced to move out of their range. The number of submarines sighted or ships sunk within Hudson range of our coasts is negligible, if not nil. Further out the battle still rages, but the Hudsons cannot take part. On the east coast the Hudsons, with other squadrons, have been so successful that the enemy was obliged to maintain a considerable force of his latest fighters in Norway and the Low Countries, to build a chain of R.D.F. stations all along his coasts, and to provide for his coastwise shipping a very heavy concentration of anti-aircraft guns and escort vessels. Against such defences the Hudsons have been forced to give way to aircraft which are better armed and faster. But they have done a magnificent job. Thousands of people on the ground, at sea and in the air will never forget the familiar tubby shape which has so often meant protection and help, and which was the magnificent forerunner of the many valuable machines which have come from the other side of the Atlantic.

Escape Exercises

The following are the reports of two evasion exercises carried out during June.

In the first exercise the initial difficulty was to drop the evaders at a starting point from which they could not see the neighbouring wireless masts, which rise more than 600 ft. above sea level.

A park, with the spaces and appearance of open country, was chosen, and the evaders were taken there in a blacked-out bus. At 1400 hours they were set down in pairs, at half-mile intervals, in the centre of the park. Each evader was provided with a compass, a flying map (scale 1/250,000) and twopence in cash. They were dressed in service trousers, a variety of upper garments and no headgear. They were ordered to speak only broken English, to break into the airfield, and either to enter an aircraft or steal a secret document from an office and bring it to the Intelligence Officer. Lifts in public transport were not allowed, and the "borrowing" of any motor vehicle was forbidden because of petrol rationing.

A Tannoy to the station at 0930 hours gave warning that a number of interned German Air Force prisoners had escaped, and that it was thought that they were making for the aerodrome. Another Tannoy at 1415 hours proclaimed that the prisoners were within five miles of the station. At the second warning, Station Police began to patrol the perimeter, and 12 airmen were detailed by the L.D.A. to guard bridges, etc., in the vicinity. Otherwise, the work of the station went on as usual. In order to return to the station, the evaders had to cross a railway and also a canal, with few bridges which were easily guarded. The Royal Ulster Constabulary, Home Guard and local Army Units were warned of what was afoot, and they co-operated cheerfully.

The evaders did not take long to pin-point their position. Some walked until they came to a lake. Reference to the map showed only one lake surrounded by woodland. Others saw a monument over which they had frequently flown, whilst one couple with abnormally acute hearing took bearings on the noise of engines revving up some four miles away. The only human being encountered in the early stages was a young girl about five. One of the warrant officers described her as "just old enough to be useful without being suspicious." No less than four evaders verified their position by shouting the name of the nearby town to the unsuspecting child, with a guttural accent. The first two were answered with a friendly smile. The child showed them the way. But suspicion stirred in her innocent mind when the next two evaders questioned her, and she was somewhat perturbed.

The first news of the prisoners arrived by telephone at 1505 hours, when an officer of the Home Guard reported that he had captured two sergeants in the churchyard of the parish church. These two N.C.O.s afterwards complained of the irony of fate which caused them to be captured by the man whose van they could have stolen so easily shortly before. On entering the village they had come across the unattended van, with ignition key in place, and they had looked at it longingly.

The remaining evaders were wiser, and they avoided the village. A pilot officer and a sergeant, working together, climbed a 6-ft. wall to get out of the park. They then crossed a main road and took to the fields, with the pilot officer some 100 yards ahead of the sergeant. They climbed to a height from which the wireless mast was

visible and then descended to the road, where they passed a civilian who bade them "Good day." They then turned left until they came to a railway, which they followed. They intended to cross by the canal bridge, but, seeing a sentry posted there, they turned right into the new instructional site, where the pilot officer borrowed a shovel and attempted to cross the railway bridge in the guise of a working man. On the bridge he encountered someone who looked as dishevelled as himself, and, taking him for a genuine workman or else another evader, he walked brazenly on. The individual turned out to be an aircraftman who, overcome by the unparalleled heat of one day of summer, had removed his jacket, collar and tie. Yet he was lively enough to challenge and arrest the pilot officer at 1605 hours. The sergeant saw all this from the rear. He waited until the aircraftman continued on his beat, then he tried to dash across the bridge. But the aircraftman was too wily for him: he whipped smartly round and caught his second prisoner.

The next news to arrive concerned a pair of warrant officers who, having climbed several walls, arrived in the churchyard of the village in time to see the capture of the two sergeants. They therefore took to the fields and after crossing a main road, they struck the railway and walked down the track. The platform was deserted, so they walked through the exit, down the ramp to the road and then hid in a ditch. One of the warrant officers then went ahead, but he was caught by the sentry on the canal bridge. The second warrant officer returned to the platform, hoping to cross the canal by the railway bridge. But the platform was no longer deserted, and a corporal came up to him and asked for a light. The warrant officer obliged in silence. The corporal then asked whether he knew when the train was due. To this the warrant officer replied by shaking his head and emitting an unintelligible grunt. At this moment, the aircraftman who had made the arrests returned to his patrol on the station and the three entered into a discussion about the time of the train, the corporal enquiring, the aircraftman explaining, and the warrant officer, like Brer Rabbit, lyin' low and sayin' nothin'. The aircraftman then resumed his patrol. When he was at what was hoped to be a safe distance, the warrant officer followed. The aircraftman was up to his tricks. He repeated his previous manoeuvre and caught his third prisoner.

This brings us to the last pair of evaders, who showed the most initiative. They were a warrant officer and a sergeant. They had identified their position and had reconnoitred until they came to a nursery garden where men were working. From a shed they borrowed a pair of bicycles, a broom, and a jacket, which was worn by the warrant officer. Emerging from the park, they passed a civilian who asked an unintelligible question about bicycles as they rode by. To this they each replied with a shake of the head and a rustic "ah!" They turned left, away from the camp, made a wide circuit of the village, passed a Home Guard, and finally found themselves on the road leading towards the camp. Having essayed two side turnings which turned out to be culs-de-sac, they came to the canal bridge, with its sentry. They realized that to cross would be impossible, so they decided to ride close up to

him, so that their Service trousers would not be seen, and then swing off to the right. This they did, at 50-yard intervals, chewing grass and generally playing the yokel. The warrant officer intensified the rusticity of the scene by carrying his broom over his shoulder. Both were successful, and they rode past a R.U.C. policeman who said that it was a brave day. They sagely replied "Ah!" and finally hid in some bushes alongside the main road, for further deliberation. The sergeant felt the need of further disguise. He saw a scarecrow in a field where a farmer was ploughing, and removed its tattered jacket. They then both rolled in the earth and chewed more grass. Their journey then took them over a hump-backed bridge (guarded) and under a railway bridge (also guarded). They rode on nonchalantly, grunting "ah" to anyone they saw. The sergeant, who was 50 yards ahead of his companion, suddenly found himself on the main road running alongside the airfield. He was so surprised that he almost collided with a W.A.A.F. on a bicycle. She informed him that he had "had it." He said "Ah!" and rode on, past a Service policeman, who took no notice of him, until the wily W.A.A.F. came along and told the S.P. that she suspected the sergeant of being one of the evaders.

While the sergeant was being questioned and detained by the special policeman, the warrant officer rode straight past him, left his bicycle at a café some hundred yards further on, and took to the fields. Sweeping round, he came to a lane patrolled by a Beaverette, along which he walked slowly, sweeping the earth with his broom to accentuate his disguise. He then came to a suitable gap in the perimeter wiring, through which he crawled on to the aerodrome. He walked straight across, meeting several airmen and civilians on the way. Some of them said laughingly that he might be an escaped prisoner. He joined in the laugh and strolled on unchallenged, finally walking into the Chief Instructor's Office and announcing that he had blown it up.

The second exercise was largely in the nature of an experiment. There was similar difficulty in finding suitable places in which to drop the evaders. There are large numbers of hills in the neighbourhood from the top of any of which the nearby firth is plainly visible. Also, there are several well-known landmarks, such as the two hills at the mouth of the firth. A low-lying road running through trees was finally chosen as the starting point for the exercise. It lay about six miles N.N.E. of the station.

The local authorities were notified and asked to keep their eyes open for any "suspicious characters" but there were no organized patrols. The bodies concerned were the R.A.F. Police, the Civil Police, the Home Guard, and the R.A.F. Regiment.

The 12 evaders were all Second Pilots and Navigators who had recently attended the escape lectures. They were joined by an instructor.

They were briefed on the evening before, thus giving them time to arrange some sort of disguise. Anything except correct Service dress was allowed. Compasses were not considered necessary, but maps were distributed. Other rules imposed were: No money to be taken. 1250's to be carried. English not to be spoken except in the broken accents of a foreigner. No violence was

to be used in avoiding arrest. If called upon to halt by anyone likely to be armed, the order was to be obeyed instantly. Private property was to be respected, especially growing crops. All the ranks of the station were notified in S.R.O.s of the exercise and instructed to apprehend anyone in civilian clothes seen during the afternoon.

The evaders travelled in a blacked-out bus and they were dropped between 1445 and 1515 hours along the selected road and instructed to report to the Tactical Library by 1745 hours. The first man home was Pilot Officer B, at 1650 hours. He had pin-pointed his position on his map by a loch near which he was dropped. He was nearly caught when he stumbled across a Home Guard observation post, but he crawled out of sight on hands and knees and got away without being seen. Otherwise, he had little trouble in reaching his destination. This officer pointed out that although every effort was made to confuse the party as to the direction taken, it

was not possible to black-out the sun. When the bus turned in its tracks, the evaders inside were aware of the fact by the changing position of the sun in relation to the bus.

Fifteen minutes later came Sergeant W. He had had quite an exciting, if exhausting time, being chased across country by two policemen. He finally lost them among some hills, only to run into two airmen whom he avoided by dropping to the ground and crawling round them. He then returned to the station with little trouble, after finding his position by climbing a hill. W/O.E. was helped in his direction-finding by the sound of aero-engines running-up. P/O. B. had been further helped by the sight of some aircraft which revealed to him the position of a nearby aerodrome. The other members of the party reached the aerodrome without difficulty or incident.

It is proposed to hold a further exercise during July when the conditions will be made more difficult.

Training in Canada

Among the first of the R.A.F. O.T.U.s to be established in Canada was No. 32 O.T.U. at Patricia Bay on Vancouver Island; one of the world's most delightful spots from the point of view of climate and scenery. When you are west of the Rockies, you do not find the extreme cold of the prairies and very little of the low cloud which contributes to the poor flying conditions of the east. Vancouver Island has a mild winter and a fairly hot summer. The worst enemies of flying are the sea fogs which you find over the Pacific Ocean during the summer months. They occasionally creep in over the coast and up the Straits of Juan de Fuca.

Patricia Bay is in the south of Vancouver Island, about 18 miles north of the city of Victoria and of its well-known naval base of Esquimalt. The situation is therefore ideal for training crews for Coastal Command squadrons.

No. 32 O.T.U. was formed to supply fully trained crews for Torpedo Bomber squadrons. As originally planned, the O.T.U., with its excellent buildings and aerodrome, would have been in an excellent position to keep up a steady output of well-trained crews, beginning early in 1942. This was made impossible by the outbreak of war with Japan. In one day, the peaceful atmosphere of the west coast changed to one of tension and expectation of attack. There was a state of emergency throughout December, 1941, so the O.T.U. was ordered to form an operational striking force squadron. The Beauforts which had arrived were accordingly used daily for anti-submarine patrol, to a depth of 200 miles from the West Coast of Vancouver Island.

The O.T.U. reverted to training early in 1942; but the new war in the Pacific hampered the work for some time. Patricia Bay was the only aerodrome on Vancouver Island and it was necessary to use it for operational purposes as well as for the two O.T.U.s. The operational squadrons were only partly trained and their exercises naturally had preference on the runways and on air firing and bombing ranges. The hilly nature of the island made it impossible to build a

satellite. Afterwards, an unused American aerodrome across the Georgia Straits was used and daytime landings were made there by some of the Hudsons of the R.C.A.F. O.T.U. to relieve congestion at Patricia Bay.

It was difficult to obtain spares for the Beauforts, as these had to come all the way from England. This, coupled with the demand for Hampden crews by Coastal Command, led to the O.T.U. being converted to Hampdens, during May and June of last year. The O.T.U. was finally equipped as a Hampden O.T.U., but it was impossible to carry out effective torpedo training until October, when the modified Hampdens were available and the F.46 training cameras had been supplied.

As the aerodrome is in a coastal area, all flights had to conform with the Western Air Command (R.C.A.F.) Operational Instructions. Long flights over the Pacific, to the West of Vancouver Island, were of some value in ordinary navigation and in W/T practice, but it was not possible to train crews in the use of the Coastal Command Operational procedure, because the R.C.A.F. procedure is different; a different system of reporting positions (grid in place of lettered co-ordinates, etc.) and a different signals organisation are used.

The high hills surrounding Patricia Bay and the absence of homing facilities, made it necessary to limit night navigational training to good weather.

The O.T.U. was the only one on the west coast; some 1,700 miles from Ottawa, the R.C.A.F. Headquarters. It was therefore administered by the Western Air Command, a very small headquarters which was already occupied in dealing with the new threat to the West Coast and with equipping and training squadrons for operations in Alaska. Very little help could therefore be given to the O.T.U. in its early stages and there were big delays in representing and rectifying difficulties and in obtaining equipment.

O.T.U. training in Canada is the same as at home, but with the important difference that one is so far away that one feels entirely divorced from the operations in the European war zone.

Members of the O.T.U. do not even hear the B.B.C. news and they therefore rely entirely upon intelligence summaries and reports sent out from Air Ministry. These usually arrive some months after the operations occur. Consequently, the training must always lag behind the policy.

All the difficulties mentioned above can be and are being successfully overcome, and there is no doubt that O.T.U. training in Canada will

be highly successful and carried out on an almost unlimited scale.

The Hampden squadrons in this Command are backed entirely from this O.T.U., and their successes are evidence of the way in which the difficulties are being overcome. When Coastal Hampden squadrons next carry out a strike off the Dutch Coast, it is worth remembering that they began their operational training 6,000 miles away from the scene of their combat.

Leaves from a Navigator's Log—VIII

Organised life is, as everyone knows, far preferable to a life of disorder. If you can't plan ahead and count on your day off; if you don't know what you'll be asked to do next; if you can't keep even a little grip on the happenings of the future, you might just as well be a gnat in a beer bottle for all the good you can do. A planned existence is the prize which civilisation offers to primitive man, and it is the civilisation that plans most intelligently which ultimately survives the onslaught of war. It isn't, therefore, surprising to find that provision has been made in the Coastal Command Navigation Drill for the drafting by the Navigator of a plan for each individual sortie before he sets out.

Much misunderstanding about the significance of the Flight Plan seems to exist. Almost any Navigator, asked what he understands by a Flight Plan, would point to the blank front page of Form 441 and say "That's it, I suppose." In one Boat Squadron recently we had the good fortune to overhear the Group Navigation Officer being asked by the Squadron Navigation Officer, anxious to score highly in the Command Summary, whether his Navigators should fill up the Flight Plan after the sorties, or continue to leave it blank! It is a pity decorum forbids us from reproducing here our reactions to this artless query. But it did show how little even these two supposedly enlightened Staff Navigators appreciated the real meaning of a Flight Plan.

One of the main troubles no doubt lies in the very name Flight Plan. The few blank spaces on Form 441, which have been alluded to in official publications as the Flight Plan, do not represent more than the stepping stones to the Plan proper, which is really in the nature of a Work Schedule. No doubt one of the reasons for the Flight Plan falling into disuse was the provision of separate meteorological data on the Form 2330, which is almost invariably carried by the Navigator in flight and so obviates the use of the space provided for the weather forecast on Form 441. As soon as this weakness in its design was disclosed the Flight Plan on Form 441 "lost face" and has since become so much waste of paper to many Navigators.

We prefer to think of the thing as a Work Schedule, for such is its proper function. In attempting a flight, be it a short dash to the Dutch coast or a long "stooge" to a convoy, a plan worked out on the ground or early in flight, will save the Navigator a good deal of work later on in the air; and that is surely not to be sneezed at!

But let it, O Intelligent One, spring from a sober contemplation of the task in hand. A few minutes' quiet perusal of the various characteristics of the sortie will indicate its similarities to other sorties you have done and will remind you of the pitfalls you fell into. It will also tell you how this sortie differs from your previous ones, for no two are exactly alike even though their purpose may be identical. For example, if you were to set out for a strike in the afternoon instead of at night, it doesn't need a brain to see the different navigational problems which would have to be faced. Likewise, if you go out so as to meet a convoy at dawn, your navigation problems are very different from those encountered by your relief aircraft a few hours later.

Admittedly the first thing to do in drawing up your Work Schedule is to work out, with the aid of the best Meteorological forecast available, the actual times you expect to complete the several major sections of your sortie. It would naturally not be necessary to calculate the details of a close convoy escort patrol much in advance, for these will not affect the main issue and cannot be known until you arrive at the convoy and make a proper appreciation of disposition, wind and weather. But it would be of especial benefit to know whether the Ops. Room Plotter has worked out your E.T.I. correctly; and if you can, in fact, stay out as long as, or longer than, the time he has allowed you. But these amount to no more than a preliminary canter at the formulation of your Schedule. What you should do, failing the provision of a comprehensive official Form, is to jot down some of the major points of issue on your chart. These will occur to you as you study your task in relation to the weather conditions, route to be followed, time of day or night, availability of astro and of radio aids, and so on. You will be able to note that, say, it will be important to take drifts before reaching a certain point in flight, where, perhaps, sea fog or low cloud may be expected to obliterate the sea surface. You will be able to plan your navigational aids so as to take full advantage of those that are offered. Thus you will note that you can expect to use astro up to such a time, when local dawn will intervene. Or that only after such-and-such a time will the sun be high enough for a sight, and that the moon will, or will not be well placed for a fix. You will thus appreciate whether or not you will have to use radio aids, and at what points in the flight these will be most useful, or least useful, reliable or not and available or not.

A sortie that is thus carefully reviewed in advance—there is no end to the suggestions that can come to mind—will be more profitable to the Navigator than one in which he sits and “takes it” from the blindly dispensing Fates. There is a healthy tendency in all of us to avoid unnecessary work, but never did the proverbial stitch save so many later “nines” than does the Flight Plan-cum-Work Schedule. It positively puts the Navigator at ease, for has he not anticipated every hazard he is going to meet? Having “buttoned up” his work in the comparative comfort of the Operations Room, almost all that remain to be done in the air are the observations, the log-keeping and the plotting. He will scarcely need to think at all, and he will be saved many disappointments if he has been cunning.

It would be to the point to quote here a recent case where a Navigator set out from S.W. Ireland to meet a convoy, nearly 600 miles away. The first hundred miles or so were cloudless, but a front of unknown activity lay beyond and extended right into the convoy area. The Navigator, true to form, asked for a flame float to be dropped (it being night), soon after leaving the coast, so as to check the track and wind. The Captain, a pilot who showed little appreciation of navigation and who was inclined to mistake authority for the power to deny requests, would

not allow this to be done as it meant someone leaving the Liberator's Flight Deck and upsetting the C.G. by going aft to the flare chute, thus altering the trim and temporarily reducing the airspeed by 4 knots. “Wait until later on,” he said. Alas! ten-tenths low cloud obscured the sea within the next half-hour, and no drifts were obtainable up to the time the convoy was found. The fact that the Navigator put up a fine show with six accurate astro fixes in 3 hours, and met the convoy without a search, was more than a saving grace. But a Work Schedule would have shown the Navigator that he must have insisted on as many drifts as possible immediately after leaving the coast, for the front might easily have been more active than it was. Indeed, he was quite likely to encounter high and medium cloud which would have made astro impossible. Without drifts his D.R. would have been very wide of the mark. Without a Plan, the Navigator did not realise his request to the Captain was so vital, and thus some valuable data was irretrievably lost.

No self-respecting Navigator would care to admit that he ever deliberately shut the door on fleeting opportunities, yet everyone who fails to make a comprehensive pre-flight plan is giving that door a pretty hearty slam. How about wedging it permanently open in future with a carefully devised Flight Plan (*sic*)?

Those Below Us

Like many others in Coastal Command, I had seen convoys but never met any of the seamen who sail in them. One night, in the train from Liverpool to Scotland, I was alone in a third class sleeping berth hoping that the other three men whom Movement Control had selected to share it would be sober and not too friendly. As the train began to move these three staggered in, tugging at heavy, shabby suitcases.

They eyed my cap on the peg, and one of them assured me, with unsteady solemnity, that they would settle down at once. “Us and the chief Engineer,” he said, “have been celebrating gettin’ home after a sticky v’yage.”

“And we’d better behave,” another said, “for we’re sharin’ this cabin with the Chief. And that don’t happen often.”

The Chief, less affected by the celebrations than his companions, bent down to give me a friendly greeting. “Glad to have the R.A.F. with us,” he said. Then he undressed into a suit of green pyjamas and sat on the short steps that lead to the upper bunks. He began to talk, and I listened eagerly, because he told of his experience in a famous convoy.

He was in a large ship, he said, when the bombs began to fall. He was on the control platform in the engine room. That is not the most reassuring place to be in a raid. But the Chief's men tended their engines without fault, although their nerves were straining upwards to the open deck where there are no pipes full of scalding steam, and where a man has a chance to leap clear of a ship sinking quickly under a direct hit. Then they heard what their ears had been listening for and their hearts had been dreading; the swish and scream and thudding explosion of a bomb hitting the ship.

The lights in the engine room went out. Every man stayed at his post. As the Chief told me this he leaned towards my bunk, swaying to the movement of the train, to make certain that I understood how brave his men had been. In his green pyjamas, with his spectacles and thinning hair, he looked a harmless, timid British citizen; an elderly man for whom life ought to be pleasant and interesting, but not hazardous. In his eyes I saw the drama of that chaotic engine room, with men shouldering fear aside while they stumbled around to find out what had happened, and to put things right if they could. They fought steam, water and fumes. And they won.

The Chief was able to go to the Captain and tell him that the ship could still steam ahead.

The Chief saw the battle for the first time when he went on deck with the glad message. He saw a great ship turn turtle and sink within a few minutes. He saw a tanker blow up and dissolve into flaming petrol which spread over the water and engulfed another ship whose gallant captain drove through it at full speed and emerged, scorched but safe, at the other side.

The Chief thought of the petrol stored in hundreds of drums in the forward holds of his own ship. At that moment a bomb crashed into one of these holds. For a breathless second the crew stared in horror. But the bomb fell at an angle, came out at the ship's side without exploding and dropped harmlessly into the sea. Not a miracle! Just a bit of bad bombing that saved men's lives.

For ten hours the engineers and crew took that ship through the attack, until a bomb came which was not badly aimed. Then she sank. The Chief was picked up by a destroyer, already overloaded with survivors from other ships. There were so many of them, wet and miserable men, that there

