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~~O. C. 'A' FLIGHT~~

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CONTENTS

	<i>Page</i>
Summary of the Month's Work : March	1
 I.—ANTI U-BOAT	
Summary of Anti U-Boat Operations : March	2
Assessments : Analysis of U-Boats sighted during March	3
Squadron Results : March	3
Recent Attacks on U-Boats	4
 II.—ANTI-SHIPPING	
Summary of Anti-Shipping Operations : March	10
Results Claimed for March	11
Analysis of Weapons expended	11
February Assessments of Attacks on Enemy Shipping	11
Shipping Strikes in March	12
 III.—OTHER OPERATIONAL FLYING	
Combats with Enemy Aircraft	14
Photographic Reconnaissance	14
Air/Sea Rescue	16
From the Report of a Naval Conference on Convoys SL. 150 and MKS. 41	16
 IV.—SPECIALIST AND GENERAL ARTICLES	
Judging the Speed of Ships	17
Flying the Mark XIV Wellington on One Engine	18
Enemy Views on the Radar War	19
Evasion Exercise in Northern Ireland	20
The Value of Bombing Practice	23
Dinghy Drift	24
The Diary of an Officer at an A.S.R. Marine Craft Unit	26
 PLATES	
<i>Plate</i>	<i>Opp. page</i>
1. U-Boat Sinking after an Attack by Sunderland U/422	4
2. Incidents in U/422's Attack	5
3. Shipping Strike by the North Coates Wing on March 1	12
4. Shipping Strike by the North Coates Wing on March 7	13
5. Amiens/Longean Marshalling Yards photographed by No. 541 Squadron	14
6. Shipping Strike by the Leuchars Wing on March 6	15
7. { Rescue of a Fortress Crew }	16
8. { R.P. Attack }	16
9. { An 8,000 ton Cruiser (to illustrate the article " Judging the Speed of Ships") }	18
10. { A Narvik Class Destroyer } (to illustrate the article " Judging the Speed of Ships")	18
11. { The Liner Queen Elizabeth }	19
12. Enemy Radar Sites	19
 CHART	
Anti U-Boat Activities : March	6

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

Summary of the Month's Work—March 1944

The Anti U-Boat Effort.—U-Boats operating against our shipping in the North Atlantic have continued retiring to the west and have been very widely scattered. This has offered few chances for attack, but has on the other hand seriously handicapped the enemy's efforts to intercept our convoys.

2. As in the earlier two months of this year the majority of locations and attacks were at night, but the numbers show a drop as compared with the February figures. A total of 33 U-Boats were sighted, of which 24 were attacked. Seventeen of these sightings were at night, resulting in 14 attacks. Once again the difficulties of obtaining evidence of after results in night attacks prevent a definite assessment, but in three cases there is sufficient evidence to warrant an assessment of "Probably Slight Damage" being awarded; and, in one further case, a night attack made by an Azores Wellington damaged the U-Boat sufficiently to enable subsequent follow-up aircraft to locate the U-Boat again and attack it, inflicting further damage. Surface forces were finally homed on to the scene, with the result that the U-Boat was destroyed.

3. The ten day attacks provided several highlights. A Sunderland caught a U-Boat on the surface in the North-West Approaches and sank it with a well-directed attack. American M.A.D. Catalinas located a U-Boat attempting to enter the Mediterranean and enabled surface forces to deliver a most promising attack. Finally, Mosquito aircraft equipped with a six-pounder gun delivered three attacks on U-Boats in the Inner Bay. The after evidence makes it appear likely that the U-Boat was destroyed.

4. Analysis of night attacks continues to show that, on many occasions, the final run in on Radar results in a visual sighting too far off the course of the aircraft to permit an accurate attack. It is hoped that the intensive training now going on will remedy this.

5. Future indications are that the patrolling U-Boats will remain widely scattered in the North Atlantic, and that the enemy may be holding his reserve of U-Boats in harbour ready to deploy in forthcoming operations.

6. **Anti-Shipping Operations.**—During March, 148 anti-shipping sorties encountered enemy shipping. This effort included three major strikes off the Norwegian coast and four major strikes off the Dutch coast.

7. On the 1st of the month the North Coates Wing carried out a strike against an M.V. of 6,000 tons, which was accompanied by two tugs and escorted by six escort vessels, off Den Helder. On return to base a quick turn round was made and a further strike was launched before dusk. This was followed up later with a bombing attack by a 415 Squadron Wellington. It is only fitting that such determination was rewarded by the total loss to the enemy of an M.V. of 6,400 tons, as well as damage to the escort vessels, without loss to ourselves.

8. Other sorties severely damaged two M.V.s of 3,000 tons and one M.V. of 2,500 tons, and three other M.V.s were damaged. The month was concluded by an attack by the Wick Wing against the 14,000 ton former liner *Monte Rosa*, proceeding southwards towards Kristiansand, supported by numerous escort vessels and fighter aircraft.

9. Night torpedo attacks have been continued by No. 254 Squadron against the few targets which appeared on the north German coast. On one occasion one M.V. was hit and observed to be on fire amidships.

10. On March 1 a 415 Squadron Wellington achieved a direct hit at night on the M.V. damaged by the North Coates Wing earlier in the day. In three other attacks by Wellingtons at night, the Squadron claim a M/S seriously damaged. Albacores of this Squadron carried out 16 attacks, causing damage to vessels on four occasions.

11. **Photographic Reconnaissance.**—Although P.R. work in March produced little of outstanding interest, a great mass of useful intelligence material has been obtained. Successful covers have been obtained of 320 airfields, 25 damage assessments of large cities and industrial centres, 425 of the "rocket installations" in north-west France and 320 of miscellaneous pinpoints and areas.

12. **Meteorological Flights.**—The U.S.A.A.F. Fortresses from Bovingdon have maintained an average of two sorties daily from Trevose Head to the westward. Met. Halifaxes of Coastal Command are slowly obtaining their special equipment, and, generally speaking, it can be said that meteorological information is now being obtained over greater areas and with much greater regularity than in the past.

13. **Air/Sea Rescue and Flying Control.**—During the month 127 calls have been made upon the services of the Air/Sea Rescue organization, which resulted in the rescue of 232 aircrew. One very quick night rescue was made when trawlers recovered the seven members of a Halifax within two hours of ditching, after a Warwick had been "scrambled" to search and had homed them on to the dinghy.

14. There were 260 diversions effected by Flying Control, of which 142 were in the 19 Group area. Of particular interest is the close co-operation between the Flying Control Staff at Castle Archdale and No. 201 Squadron which made it possible to sustain operations during a period of six days when, in the Lough Erne area, the conditions averaged a cloud base of 500 ft. and a visibility of one mile.

I.—ANTI U-BOAT

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

MARCH 1944

Duty and Base or Area.	Total Sorties.	Hours Flown.		U-Boats Sighted.		U-Boats Attacked.		Hours per Sighting.		No. of Sorties.		Col. 10, Sorties with Flak.
		Base to Base.	On Patrol.	Day.	Night.	Day.	Night.	Base to Base.	On Patrol.	When U-Boat Sighted.	When U-Boat Attacked.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Convoy Cover</i>												
United Kingdom	77	1,134	439	1	—	1	—	1,134	439	1	1	—
Iceland	18	240	120	2	—	2	—	60	30	2	2	3
Gibraltar and Moroccan Sea Frontier	121	1,258	697	1	—	—	—	1,258	697	1	—	—
Azores	9	91	31	—	—	—	—	—	—	—	—	—
TOTAL CONVOY EFFORT	225	2,723	1,287	4	2	3	1	454	214	4	3	3
<i>A/U Patrols</i>												
<i>Northern Transit</i>												
United Kingdom	111	864	498	—	—	—	—	—	—	—	—	—
Iceland	40	438	243	—	—	—	—	—	—	—	—	—
<i>Northern Convoy</i>												
United Kingdom	205	2,395	1,112	1	3	1	3	599	278	4	4	3
Iceland	52	608	274	—	1	—	—	608	274	1	—	1
Azores	63	710	279	—	1	—	1	710	279	2	2	2
<i>Bay of Biscay (including adjacent patrols)</i>												
United Kingdom	1,162	12,246	6,560	6	9	5	8	816	437	19	16	10
Gibraltar and Moroccan Sea Frontier	7	61	28	—	—	—	—	—	—	—	—	—
<i>Central Convoy</i>												
Gibraltar and Moroccan Sea Frontier	856	6,372	4,802	5	1	1	1	1,062	800	6	2	1
Azores	22	152	92	—	—	—	—	—	—	—	—	—
TOTAL A/U PATROLS	2,518	23,846	13,888	12	15	7	13	883	514	32	24	17
ADD CONVOY EFFORT	225	2,723	1,287	4	2	3	1	—	—	4	3	3
TOTAL EFFORT	2,743	26,569	15,175	16	17	10	14	805	460	36	27	20

Notes.—(1) In addition to the above there were 4 chance sightings, 3 by Transit aircraft and 1 by an A.D.G.B. Mosquito in the Bay.
(2) The U-Boat sighted and attacked at night by an Azores aircraft in the Northern Convoy area was sighted and attacked again in daylight by another Azores aircraft.

Summary—continued.

Assessments

Month.	Known Sunk.	Probably Sunk.	Damaged. A.	Damaged. B.	Slight Damage.	I.E.D.	No Damage.	Unassessed.
January	3	2	—	3	3	12	8	5
February	1	2	—	—	4	12	6	4
March	1	—	—	2	2	6	4	9

Analysis of U-Boats sighted during March

Particulars of Incidents.	U-Boats		Sorties when Aircraft	
	Sighted.	Attacked.	Sighted.	Attacked.
On 24 occasions 1 U-Boat was sighted by 1 aircraft—17 aircraft attacked.	24	17	24	17
On 2 occasions 1 U-Boat was sighted by 2 aircraft—all aircraft attacked.	2	2	4	4
On 1 occasion 1 U-Boat was sighted by 4 aircraft—2 aircraft attacked	1	1	4	2
On 1 occasion 2 U-Boats were sighted by 2 aircraft—both aircraft attacked same U-Boat.	2	1	2	2
On 2 occasions 2 U-Boats were sighted by 1 aircraft—3 U-Boats were attacked.	4	3	2	2
TOTALS	33	24	36	27

Squadron Results—March

				Sorties when U-Boat Sighted.	Sorties when U-Boat Attacked.
(i) United Kingdom					
58	Halifax	St. Davids		1	1
53	Liberator L.L.	St. Eval		2	2
224	Liberator L.L.	St. Eval		2	2
59	Liberator	Ballykelly		1	1
103 (U.S.N.)	Liberator	Dunkeswell		1	1
311 (Czech)	Liberator	Predannack		3 (2 U/B's)	1
547	Liberator	St. Eval		2	2
248	Mosquito	Portreath		6 (4 U/B's)	6 (3 U/B's)
422 (R.C.A.F.)	Sunderland	Castle Archdale		1	1
304 (Polish)	Wellington L.L.	Chivenor		2	1
407 (R.C.A.F.)	Wellington L.L.	Limavady		2	2
612	Wellington L.L.	Chivenor		1	1
(ii) Iceland					
120	Liberator L.L.	Reykjavik		3 (5 U/B's)	2 (3 U/B's)
(iii) Gibraltar					
52	Baltimore	North Front		2	1
1 (French)	Catalina	Port Lyautey		1	—
112 (U.S.N.)	Liberator	Agadir		3	—
179	Wellington L.L.	North Front		2	1
(iv) Azores					
206	Fortress	Lagens		1	1
172	Wellington L.L.	Lagens		1	1
				37	27

Notes

1. One sighting by a Baltimore of 52 Squadron was a chance sighting while the aircraft was on transit.
2. Two aircraft of 311 Squadron and two aircraft of 248 Squadron sighted the same U-Boat.
3. One aircraft of each of 172 and 206 Squadrons sighted and attacked the same U-Boat.

Recent Attacks on U-Boats

On the night of February 18, **Liberator S/53** was flying at 1,500 feet in very poor visibility on the way to escort convoy ONS.29. The aircraft was homing on the convoy by Radar when two blips appeared bearing Green 60° and Green 70° at ranges of 15 and 20 miles respectively. The **Liberator** turned and homed on the nearer contact, losing height. At a range of 1 mile the Leigh Light was switched on but it illuminated nothing. The aircraft passed over the estimated position of the U-Boat and then altered course slightly to starboard in order to home on the second contact. At about 2 miles this contact was lost, and the Captain made a wide turn to port, regaining contact at about 4 miles. At 1 mile, when the aircraft was at 200 feet, the Leigh Light was switched on again. The U-Boat immediately fired a very accurate burst from about six guns and orange tracer was seen passing close to the port side of the **Liberator**. The Captain then turned slightly to port and homed on the gun flashes, which ceased when the range was down to about half a mile. The Leigh Light failed to illuminate the target, but at about 300 yards the Captain saw a big pool of white which he took to be the swirl of a diving U-Boat. The enemy's estimated course and speed were 200° 14 knots, and the position, which was 50 miles from the convoy, was 49° 32' N., 23° 10' W. While a pronounced wake was still visible the **Liberator** attacked from abaft the U-Boat's port beam and from 150 feet dropped six depth charges spaced at 50 feet. Almost as soon as the depth charges had been released the Leigh Light illuminated both the target and the wake, and the Captain saw the U-Boat beyond his port wing tip, heading to port. He had attacked the pronounced wake caused by the enemy's high speed. The U-Boat again opened fire and continued until the **Liberator's** tail gunner replied. It is estimated by the Captain and confirmed by the rear gunner that the depth charges straddled the track about 100-150 feet behind the U-Boat. The **Liberator** remained in the area for about half an hour and was then ordered to return to the convoy.

About two hours later the aircraft was patrolling round the convoy at 1,000 feet in similar weather conditions when a Radar contact was obtained bearing Green 60° at a range of 15 miles. The

Liberator homed and lost height to 200 feet. At three-quarters of a mile range the Leigh Light was switched on and the Captain sighted through haze a surfaced U-Boat lying almost stationary. Her position was 37 miles from the convoy. The enemy at once opened erratic fire with self-destroying ammunition and red tracer. The nose gunner replied, but at about half a mile the U-Boat was lost and her fire ceased. The **Liberator** continued to home, and at 400 yards the enemy again opened fire. The aircraft flew over the centre of the gun flashes and dropped two depth charges spaced at 50 feet from 200 feet. The low level bomb sight was used and the gun flashes served as the point of aim. The U-Boat continued to fire vertically upwards as the aircraft flew over, and the tail gunner replied with short bursts aimed at the gun flashes. He was able to see the depth charges explode but no one actually saw the U-Boat in the extreme blackness and haze. The aircraft dropped a marker at the time of the attack and was able to maintain contact for another 5 miles. But when it returned to the marker no contact was obtained. The **Liberator** returned soon afterwards to the convoy and then set course for base as it had reached P.L.E. The escort vessels could not detach a ship to investigate as they were too far away.

Comments

A good effort in poor conditions. It is impossible to assess the results but the attacks probably discouraged the U-Boats from closing the convoy. Two points of interest arise from these attacks. In the first place, it is noteworthy that by artificial light it is possible to mistake the wake of a fast moving U-Boat for a swirl.

*In the second attack the U-Boat was sighted in the searchlight beam and then lost again. Normal experience is that once the light is trained on the target there is no difficulty in keeping the U-Boat illuminated. It is possible that this U-Boat was lost because of the back glare from the haze. In such circumstances it is essential to keep the target on the edge of the beam nearest to the operator. In the **Liberator** installation the top left-hand corner of the illuminated patch should be used and the target should not be allowed to get over to the right-hand side of the lighted patch.*

Perseverance Rewarded

The night of February 19 was very dark and hazy, and a 22-knot wind made the sea rough. Soon after 0300 hours **Wellington B/179**, which was on anti-U-Boat patrol at 1,000 feet, obtained a Radar contact 12 miles on the starboard bow. A lighted fishing vessel was seen in this position, but the contact split in two on a bearing Green 80°, range 3½ miles. As he could not see any other lights in the second position the **Wellington** Captain decided to investigate, but he did not lose height when homing since he assumed that

the contact was probably another fishing boat. As the aircraft passed over, the rear gunner and the second pilot saw a vessel which they could not identify. The Captain maintained his course for about 3 miles and then turned. He reduced height and lowered the Leigh Light, but as the aircraft was flying into wind the sea returns were so great that contact could not be held. Realizing this, the Captain manoeuvred the aircraft so as to approach the position down wind. These tactics were rewarded by a contact at 3 miles



The crew of the U-Boat attacked by U/422 (R.C.A.F.) scramble to get clear of their sinking ship. The fine definition of this photograph, and those on Plate 2, which show further incidents in the attack, is due to the rearward-facing F.24 camera, which is now fitted to Sunderland aircraft. For details of the attack *see* letterpress on page 8.



Two photographs of the U-Boat attacked and sunk by Sunderland U/422 (R.C.A.F.) on March 10.



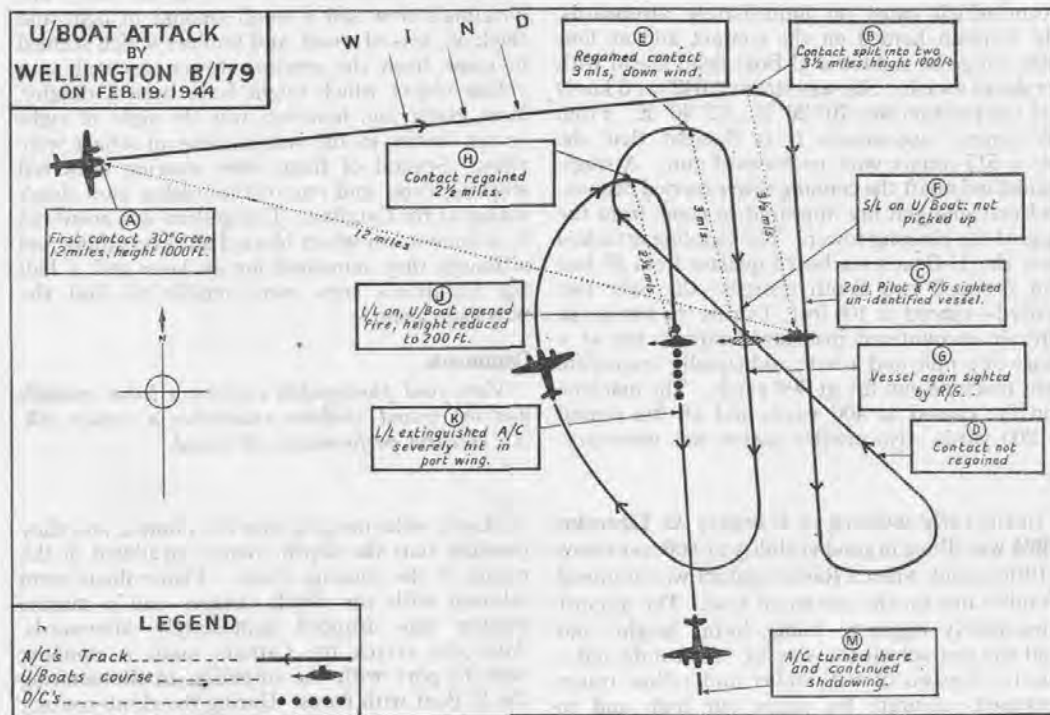
Survivors from the U-Boat. They are some 500 miles west of Land's End.

almost dead ahead. At half a mile range and from 200 feet the Leigh Light was switched on, but it did not pick up the target. The rear gunner, however, again sighted an unidentified vessel on the aircraft's port quarter. He did not think it was a U-Boat. Nevertheless, the Captain again flew up wind and turned. He regained contact at $2\frac{1}{2}$ miles, homed and switched on the Leigh Light at a range of half a mile. This time the beam illuminated a U-Boat steering west at 4 knots. The U-Boat looked very small and had a straight conning tower painted grey-white. Her position was $38^{\circ} 55' N.$, $09^{\circ} 31' W.$ Almost as soon as the Leigh Light was switched on the enemy opened fire with at least three guns and the Wellington replied with the nose gun. The aircraft attacked from forward of the U-Boat's starboard beam, releasing from 120 feet six depth charges spaced at 60 feet. Just after the depth charges were released the aircraft was badly hit in the port wing. Because of the flak the Leigh Light was extinguished immediately after the attack. The rear gunner saw the depth charges explode, their plumes obliterating the U-Boat. He considers that most of the stick overshot but that either the

first two or Nos. 2 and 3 straddled. After the plumes had subsided he saw an explosion on the U-Boat like red, white and blue fireworks: this might have been ammunition exploding on the enemy's deck. The U-Boat appeared to be stopped on the surface. It was very difficult for the aircraft to shadow because no contact could be obtained up wind and because the flame floats did not work. Nevertheless, intermittent contacts were obtained down wind and the enemy was certainly shadowed for half an hour. At 0350 hours a long endurance flame float was dropped on a contact, but this turned out to be the original fishing vessel, whose lights had gone out. After the flame float was dropped she put on her lights again. The Wellington homed two other aircraft to the scene and remained until after dawn, but nothing more was seen of the U-Boat. (See diagram below.)

Comments

An excellent, persevering and finally successful location in difficult weather conditions. The attack appears to have been accurate, the after effects confirming that damage is likely to have been inflicted.



Flak Silenced by Good Gunnery

On February 22 **Canso A/162** (R.C.A.F.) was patrolling at 3,000 feet in good visibility over a choppy sea. At 1405 hours a 517-ton U-Boat was sighted three miles away fine on the starboard bow. She was painted a brownish-grey and carried guns in the upper and lower bandstands abaft the conning tower. No gun was seen forward. The enemy's course was 240° at 12 knots, and the position was $61^{\circ} 03' N.$, $20^{\circ} 10' W.$ The aircraft lost height rapidly and attempted to make a bow attack but the U-Boat turned hard to port and opened fire with cannon and machine guns. In the next few minutes the aircraft and the U-Boat made at least four complete circles,

the aircraft staying at a range of about 1,500 yards. The enemy's fire was heavy, but vigorous evasive action saved the Canso from any hits. After 12 minutes of circling the aircraft was directly astern of the enemy, and the Captain made a tight turn to port and attacked over the U-Boat's port quarter from a height of 50 feet. Four depth charges were dropped, spaced at 70 feet, while the U-Boat was still on the surface. The first depth charge fell close to the enemy's starboard side and the explosions were seen forward of the conning tower. During the run in all three guns on the aircraft opened fire and hit the conning tower where at least three of

the U-Boat's crew were seen to fall. After the attack the Canso began to turn to port but changed to a tight turn to starboard and made a machine gun attack. The enemy did not reply. Two minutes after the attack the U-Boat turned to starboard and submerged on a course of 235°. Her angle of dive was 20°. A good deal of oil appeared on the surface and persisted in long streaks which indicated the underwater course of the U-Boat. The slick reached a length of two miles and altered course from 220° to 185°. The Canso remained for six hours and homed a Liberator before returning to base.

Comments

This action began with a visual sighting at a distance rather below the average in similar conditions, but the subsequent anti-flak tactics were very good indeed. It is a pity that the attack was marred by the overshoot of the depth charge stick. The aircraft's tracking in the attack was excellent; had it been possible to attack on a course nearer the U-Boat's track, there would have been a much greater possibility of the stick being within lethal range.

Two Depth Charges—One U-Boat

Catalina M/210 was returning from convoy JW.57 on the morning of February 25 when from 1,500 feet a Radar contact was obtained 24 miles abaft the starboard beam. The sea was rough and the visibility, which was 12 miles during the attack, shut down to nil in the snowstorm which came on immediately afterwards. The Captain homed on the contact and at four miles range he sighted a U-Boat dead ahead with her decks awash. She was steering 042° at 6 knots and her position was 70° 26' N., 12° 40' E. From her general appearance it is thought that she was a 517-tonner with no forward gun. A single bandstand abaft the conning tower carried cannon, and machine gun fire appeared to come from the base of the conning tower. The Catalina attacked over the U-Boat's starboard quarter from 50 feet and dropped two depth charges—the only two carried—spaced at 100 feet. During the run in the aircraft encountered inaccurate cannon fire at a range of a mile and a half, and equally inaccurate light machine gun fire at 800 yards. The machine gun fire ceased at 400 yards and all fire ceased at 200 yards. No evasive action was necessary.

The first depth charge exploded 15 feet from the starboard quarter level with the stern, and the second on the port bow 5 feet from the U-Boat almost level with the conning tower. Thirty seconds after the attack the U-Boat was seen to sink stern first with her bows in the air. The Catalina's crew saw a small amount of light and thick oil, bits of wood, and bubbles which seemed to come from the conning tower, as well as a yellow object which might have been a dinghy. More gratifying, however, was the sight of eight or ten bodies in the water, some of which were alive. Several of them were wearing dark red stocking caps, and one of the livelier ones shook his fist at the Catalina. This gesture was answered by a snowstorm which blotted out everything and although they remained for an hour and a half the Catalina's crew were unable to find the wreckage again.

Comments

Very good photographs confirm a lethal straddle and the visual evidence establishes a certain kill. An excellent performance all round.

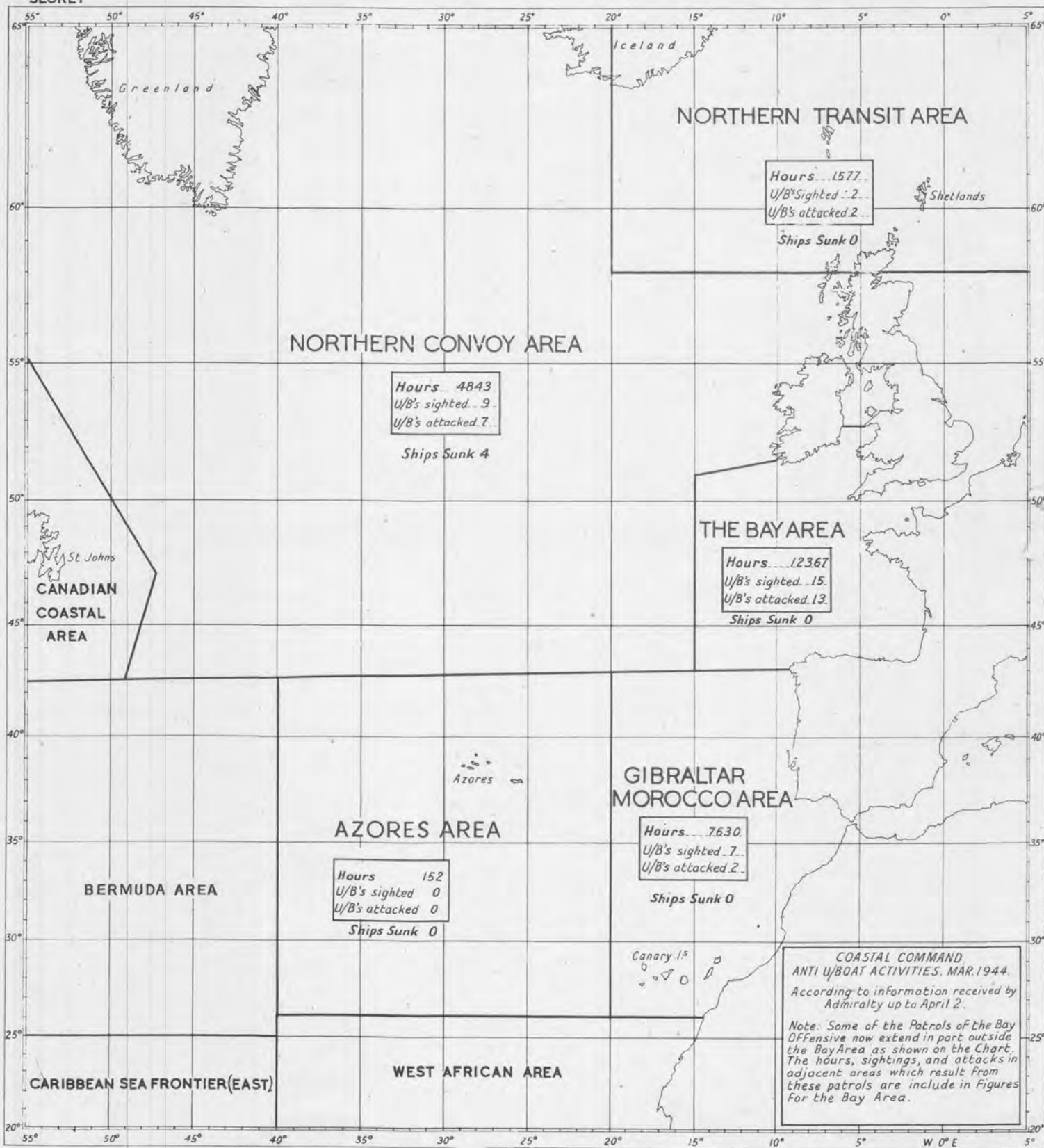
In the early morning of February 29, **Liberator J/224** was flying in good visibility at 800 feet below 5/10ths cloud, when a Radar contact was obtained 18 miles fine on the starboard bow. The aircraft immediately began to home, losing height, and held the contact all the way in. At a mile and a quarter streams of red, amber and yellow tracer appeared, accurate for range but high and to port of the aircraft. At a mile, when the Liberator was at 250 feet, the Leigh Light was switched on illuminating a surfaced U-Boat steering west at 12 knots. The U-Boat seemed large and her superstructure was long and low with a broken outline. Her position was 48° 04' N., 11° 57' W. About eight separate streams of tracer were seen coming from the front and top of the conning tower. The enemy kept up his fire during the run in, but ceased when the depth charges exploded. The aircraft was not hit. The attack was made from the U-Boat's port beam between the conning tower and the bows and six depth charges, spaced at 50 feet, were released from 250 feet with the aid of the low-level bomb sight. The rear gunner had his guns depressed and fired 100 rounds into the explosions as soon as they appeared in his sights. The crew saw the

U-Boat's wake merging into the plumes, and they consider that the depth charges straddled in the region of the conning tower. Flame floats were released with the depth charges and a marine marker was dropped immediately afterwards. After the attack the Captain made a climbing turn to port with the intention of illuminating the U-Boat with flares. During the climb contact was maintained only intermittently and when the Liberator levelled out at 3,000 feet the contact had completely disappeared. A further circle of flame floats was placed near the original marker, and two other markers were dropped set to two and four hours delay. Contact was not regained and the aircraft set course for base, having reached P.L.E. The Captain was later ordered to begin homing procedure but this could not be done as he was already on his way to base.

Comments

Apparently an excellent attack resulting from a very good long-range Radar contact and accurate homing. It is a pity that the points of entry of the depth charges could not be seen, for without knowing this it is impossible to say how much damage was inflicted. In this connection, until night photographs can be taken, rear gunners should hold their fire for

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the few vital seconds before the explosion plumes come up, and they should make every attempt to see the splash of the depth charges entering the water so that their position in relation to the U-Boat can be judged.

The fact that the U-Boat fired before the Leigh Light was switched on suggests that the U-Boat look-outs are efficient. Our own submarines report that even on dark nights aircraft can sometimes be seen up to one and a half miles away.

When the position of the U-Boat is disclosed by gun flashes, as in this case, it is strongly recommended that the searchlight should not be switched

on until the range has been closed to three-quarters of a mile, as at ranges of a mile or over the dazzling effect of the light is small and it makes a good target. If the light is left off until three-quarters of a mile, the enemy gunners may have got a good sight of the dark shape of the aircraft only to have it completely blotted out by the sudden dazzling glare of the searchlight.

The idea of climbing after an attack to release flares to illuminate the U-Boat has not previously been mentioned. It may be easier to see after-evidence by this method than with the Leigh Light.

A Blinding Flash

On the night of March 2 **Wellington B/179** was patrolling at 500 feet in a cloudless sky when two Radar contacts were obtained bearing Red 100° 12 miles and Red 90° 11 miles. The nearer of the two was a brilliantly lit fishing vessel, but the other was unlighted. The Wellington therefore altered course and homed on the unlighted contact. At three-quarters of a mile, from 400 feet, the Leigh Light was switched on and it illuminated a 500-ton U-Boat steering 160° at 10 knots. She carried guns on the conning tower and aft of it. Her position was 38° 45' N., 09° 43' W. The front gunner opened fire but after 40 rounds the gun jammed and the U-Boat immediately began firing. The Wellington's starboard engine was hit but the Captain pressed home the attack and from 100 feet released six depth charges spaced at 60 feet. Soon after the release a shell exploded in the centre bomb bay putting the Radar out of action and causing other damage. As the aircraft passed over, the rear gunner saw a brilliant flash which seemed to come from the U-Boat. He was

temporarily blinded by the flash and did not therefore see either the U-Boat or the explosion plumes. He did, however, see streams of tracer coming from the region of the flash. No severe bump was felt in the aircraft. Owing to the severe damage to his engine and aircraft the Captain immediately headed for base where he landed safely after flying for three hours on one engine.

Comments

A very well executed attack in face of accurate flak. The blinding flash is unlikely to have been caused by a depth charge exploding or hitting the U-Boat, for such an explosion would certainly have been felt. It may have come from ready-use ammunition. As the rear gunner was temporarily blinded and the aircraft so badly damaged as to be unable to circle for observation, after evidence is completely lacking. It is therefore impossible to give a definite assessment.

Insufficient Evidence of Damage

Soon after 2200 hours on March 3 **Wellington U/304** (Polish) was patrolling at 700 feet when a Radar contact was obtained 4 miles dead ahead. The visibility was 10 miles but the sea was rough and the windspeed was 20-24 knots. The Wellington dived to 300 feet and first a wake and then a U-Boat was sighted 1 mile ahead steering 310° at 8 knots. Her position was 47° 05' N., 05° 40' W. She was clearly seen in the moonlight and the Leigh Light was therefore not used. The Wellington attacked from Red 170° and released from 200 feet six depth charges spaced at 60 feet. The depth charges straddled, the first two exploding in the wake and the rest along the U-Boat's track. Two flame floats were released with the depth charges and when the Wellington returned one

minute later they were still burning. The U-Boat, however, was not seen and no Radar contact was obtained. The aircraft remained for 2 hours 22 minutes but nothing further was seen. Another aircraft relieved the Wellington which set course for base at 0030 hours.

Comments

A well executed attack. As there was no flak it seems that the U-Boat was taken by surprise. It is reported that the first depth charge fell in the wake and that the rest straddled along the track. If this report is accurate it is all the more disappointing that the lack of after results makes it necessary to assess the attack as "Insufficient Evidence of Damage".

Honours Divided

Shortly before 1800 hours on March 6, **Liberator B/120** was flying at 800 feet on the way to escort convoy RA.57 when two Radar contacts were obtained 15 miles on the port bow. The Captain turned to home on to the contacts, but one of them disappeared at 10 miles. The other was held to 4 miles at which point the Captain broke cloud and sighted a U-Boat dead ahead in position

68° 57' N., 03° 16' E. She was a 517-tonner steering 190° at 14 knots. As the aircraft flew in the U-Boat turned to port to keep stern on to the attack. The Liberator came in at 50 feet from Green 170° and released six depth charges spaced at 50 feet. The low level bomb sight was used. There was a vigorous exchange of gunfire during the run in and though the Liberator's front gunner hit the

enemy's conning tower, it was itself hit in several places, including No. 4 engine, which caught fire. The explosion of the first six depth charges was not seen, but when the Captain had turned to port after the attack he saw the U-Boat still fully surfaced and he ran in for a second attack. The flak was as heavy as before and at 300 yards the Liberator lurched badly. After he had again passed over the U-Boat at 50 feet the Captain found that no depth charges had been dropped. He then discovered that a shell had entered the nose and wounded both the navigators, one of them badly. The other reported that the intervalometer was unserviceable. Meanwhile, the aircraft had climbed to 150 feet but a bad hit in the port mainplane and the fact that No. 4 engine was out of action, made it impossible to hold this height. The remaining depth charges and all excess ammunition were therefore jettisoned, No. 4 engine was feathered—the fire had by then gone out—and the Radar turret was wound in. Then, by putting down 10° of flap, the Captain was able to climb to 2,500 ft. For some time after the action the rear of the aircraft had been full of smoke, probably from No. 4 engine, but this

eventually dispersed and the Liberator set course for base. The beam gunners were then able to report that the explosion of the depth charges on the first run had enveloped the U-Boat and that she had seemed to disappear after her bows had apparently been blown out of the water. This report, together with the fact that there were originally two Radar contacts, points to the possibility that there were two U-Boats present, the second of which was not seen during the first attack but was actually the target for the second run. This second target, however, did not seem to manoeuvre as much as usual. The hit in the Liberator's port mainplane had holed the inboard fuel tanks and it was thanks to the self-sealing material that the aircraft reached its base. On landing only two engines were fully serviceable as the constant speed unit on No. 2 had stuck at 2,000 r.p.m.

Comments

A very gallant effort. Photographs show that the U-Boat probably fared at least as badly as the Liberator.

Faulty Homing Spoils Attack

On March 6 in conditions of moonlight and haze Liberator V/53 was flying at 800 feet when a Radar contact was obtained 17 miles on the port bow. The aircraft homed, losing height to 300 feet, and at three-quarters of a mile the Leigh Light was switched on. Intense flak with red, white and yellow tracer appeared, and immediately afterwards a U-Boat was sighted slightly to starboard half a mile away. She was in position 46° 11' N., 06° 01' W., and was steering 220° at 14 knots. The Captain, who had not yet sighted the U-Boat, turned to starboard to close, and the Navigator sighted a very long wake. Using the low level bombsight and aiming at the head of the wake, he released six depth charges spaced at 50 feet while the Liberator was at 150 feet. Immediately after releasing the depth charges he looked through the starboard side of the nose compartment and sighted the U-Boat herself, ahead of his point of aim. The rear gunner saw only two explosions and estimated from these that the stick straddled the wake about 150 feet astern of the U-Boat. During the attack both front and rear gunners opened fire, but neither is confident

of his accuracy. Although he believed that the aircraft had been hit the Captain turned to port, circled and made a second run over the U-Boat from fine on her port quarter, attacking towards the moon. The front and rear gunners raked the conning tower, the rear gunner putting in a very long burst. The enemy replied vigorously with self-destroying ammunition which exploded high and with tracer which was hosed all round the Liberator. No. 1 engine was put out of action and the aircraft was hit repeatedly. The Captain was therefore obliged to return to base.

Comments

This attack was spoiled by the failure to home accurately for the final run in. This inaccuracy may have been due to the Captain failing to assess and allow for a relative drift of about 5° to port. No damage would have been caused by the depth charges. If the target had been properly illuminated, the aiming point would have been clearly seen. The depth charges could then have been kept for a second run, as the aircraft was not tracking over the target on the first run.

"Fine Bombish"

While Sunderland U/422 was on passage to her patrol area on March 10 a surfaced U-Boat was sighted at 6 miles forward of the port beam. The Sunderland was at 1,000 feet, the sea was calm and the visibility 15-20 miles. The U-Boat, which was steering 240° at 12-15 knots, was in position 52° 35' N., 20° 19' W. She was a standard 517-tonner without the forward gun, and she carried two twin 20-mm. mountings on the upper platform and one on the lower, the latter being well shielded. The Sunderland immediately manoeuvred to attack, reducing height to 400 feet and the range to one mile. The enemy, however, sighted the aircraft as it turned in and they opened fire at about five miles. Not unnaturally the fire was well short and it dropped about half way between the aircraft and the U-Boat. The

enemy also began to zigzag hard, but when the Sunderland was about a mile away the U-Boat turned sharply to port and circled in order to keep stern on to the aircraft. Meanwhile the Sunderland avoided the flak by frequent alterations of height and course, and circled in an attempt to attack from the bow. It was soon evident that this was impossible and when the Sunderland was 1,000 yards away on the U-Boat's starboard beam, the pilot dived in to attack from the quarter. The last 400 yards of the run in was made at 50 feet and the enemy put up intense flak, one shell hitting the aircraft's hull below the waterline. The Sunderland's front guns replied to such effect that in the end only one enemy gunner appeared to be serviceable. The attack was made from the U-Boat's starboard

quarter and six depth charges spaced at 60 feet were released while the U-Boat was still surfaced. The depth charges straddled the enemy's conning tower, one being seen to enter the water on the starboard side and three on the port. Four explosions were seen, one to starboard and three to port just abaft the conning tower. Three minutes after the attack the U-Boat submerged but re-surfaced after another three minutes. She was then moving very slowly leaving a heavy oil trace and turning to starboard. An hour and

half later the U-Boat signalled by V/S "Fine bombish," and the crew abandoned ship. Ten minutes later the U-Boat sank by the stern leaving her crew in numerous small dinghies and one big one (see plates 1 and 2). The Sunderland's crew were able to repair their damaged hull and the aircraft alighted safely at its base.

Comments

A very fine attack in the face of flak rewarded with the kill it deserved.

Persistent Hunting

In the early hours of March 11 **Liberator K/120** was escorting convoy N when a Radar contact was obtained at Red 90° bearing 085° T. 29 miles from the convoy. The aircraft homed and at half a mile the Leigh Light illuminated a U-Boat on the surface. She was too far to starboard for an attack to be made but flame floats and a marine marker were dropped. When the aircraft made a second run the U-Boat had dived. The S.N.O. was informed by R/T and the convoy altered course. The Liberator resumed patrol. About an hour and a half later the aircraft returned to the markers and began a Radar search. At 0220 hours a contact was obtained bearing 90° T. 38 miles from the convoy. The aircraft homed, but the contact disappeared at 10 miles. At 0319 hours the Liberator was again at the marker and immediately obtained a contact. The Captain flew north, keeping the range at 8 miles, until he was down moon, and then he made a straight run towards the moon. At a mile and a half the U-Boat was sighted steering towards the convoy at 12-14 knots in position 57° 45' N., 19° 37' W. The convoy was then 49 miles away. At a mile and a quarter the enemy opened fire with intense flak which burst above and below the aircraft. This flak was so dazzling at close range that even instrument flying was difficult. At one mile the Leigh Light was switched on and it was seen that the U-Boat's conning tower was very long compared with the vessel's overall length. The flak continued, bursting in red and white stars mixed with tracer: the co-navigator noted that twin guns firing tracer simultaneously were the first

guns to open fire. The Liberator attacked from the U-Boat's starboard beam at 100 feet and dropped six depth charges spaced at 60 feet. The low level bomb sight was used. The positions of the explosions relative to the U-Boat were not seen. The Liberator tracked over the conning tower and during the run a marine marker was released 300 yards short of the U-Boat and flame floats immediately after the depth charges. The aircraft then circled to port and, after making a run between the flame floats and the marker, the Captain sighted first a black oil streak and then the U-Boat half a mile away on the port beam. She was down by the stern and was trailing oil. Her speed was reduced to about 8 knots and she had altered course to the north-east. The Liberator circled and was fired at whenever the range closed. Radar contact was maintained but the blip was small and was affected by the seas, whereas before the attack contact had been good even at long range. About an hour after the attack the Liberator set course for base, having passed P.L.E.

Comments

The original sighting was made after a homing run of 18 miles, during which the relative drift was about 13° port. It appears from the form U-sight that no allowance was made for this large drift, so it is not surprising that the U-Boat was sighted to starboard. The actual attack was well executed, but it is not possible for the Naval Staff to estimate the extent of damage to the U-Boat.

A Good Attack with a Damaged Aircraft

On March 12 **Wellington C/612** was patrolling at 1,000 feet when a Radar contact was obtained 18½ miles almost dead ahead. The Captain homed and when the range was 8 miles he captured height to 200 feet. He encountered patches of cloud down to sea level and after the Leigh Light had been switched on at half a mile a U-Boat was sighted bearing Red 25° 400 yards away. She was steering west at 12-14 knots and her position was 46° 57' N., 09° 05' W. She opened intense fire as soon as the searchlight was switched on. The Captain decided that he was in an unfavourable position to attack, so he flew over the U-Boat and climbed away. The enemy's flak had damaged the tail unit and put the rear guns out of action; the front gun jammed after firing two rounds and remained unserviceable for the rest of the action. As soon as possible after passing over the U-Boat the Wellington released a marine marker and circled it. When the aircraft was at 500 feet a Radar contact was obtained 8 miles on the port bow and the Captain homed. At 5 miles range he reduced height to 50 feet and, meeting no

low cloud, he sighted the U-Boat's wake 1½ miles away fine on the starboard bow. He altered course and attacked from abaft the enemy's starboard beam, releasing five depth charges spaced at 60 feet. Evidence states that the depth charges straddled about 60 feet abaft the conning tower, three falling to starboard and two to port. The aircraft circled and by the light of the moon the crew saw the U-Boat lying stationary near the flame floats which had been released with the depth charges. The enemy again opened fire, but did not hit the aircraft, which dropped a Mark II marine marker as near to the U-Boat as the flak allowed. The Wellington continued to shadow and send signals until P.L.E. It then dropped a Mark III marine marker set to 2 hours delay and set course for base.

Comments

The damage to the aircraft on the first run was almost certainly due to the inaccurate homing. On the second run the moon came to the rescue and an excellent attack was made.

II.—ANTI-SHIPING

SUMMARY OF ANTI-SHIPING OPERATIONS BY COASTAL COMMAND AIRCRAFT.

MARCH 1944

Weapon Carried.	Number of Sorties.			Number of Aircraft to Attack.				
(1)	On Reconnaissance. (2)	On Strike. (3)	Total. (4)	On Reconnaissance. (5)	On Strike. (6)	Total. (7)	Naval Target. (8)	M/V Target. (9)
DAY OPERATIONS.								
Torpedo ..	97	8	105	28	—	28	—	28
R.P. ..	111	—	111	28	—	28	—	28
Bomb ..	— (2)	—	— (2)	— (2)	—	— (2)	— (2)	— (1)
6-pdr. cannon ..	— (3)	—	— (3)	— (3)	—	— (3)	— (2)	— (1)
Cannon and M.G. only ..	281 (14)	8	289 (14)	77 (14)	—	77 (14)	— (10)	77 (4)
TOTAL DAY ..	489 (19)	16	505 (19)	133 (19)	—	133 (19)	— (14)	133 (5)
NIGHT OPERATIONS.								
Torpedo ..	48	—	48	8	—	8	—	8
R.P. ..	75 (1)	5	80 (1)	19 (1)	2	21 (1)	13 (1)	8
Bomb ..	1 (2)	—	1 (2)	— (2)	—	— (2)	— (2)	—
Depth charge ..	66 (3)	—	66 (3)	— (3)	—	— (3)	— (2)	— (1)
Cannon and M.G. only ..	—	—	—	—	—	—	—	—
TOTAL NIGHT ..	190 (6)	5	195 (6)	27 (6)	2	29 (6)	13 (5)	16 (1)
ALL OPERATIONS.								
Torpedo ..	145	8	153	36	—	36	—	36
R.P. ..	111	—	111	28	—	28	—	28
Bomb ..	75 (3)	5	80 (3)	19 (3)	2	21 (3)	13 (3)	8
6 pdr. cannon ..	— (3)	—	— (3)	— (3)	—	— (3)	— (2)	— (1)
Depth charge ..	1 (2)	—	1 (2)	— (2)	—	— (2)	— (2)	—
Cannon and M.G. only ..	347 (17)	8	355 (17)	77 (17)	—	77 (17)	— (12)	77 (5)
GRAND TOTAL ..	679 (25)	21	700 (25)	160 (25)	2	162 (25)	13 (19)	149 (6)

Note.—The figures in brackets, which are not included in the totals, represent attacks on shipping by aircraft on operations other than anti-shiping.

Summary—continued

RESULTS CLAIMED FOR MARCH

(Subject to Assessment)

Torpedo Day : 1 M/V (3,000 tons) seriously damaged.
 1 M/V (4,000 tons) seriously damaged.
 1 M/V (2,000 tons) seriously damaged.
 2 M/V.s (2,500 tons each) seriously damaged.
 1 M/V (14,000 tons) damaged.

Night : 1 M/V (1,800 tons) sunk.
 1 M/V (3,000 tons) seriously damaged.

Torpedo, R.P. and Bombs Day : 1 M/V (6,400 tons) sunk.
 1 E/V seriously damaged.
 2 E/V.s damaged.
 1 Tug damaged.

Bomb Night : 1 M/S seriously damaged.
 3 Vessels damaged.

R.P. Day : 1 M/V (3,000 tons) seriously damaged.
 2 E/V.s damaged.

R.P. and Cannon ... Day : 2 E/V.s seriously damaged.
 2 Coasters damaged.
 1 Pilot cutter damaged.
 3 Vessels damaged.
 3 E/V.s damaged.

57-mm. Cannon Day : 1 M/S damaged.
 1 Coaster damaged.

Cannon Day : 3 E/V.s damaged.
 2 E/V.s seriously damaged.
 2 E/V.s damaged.

Depth Charge 1 E-Boat damaged.

ANALYSIS OF WEAPONS EXPENDED

Weapon.	No. of Aircraft to Attack.	Weapons Expended.	
		M/V.	Naval.
Day Operations :—			
Torpedo, 8 ft.	28	28	—
R.P.	28	202 × 25 lb. A.P.	—
Bomb	2	—	7 × 250 G.P.s
57-mm. cannon	3	1 attack	2 attacks
Night Operations :—			
Torpedo, 8 ft.	8	8	—
Bomb	22	9 × 500 lb. M.C. 23 × 250 lb. G.P.	10 × 500 lb. M.C. 78 × 250 lb. G.P.
Depth charge	2	—	13 × 250 lb. D.C.s

FEBRUARY ASSESSMENTS OF ATTACKS ON ENEMY SHIPPING

Day :—

Torpedoes .. M/V (1,500 tons) damaged.
 M/V (5,000 tons) damaged.

R.P. .. M/V (5,000 tons) sunk.
 E/V sunk.
 E/V damaged.

Cannon .. R/Boat sunk.
 "M" class M/S seriously damaged.
 "M" class M/S damaged.
 4 E/V.s damaged.

Night :—

Bombs .. E-Boat seriously damaged.

Shipping Strikes in March

The **North Coates Wing** began the month well by making two attacks against enemy shipping near Den Helder on March 1.

During the morning three Beaufighters of 236 Squadron armed with 25 lb. R.P. and cannon, supported by nine Beaufighters of 254 Squadron and nine of 143 Squadron using cannon only, flew an armed reconnaissance along the Dutch coast. The Beaufighter force was escorted by Spitfires of A.D.G.B. About four miles west of Den Helder they sighted a convoy of one 5,000/6,000 ton merchant ship, which was being towed stern first by a large tug, another tug nearby and a screen of about six armed trawlers to seaward of the M/V. Despite rather poor visibility and a cloud base of less than 1,200 feet, an excellent attack was made. Seven aircraft including the three with R.P. attacked the merchant ship, seven attacked the leading tug and the rest engaged the escorts. Some degree of surprise seems to have been achieved as no flak was experienced until the attack was well developed. Eight direct hits with R.P. as well as numerous cannon hits were scored on the M/V and the leading tug was damaged. One of the armed trawlers was seriously damaged and left on fire and two others were also damaged. All our aircraft returned from this operation without loss or damage.

After lunch the Wing went out again. This time three of the 254 Beaufighters carried torpedoes and seven cannon only; 236 Squadron provided six aircraft and 143 Squadron five, all armed with cannon. With an escort of Spitfires the Beaufighters returned to the scene of the morning's strike, where they found the merchantman stationary and unescorted. They attacked again and scored two torpedo hits amidships, as well as a great number of cannon strikes all over the ship. The vessel was left seriously damaged and on fire. None of the Beaufighters was lost or damaged.

These attacks were followed by a night attack by **Wellington C/415**. "C" dropped three 500 lb. bombs on the same ship and a direct hit caused fresh fires to break out.

Before dawn on March 2 attacks were made on enemy shipping near Gravelines. **Albacore L/415** was vectored over seven vessels, E or R-Boats and minesweepers, about 1 mile from the coast. The pilot attacked two of the minesweepers in close formation with a stick of six 250 lb. bombs. A direct hit followed by a big red glow was seen on one vessel and another bomb fell very near to the other minesweeper. Immediately afterwards intense flak was experienced from all vessels except the two attacked.

A little while later **Albacore F/415** was over six vessels north-east of Gravelines. The crew could not at first see the target, but when the vessels, which were stationary, opened up with intense light flak, the pilot sighted four E or R-Boats and two possible minesweepers. He attacked the rearmost vessel, a minesweeper, with six 250 lb. bombs. Explosions were not seen, but a few seconds later a huge pall of smoke rose from this vessel. No more flak came from the target and it is claimed as damaged.

Before dawn on March 3 **Albcores** again attacked shipping off the French coast.

M/415 was vectored over a target near Gravelines. The pilot searched in the area for half an hour without finding anything. Just as he was leaving, however, some ships opened fire and by the light of the flak three ships, believed to be armed trawlers, were seen. "M" attacked in a dive with six 250 lb. bombs. Two of them exploded close to one of the trawlers and it is claimed as damaged.

A/415 sighted four wakes about 5 miles north of Alderney. A closer inspection showed four vessels, probably E-Boats, travelling very fast in an easterly direction. The **Albacore** attacked with six 250 lb. bombs and a brilliant flash was seen from a direct hit on one of the E-Boats. The wake immediately ceased.

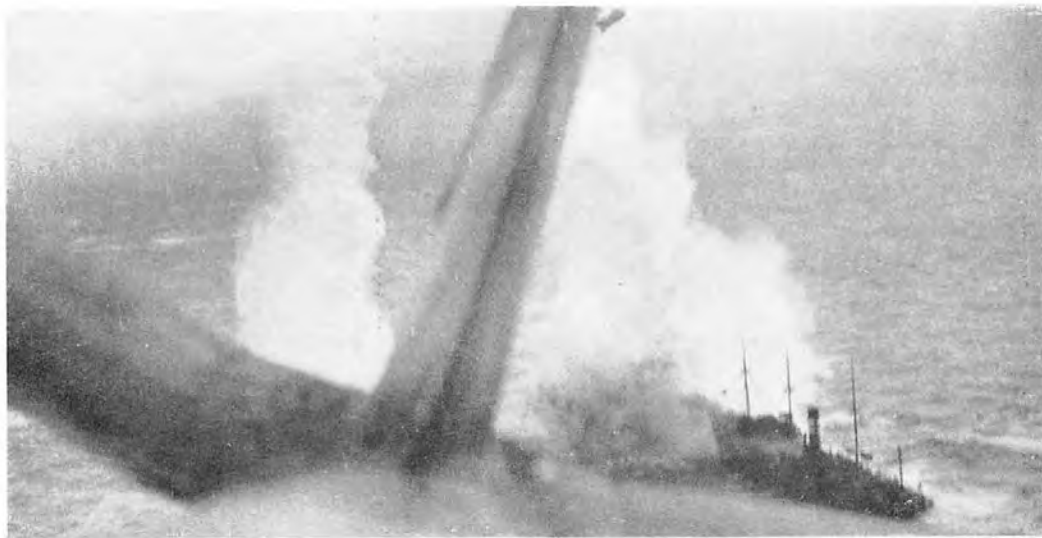
At the time of this attack **Q/415** was in the vicinity of Cap de la Hague, and the crew saw a bright explosion which is thought to have been result of A's attack. A Radar contact was obtained by "Q" and on homing the pilot saw three E-Boats on an easterly course in vic formation. He attacked with a stick of six 250 lb. bombs. The third bomb, which fell ahead of the starboard wake, was followed by a brilliant flash and the wake stopped. The fifth bomb fell on the stern of the centre boat and caused another brilliant flash. After this only one wake was visible and two E-Boats are claimed as at least seriously damaged.

On March 5 two dusk torpedo attacks were made on enemy shipping off the Norwegian coast.

Beaufighter K/489 flew over a convoy consisting of a 3,000 ton merchant ship, another of 2,000 tons and an escort vessel. These were all stationary about 3 miles south of Egero. The aircraft turned out to sea and then returned to drop its torpedo against the 3,000 ton M/V. A dull orange explosion followed by a great column of smoke came from the target.

Beaufighter M/489 sighted a 5,000 ton merchant ship and four smaller vessels of about 400 tons at anchor near Egero. The pilot attacked the large vessel with a torpedo but owing to the poor light did not see any results. No flak was experienced, but after breaking away the crew saw flak followed by a plume of water and a red glow from the convoy attacked by "K."

On March 5 a successful night attack on shipping off the Dutch coast was made by **Wellington M/415** and **Beaufighters D, G and R/254**. North of Schiermonikoog a merchant vessel of about 3,000 tons escorted by three "M" class minesweepers was located by the **Wellington** which homed the Beaufighters to the area. When all the Beaufighters had arrived and made contact, "M" dropped four flares over the convoy and then attacked with three 500 lb. bombs. The nearest bomb undershot by 100 yards. The **Wellington** then dropped a stick of 20 flares and set course for base. A fair amount of light and heavy flak was being put up by these ships and this helped to guide the Beaufighters to their target. When within range, "R" attacked the merchant ship on the starboard bow, dropping its torpedo at 1,500 yards range, but no results were seen. Both "D" and "G" made their attacks on the starboard quarter scoring at least one torpedo hit between them. A big explosion and flames came from the target which was still on fire and smoking when the aircraft left the area. None of our aircraft was damaged.



On March 1, the North Coates Wing twice attacked an enemy convoy containing the 6,415 ton *Maasburg* which was being towed stern first, evidently having been mined. The two upper photographs show an earlier attack and the lower shows the ship under heavy cannon fire in the second action. She is now a total loss.



An eastbound enemy convoy consisting of two coasters, escorted by three armed trawlers, and two tugs was attacked off Borkum by Nos. 254, 236 and 143 Squadrons on March 7, 1944, with torpedoes, R.P. and cannon. Both the armed trawlers were set on fire and smoke was issuing from the coasters at the end of the attack. A torpedo hit, not seen on the photographs, was also claimed on another vessel. A small passenger packet, probably a pilot cutter, at anchor nearby, was also beaten up. The top photograph gives a general view of the action, with an armed trawler as the focus of attention. The middle one shows an armed trawler well alight, and the lowest shows the pilot cutter with port life-boat swung out and hanging from the after fall.

PLATE 4



At dawn on March 6 **Beaufighter H/489** made a determined attack on a convoy near Stavanger. The convoy consisted of two 3,000 ton merchant ships with two trawler-type escorts. The pilot chose the leading M/V for his target and scored a direct hit with his torpedo. A column of heavy dark smoke rose from the ship and showed no signs of dispersing. Light flak was experienced as the aircraft broke away but it came from the escorts only. "H" was undamaged.

Later on March 6 the **Leuchars Wing** carried out an anti-shipping strike off Norway. The striking force comprised Beaufighters K, F, T and Z/489 carrying torpedoes, and eight Beaufighters of 455 Squadron armed with cannon only. The torpedo aircraft flew in the centre of the formation with four anti-flak aircraft on either wing. Off Stavanger a convoy of 16 ships was sighted on a northerly course. It consisted of one merchant ship of 4,000 tons, five of 3,000 tons, one coaster and nine escort vessels, one of which was an "M" class minesweeper. The merchant ships were in three parallel columns of two ships each and were protected on all sides by the escorts. There was also an air escort of four Me.109's and one B.V.138. In face of heavy and light flak from the escorts and shore batteries, and opposition from enemy fighters, the Wing attacked from the seaward side of the convoy. Beaufighter "Z" was intercepted by a 109 before it could get into dropping position and was forced to seek cloud cover. The other three aircraft of No. 489 Squadron made good attacks although "K" was chased by another 109 before and after dropping its torpedo. A large explosion followed by clouds of smoke was seen on one of the 3,000 ton ships. Numerous cannon hits were scored by the anti-flak aircraft on the escorts, the coaster and two of the M/V's. Only one of the Beaufighters sustained slight damage and there were no casualties.

On March 7 the **North Coates Wing** escorted by two squadrons of Mustangs carried out an armed reconnaissance off the Frisian Islands. The Wing was composed of twenty-nine Beaufighters drawn from Nos. 254, 143 and 236 Squadrons. Six aircraft carried torpedoes, five carried 25 lb. R.P. and cannon, and eighteen were armed with cannon only.

A convoy of eight small ships was sighted near Borkum; three armed trawlers, two coasters and a tug were steaming east, another coaster was on a westerly course and a pilot cutter or cable layer was at anchor heading south. Although none of these vessels was more than 1,000 tons the leader decided to attack as there were no other ships in the target area. The Beaufighters seemed to achieve almost complete surprise as very little flak was experienced by the first sections, but it became very intense before the end of the attack. There were many strikes on all the vessels and two torpedoes are believed to have hit. Three vessels were hit by a total of eight R.P., two of which were seen to pass right through one of the ships. As the target was small and the striking force large some aircraft were crowded out and unable to fire. The attack, however, was well executed and photographs confirm that three armed trawlers were set on fire, three coasters and the cable layer left smoking, and the tug damaged by cannon fire. Two aircraft failed to return from this operation.

On the night of March 15/16 **Wellington J/172** was diverted from anti U-Boat patrol to intercept E-Boats heading towards the south-west coast of Cornwall. A force of seven E-Boats on a northerly course was sighted south of the Scillies. This force split into two, three boats forming vic and the other four going into line ahead about 4 miles away. The Wellington made two reconnaissance runs across the track of the column of four and then attacked with six depth charges. Three fell short, two straddled the third E-Boat and the sixth overshot. The Wellington crew saw a big explosion and a bright orange flash which are thought to have come from one of the vessels. Owing to the darkness no definite claim can be made, but the attack caused the E-Boats to turn back.

On the night of March 19/20 **Albacore F/415** was vectored to a position off Gravelines. A large coaster of about 1,500 tons was sighted ahead of its escorts. The pilot attacked with six 250 lb. bombs, and saw four hits on the ship which is claimed as damaged.

On March 23 an enemy convoy was attacked off Vaagso by the **Wick Wing**. The force consisted of four torpedo Beaufighters of 144 Squadron and six Beaufighters of 404 Squadron armed with 25 lb. R.P.s and cannon. The convoy comprised two merchant vessels, one of 3,000 tons and the other of 2,500 tons, accompanied by three escort vessels. Eight direct hits with R.P. were seen on the larger merchant ship and four under-water hits are estimated. Numerous strikes with cannon fire were scored on the M/V as well as on the three escorts. Three torpedoes were dropped but no hits are claimed. Considerable flak was experienced from the ships and shore batteries and one of the Torbeaus failed to return. The total damage inflicted on the enemy was one 3,000-ton merchant ship seriously damaged and three escort vessels damaged.

On March 23 **Beaufighter P/489** formed part of a striking force but became separated from the other aircraft owing to bad weather. On coming out of a fog bank the pilot sighted a passenger-type vessel of 2,000 tons about 1,500 yards away on the port bow. He closed the range and dropped his torpedo from 700 yards. The torpedo hit and a column of water shot into the air just off the ship's port beam. During the run in and after the attack flak was encountered from the vessel and also from shore batteries near Lister. The Beaufighter was undamaged and returned safely to base.

Early on March 23 **Albacore M/415** was vectored over four enemy ships off Berck-sur-Mer. The largest, believed to be a minesweeper, was escorted by three E/R-Boats. The aircraft made a diving attack on the minesweeper with six 250 lb. bombs and the pilot saw one direct hit. As a result a fire broke out on the ship and lasted for five minutes after the attack. The vessel is claimed as seriously damaged.

On the night of March 26 **Albacore H/415** was directed to a target about 4 miles off Cap de la Hague. The pilot sighted a vessel, which he took to be an "M" class minesweeper, and attacked with six 250 lb. bombs. Two minutes after the attack a big explosion, accompanied by a bright white flash was seen on the target, and this was followed by a red glow. It is estimated that the minesweeper was seriously damaged.

III.-OTHER OPERATIONAL FLYING

Combats with Enemy Aircraft

On February 25 **Mosquitos Q** and **R/248** were flying at 500 feet on escort patrol off the south-west coast of Eire when they sighted a Ju.88 about 2,000 yards away to starboard at 1,500 feet. "Q" at once made a climbing attack on the beam opening fire at 300 yards, while "R" climbed and attacked from astern. One of the enemy's engines began to smoke as he made for cloud. Both **Mosquitos** followed the 88 in and out of broken cloud and fired several short bursts which damaged the cockpit and fuselage. The Ju. took violent evasive action and replied with its rear guns before escaping in thick cloud. Neither of our aircraft was damaged.

On March 7 **Beaufighters** on a shipping strike sighted an Arado 196 flying along the Norwegian coast. When the formation was north-west of Svinoy the enemy aircraft turned towards **B/144** which was on the port flank. The pilot of **J/144**, thinking the Arado might attack "B," turned towards it to make an attack himself. The enemy at once turned away presenting his stern to "J," who opened fire at 600 yards. The Arado flew close to the water and took skidding evasive action. "J" was able to use it as a splash target and scored cannon hits on both mainplanes before he overshot and had to break away. The **Beaufighter** pilot had retained his torpedo and decided to rejoin

the formation. The enemy aircraft was last seen corkscrewing away in a westerly direction.

A few miles off the north coast of Spain on March 10, **Liberator R/311** (Czech) sighted an enemy naval force escorted by eight Ju.88's. "R" was driven off by the enemy aircraft when it attempted to bomb the ships and had to seek cover in patches of cloud. The pilot made three more unsuccessful attempts, but on his fifth run in he was able to drop his bombs. During the bombing runs the enemy aircraft made no fewer than 15 attacks from all directions and damaged the **Liberator**. However, one of the 88's was hit by fire from "R's" guns and was last seen diving steeply towards the sea with thick black smoke pouring from both engines. "R" eventually gained cloud cover and set course for base. This was a very determined action on the part of the **Liberator** crew.

Flying a few miles off the north coast of Spain on March 10, **Mosquitos E, L, R, U, Z** and **Y/248** encountered 8-10 Ju.88's escorting an enemy naval force. A series of very mixed combats ensued, during which "E" and "Y" each destroyed an 88; "R" also shot down one enemy aircraft and damaged another. All our aircraft returned and sustained a total damage of only three bullet holes.

Photographic Reconnaissance

Although P.R. work in March has produced little of outstanding interest, a great mass of intelligence material has been obtained. As the following accounts show, some of the sorties were made in the face of persistent opposition. At this early date it is difficult to give figures of the complete results because of the variety of targets which have been revealed to the photographic interpreters. Rough figures, however, are available for readily identified targets such as airfields, ports, etc.

The following is a list of the *successful* covers obtained during March: 320 covers of airfields (including many damage assessment sorties), 25 sorties for damage assessment in large cities and industrial centres, 425 covers of the "rocket installations" in north-west France (including many for damage assessment), 100 covers of particular areas, 140 of special pinpoint targets, 35 of U-Boat yards, and 45 of marshalling yards.

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

544 Squadron (Mosquito)

We took off from base at 1100 hours on March 17 with Pillau and the Gdynia-Danzig area as our primary objectives. The outward trip was uneventful and at 1330 hours we turned on our cameras to photograph an airfield just north of Gdynia. We kept the cameras on across the bay to the Hel Peninsula and set course for Pillau. We then found that the drop tanks would not feed and when we landed there were still 40 gallons in them. Pillau was photographed at 1345 hours from 32,000 feet and we returned across the Gulf of Danzig to Danzig. It was obvious that the *Herrenvolk* knew of our presence for when we were 15 miles away we could see that the smoke screens at Danzig and Gdynia were well under way. It was clear that we could not get any vertical photographs of these ports, so the navi-

gator turned on the oblique camera in the hope of photographing some of the shipping anchored off Danzig. We were very fortunate for these oblique photographs showed the heavy cruiser *Prinz Eugen* proceeding slowly towards Gdynia, the pocket battleship *Admiral Scheer* and the cruisers *Hipper* and *Leipzig* anchored off Gdynia. We made one further run over the Hel Peninsula and Puck Bay and there photographed the light cruiser *Nurnberg*. We then set course for base. At 1500 hours, when we were just south-west of Kolding and about to cross out of the enemy coast, the navigator saw black specks in the port trail and oil froth coming from the port engine. Almost immediately the oil pressure on this engine dropped and the temperature rose. The pilot turned on the emergency oil supply but this had no effect and the engine vibrated violently.



Amiens/Longeau marshalling yards after a night attack by Bomber Command. The photograph was taken by 541 Squadron from 26,000 feet.

PLATE 6



Torpedo-carrying Beaufighters of No. 489 Squadron escorted by anti-flak Beaufighters of No. 455 Squadron (R.A.A.F.), attacked a convoy consisting of eight medium merchant ships escorted by nine auxiliaries off Stavanger on March 6, 1944. A hit by torpedo can be seen in the upper photograph. The centre photograph shows a general view of the convoy, and in the lower one a merchant vessel is seen being attacked by cannon fire. (See letterpress page 13.)

At 1525 hours the port airscrew was feathered. We began losing height and five minutes later we got very worried when the starboard engine began vibrating and surging. The oil pressure on this engine also dropped but the auxiliary oil supply seemed to help things temporarily. However, we found it necessary to keep turning this on intermittently throughout the rest of the journey back as the engine continued to run very roughly.

At 1535 hours we tried to contact a homing station on V.H.F. and W/T, but we received no reply until over an hour later when we got a homing from Coltishall. When we were 20 miles off the English coast two Spitfires and a Mosquito met us and escorted us in. Weather conditions were very bad—cloud tops 4,500 feet, cloud base 1,500 feet, visibility 800 yards in rain but the pilot landed successfully.

544 Squadron (Mosquito)

We were airborne at 1000 hours on March 23 to photograph targets in Denmark and ports in the western Baltic. Conditions at base were very bad—10/10ths low, medium and high cloud which persisted over the whole of the North Sea. Our first and, as it turned out, only pinpoint was Kiel, and we began our run over the port at 1200 hours from 32,000 feet. Almost as soon as we started the run flak began bursting all around us. It was extremely accurate for height but most of the bursts were to port and starboard. Suddenly we felt a heavy bump and the starboard engine stopped with oil and glycol pouring from it. Then smoke began to come from underneath the engine, but the starboard fire extinguisher checked any possibility of fire. We could see nothing actually falling off the engine so we continued the run until we thought we had obtained a reasonable cover of the port. We then feathered the starboard airscrew and set course for base.

Immediately the revs. on the port engine began to fluctuate and the aircraft lost height. The pilot opened up the good engine to 2,900 revs. but this gave only +6 boost and we continued to lose height to 8,000 feet. The navigator began sending SOS on MF and HF but there was no response at all. At 1330 hours we were 130 miles off the English coast at 8,000 feet and still losing height when all wireless facilities packed up. We considered jettisoning all loose equipment and the pilot estimated that we could fly for another hour and a half before being compelled to ditch. We were down to 3,000 feet and about a mile off the English coast when the navigator sighted a Wellington about a quarter of a mile away. He fired the colours of the day hoping that the Wellington might formate on us and help us through the cloud, but it obviously did not see our signal.

We were now over the coast at 2,000 feet, still in cloud and still losing height. The navigator went down into the nose of the aircraft to look out for obstructions. We broke cloud at 600 feet, right over Coltishall. The pilot put the wheels down, which made the aircraft lose height imme-

diately, and he had to make a cross-wind landing. When this was successfully done we got out and found a big hole in the starboard wing, near the engine nacelle, and discovered that the glycol and oil pipes had been pierced. Our cameras were not damaged and we found later that our efforts over Kiel had not been fruitless.

542 Squadron (Spitfire)

Berlin weather had not been kind for several weeks when I was briefed to cover a raid by the U.S. Bomber Command on March 8. I took off from base, refuelled on the coast and soon after 1400 hours I was on my way to the German capital. The weather was good and I was able to pinpoint myself all the way. As I neared Hanover I looked to port and could see hundreds of black flak bursts. There were so many of them that they looked like a big black carpet, and although I could not see any other aircraft about, I knew the Fortresses were going in. I was feeling glad that I was on my own and away from that stuff when flak suddenly began to burst all around me. I had been so absorbed in the other flak that I had drifted right over Hanover. I altered course, climbed and left Hanover in a hurry.

As I approached Berlin I could see columns of grey smoke rising from the eastern side of the city where one of my targets lay. I went straight between the lakes on the western side and did my first run over the centre of the city. I turned at the end of the run and lined up to photograph the target on the eastern side, but felt sure that the smoke which was rising from it would make the photographs pretty useless. The smoke was drifting to the south-west for about 20 miles and blotted out both the built-up areas and the countryside for miles around. I had finished one run over these fires and was turning for a third run over the city when I spotted a FW.190 at my own height approaching from head on. I kept on course to meet him, climbed and then turned steeply to port. As I did so, three more 190's appeared from the south-west turning in towards me. I did another steep turn and climbed again and as I did so the perspex iced up so that I could not see anything for the next few moments. Then it cleared sufficiently for me to keep all four of my would-be interceptors in sight. I was then at 38,000 feet and flat out, and it was comforting to see the 190's gradually dropping behind. After three minutes they gave up altogether and I saw them break away. I then went back to cruising speed.

I gave Hanover a wide berth on the way back, but just after I had left the city to port, my engine cut on the main tanks. I was at 32,000 feet and was down to 16,000 feet before the engine picked up again as the result of some vigorous priming. This proved to be the end of my troubles and I landed on the coast 1815 hours, having been airborne exactly four hours.

Air/Sea Rescue

On the afternoon of March 9, Hudsons of No. 279 Squadron were patrolling the track of returning U.S. bombers when they were diverted to two positions where aircraft had ditched. **M/279** found the crew of a U.S. Fortress which had ditched 45 miles east of Great Yarmouth. **RML 514**, which was at a rendezvous position nearby, was homed on to the dinghies and the ten survivors were taken on board.

Meanwhile **B/279**, which was covering the other incident, had found two dinghies containing the crew of another Fortress which had ditched in position 52° 50' N., 03° 55' E. The airborne lifeboat was dropped and the survivors were seen to paddle up to it, climb in and wave cheerfully to the aircraft. After this, bad weather caused the aircraft to lose contact and the next morning searches were organized on the assumption that the crew had started the engines and made some headway. These searches proved abortive and it was discovered later that the crew had been unable to start the engine of the lifeboat. They had, however, used the dinghy radio and during the afternoon bearings on an automatic SOS signal were received by various W/T stations and a fix was obtained. It was then obvious that the airborne lifeboat had not been under way and air and surface craft were instructed to search further east. At 1700 hours the lifeboat was found again and the ten survivors transferred to an H.S.L.

Quick Rescue at Night

At 0006 hours on March 23, an SOS was received from a Halifax which was returning from operations over Germany. This aircraft was presumed to have ditched when the plot faded at 0020 hours in position 53° 35' N., 01° 22' E. At 0103 hours **Warwick D/280** was airborne from Thornaby and two trawlers from the Humber area were

diverted to the position. The seven members of the Halifax crew who had been able to get into their dinghy were sighted by the Warwick at 0320 hours. Flares were dropped to guide the trawler and the rescue was made at 0347 hours.

A Very Fine Rescue

With co-operation from the Navy, a very fine rescue was made 100 miles north-west of Cape Finisterre.

At 1351 hours on March 23 **Sunderland M/461** signalled that it had been attacked by enemy aircraft in position 44° 25' N., 09° 58' W. After that nothing more was heard. Air/Sea Rescue was immediately organized by 19 Group and aircraft in the vicinity were diverted to this position. The search was continued during the night and at 0932 hours next morning **Sunderland L/228** sighted two dinghies containing seven survivors in position 44° 42' N., 10° 02' W. Unfortunately the state of the sea made landing impossible and contact was lost in the poor visibility. Two destroyers were sailed at 1330 hours and the search was continued day and night by Warwicks, Sunderlands, Liberators, Mosquitos and Halifaxes drawn from 10 different squadrons. At 0055 hours on March 25, **Liberator C/311** (Czech) signalled that it was over a dinghy in position 44° 55' N., 10° 37' W. Since this showed that the dinghy had drifted north-west, the Navy was asked to signal this new position to the destroyers and other aircraft in the area were informed. **C/311** was relieved by **Halifax Q/502**, and at 0935 hours **Sunderland R/461** was over the dinghy. The surface craft were then approaching and **R/461** was relieved by **Liberators Q/547** and **O/105** (U.S.N.), which contacted the destroyers, and at 1540 hours signalled that the rescue had been completed.

From the Report of a Naval Conference on Convoys SL. 150 and MKS. 41

On the second day out on the outward journey, two aircraft from H.M.S. "Biter" intercepted and destroyed an enemy aircraft which had been shadowing the convoy.

In reply to a question put by the Coastal Command Signals Liaison Officer regarding the use of shore-based aircraft, the Group Commander stated that, on the third day out, an enemy aircraft was known to be shadowing the convoy. Beaufighter N/235 from Coastal Command homed on to the Convoy, located the enemy aircraft, and shot it down into the sea.

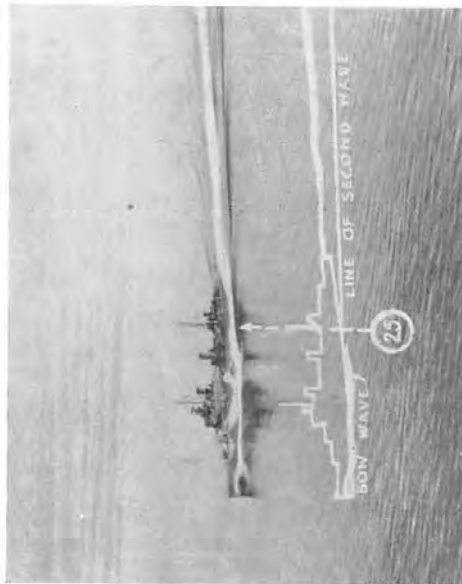
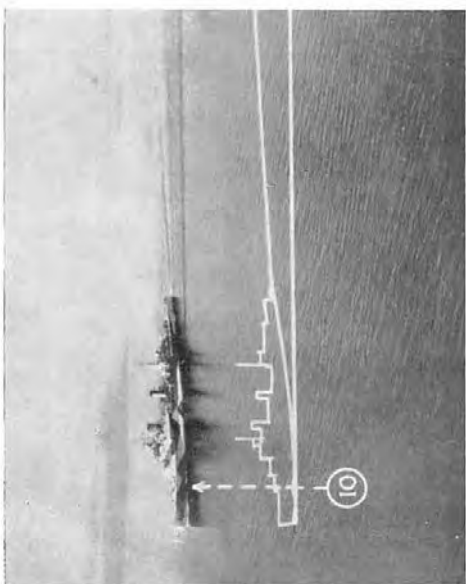
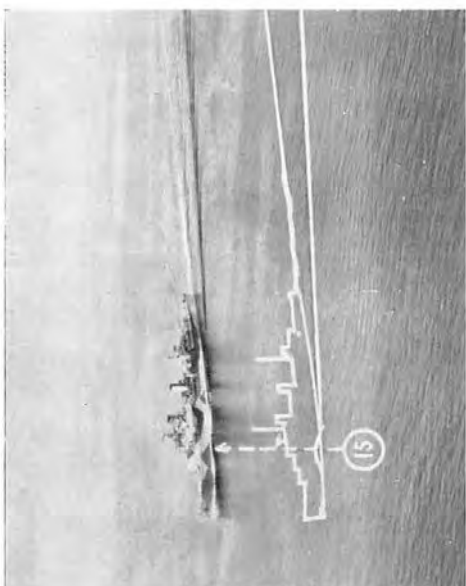
On the nights of the 9th/10th and 10th/11th of March, two Liberators of Coastal Command were homed on to the Convoy, co-operated with R/T and V/S, and carried out instructions issued by Group Commander. Addressing the President, the Group Commander stated that the execution of the task, which included R/T, V/S, Procedure "B," and co-operation with the S.N.O., was carried out in an exemplary fashion and the co-operation was excellent.



Air/Sea rescue of a Fortress crew



The two photographs above show the development of an R.P. and cannon attack on an armed coaster, taken by the automatic nose camera of a Beaufighter of No. 236 Squadron. The R.P. can be seen missing astern, due to insufficient allowance for the speed of the target.



A typical 8,000 ton cruiser

These photographs show a cruiser at speeds ranging from 10 to 30 knots. The position of the second wave is marked in each case by an arrow. The point of intersection of the line of the second wave and the ship's side can be estimated visually even if the wave itself cannot be seen. (See letterpress opposite.)

IV.—SPECIALIST AND GENERAL ARTICLES

Judging the Speed of Ships

Early in the war methods were evolved whereby photographic interpreters could estimate the speed of ships quite simply unless the lighting or sea conditions were very unsuitable. At first the distance a ship moved during the interval between successive photographs was measured, and in conjunction with a known time interval it was possible to determine the ship's speed. But these measurements had to be made with extreme care and the method was not suitable for general use. Something more rapid and accurate was required, and the experts remembered the theory of wave systems worked out by Lord Kelvin many years ago. Kelvin's theory is that the waves set up by a vessel moving through water are contained within an angle of $19^{\circ} 28'$ on either side of the bow, and that the spacing of the "cusps" of the waves along that $19^{\circ} 28'$ line is proportional to the square of the speed. This wave system shows up very clearly on aerial photographs and provided that the scale of the photograph can be determined, measurements can easily be made. As the average of many of waves can be taken, the method proved well suited for the use of interpreters. Not only did it give the speed, but, combined with measurements of distance moved, it provided the key to all sorts of problems involving Time, Distance and Speed. By its means the effective magnetic field of Sperrbrechers was found, and reconstructions of torpedo attacks, including track diagrams, have been made.

This was all very well for interpreters, but it was of no use to pilots. However, as the spacing of the waves along the ship's side becomes greater as her speed increases, this spacing must therefore be a measure of the ship's speed. Thus a simple way to judge speed is to consider the bow as the crest of No. 1 wave and to note the position of the next crest in relation to prominent features on the ship. For example, the second wave might appear under "B" turret, the mainmast, the bridge or the mizzen mast.

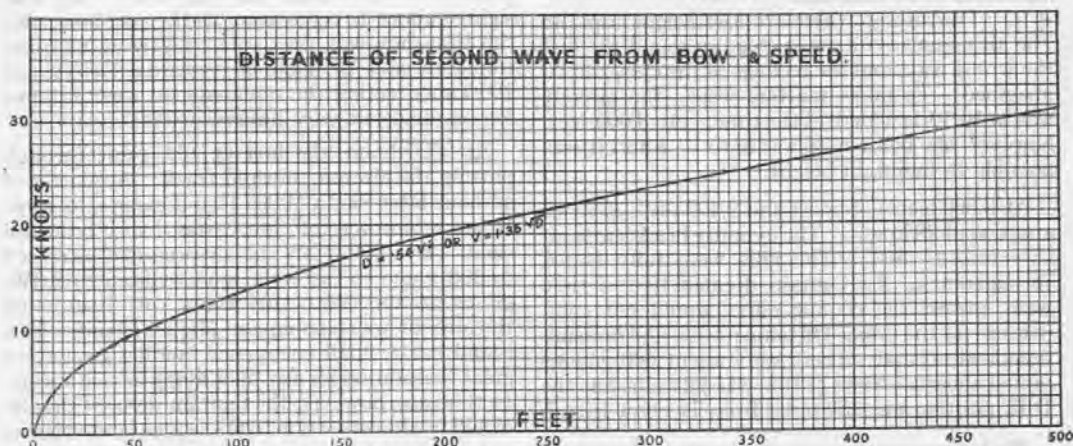
To test this idea a series of photographs was taken of a cruiser travelling at different speeds.

(See plate opposite.) It was found difficult to see the second wave against the ship's side, but its line farther away from the vessel could usually be traced. From this it was easy to decide which was the appropriate wave and from what point along the ship's side it began. In rougher seas this became difficult and in really rough weather it was impossible.

The method is therefore not foolproof: the main difficulty, in any but comparatively calm conditions, is to determine which is the right wave to observe. This series of photographs showed that at speeds below 25 knots the wave could be seen right up to the ship's side. At higher speeds the line of the wave must be used. At 30 knots the bow wave becomes so pronounced that it is not easy to distinguish the second wave.

If a pilot is briefed to intercept this cruiser, photographs will show him what her second wave looks like. He will see that if it appears to originate against the forward half of the ship's side, she must be travelling at under 20 knots. Going into greater detail, he will see, for instance, that at 15 knots the wave would be under "B" turret. When he sights the ship, sea conditions may prevent him from being sure which is the wave that he should look for. He should then ask himself whether the ship looks as if she is going fast or slowly. If the bow wave is not pronounced and the wake not long, he will know she is going slowly: in that case the second wave must be somewhere up forward and cannot be, for instance, the one he can see just abaft the bridge. It must therefore be the one which seems to begin in line with the forward gun position. This must mean a speed of about ten knots. Even if the pilot is inaccurate it will be possible when he returns to measure the position from the silhouette.

Or again, he might be going out to spot an incoming blockade runner. Her maximum speed could be looked up and the position of the second wave plotted on the silhouette. (The formula for this purpose is $D = 0.54 V^2$, where D is the



distance of the second wave from the bow expressed in feet, and V the speed in knots.) Once again the pilot would note the position of the wave in relation to the ship and when making up his mind he should take into account that a bluff-bowed merchant ship will make much more disturbance for a given speed than a warship.

[A graph at the foot of the previous page relates the position of the second wave and the speed of the ship.]

These hypothetical cases show that other methods help greatly in applying this second wave theory. The following points should therefore be considered in relation to the type of vessel under observation:—

- (1) The height of the bow wave against the ship's stern.
- (2) The length and form of the wake astern.
- (3) Whether the ship is "sitting down" by the stern (like a destroyer at high speed).
- (4) Whether the wave pattern set up by the bow wave is actually breaking, and forming a sort of white shoulder.

(This does not occur until the ship is near her maximum speed. For instance a trawler does this at about 10 knots, while the cruiser shown in the illustrations does not develop this shoulder effect until she is moving at over 20 knots.)

- (5) Although the total angle of the bow wave remains constant at all speeds, the most pronounced part of the wake within this angle occurs at an increasingly acute angle as the speed is increased. On photographs of E-Boats moving at over 30 knots this pronounced angle is only about 8° . Thus the faster a vessel moves the narrower will be the angle of the most noticeable part of the wave pattern set up by the bow.

A study of a large number of photographs of ships moving at known speeds indicates that with practice, estimates to within plus or minus $1\frac{1}{2}$ knots can usually be given wherever the second wave can be picked out. It is interesting to note that captured documents show that this system has been independently developed by the Japanese.

Flying the Mark XIV Wellington on One Engine

One night last winter a Wellington took off from Gibraltar on a transit flight to the Azores. At 0300 hours St. Vincent light was on the starboard beam, but at this point the Navigator's sextant became unserviceable and the sortie had to be completed on D.R. At 0615 hours the port "oil low" warning light came on and the captain found that a serious oil leak must have developed in the port engine, the cowling being covered with oil. The depth charges and Leigh Light batteries were jettisoned immediately, but no other equipment was jettisoned during the flight.

The Captain climbed to 6,000 feet and pumped oil from the auxiliary tank (capacity 14 gallons). The red light was extinguished three times before all this oil was used. At 0700 hours, however, the oil pressure fell and the port propeller was feathered. As the engine was a Hercules, Mark XVII, the maximum boost obtainable at 6,000 feet was about +1. The aircraft therefore lost height rapidly. The altimeter needle went steadily round the dial the wrong way, and the feelings of the crew can be imagined. To make matters worse, the aircraft was in 10/10ths cloud all the time. At 3,000 feet, however, the boost needle rose to +4 and it was possible to maintain height.

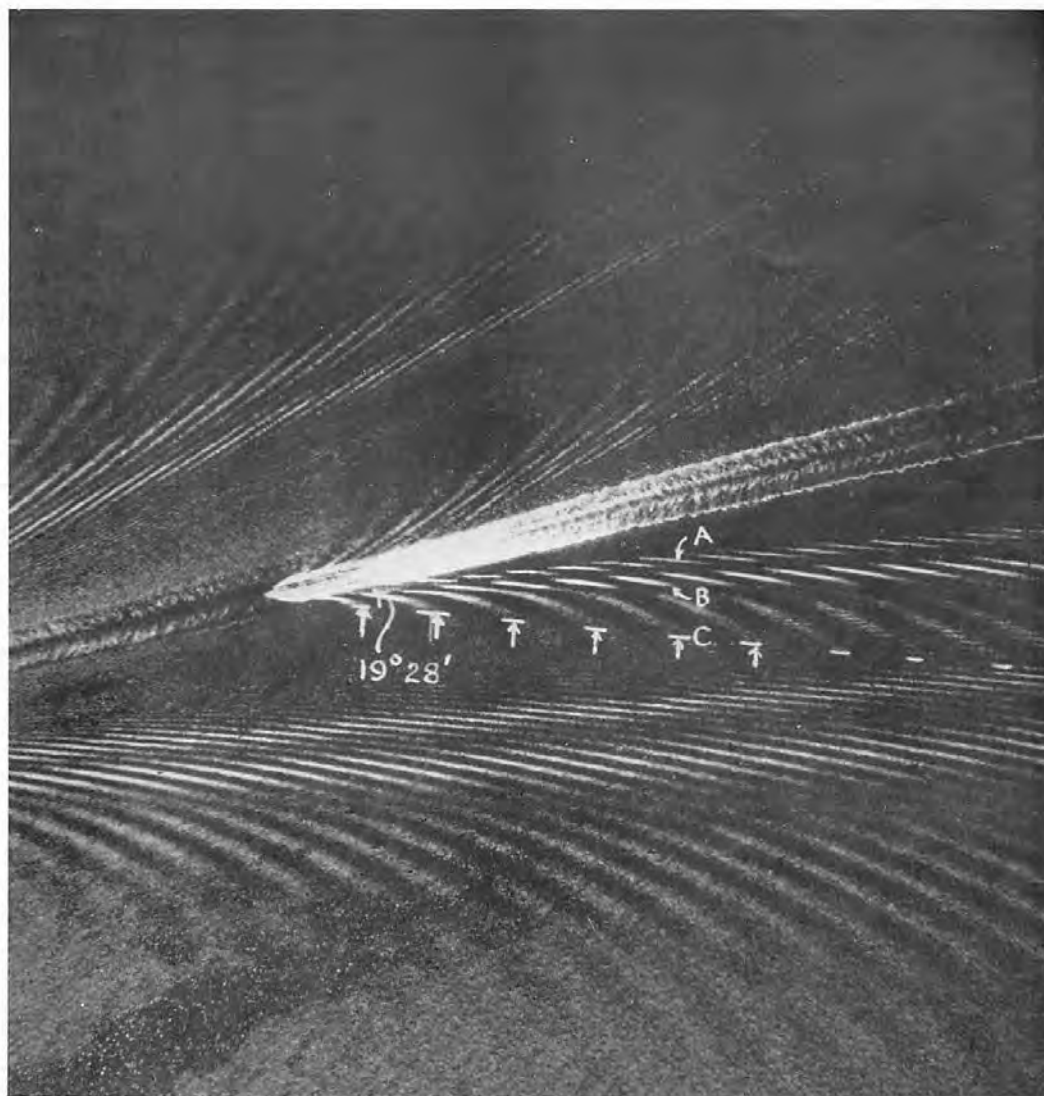
At 3,000 feet +4 boost and 2,400 revs. gave an airspeed of 98 knots. The cylinder head temperature rose to 300° . The gills were fully closed throughout as the Captain decided that if they were opened the cooling effect would not compensate for the drag. Oil temperature and pressure remained normal. There were about 600 gallons of fuel aboard. None of this was jettisoned as the D.R. position was 450 miles from Tiercera Island.

With these settings on the starboard engine it was just possible to hold the aircraft on course by

keeping the starboard rudder pedal fully forward and applying full trim. This was done by looping the Leigh Light turret raising rope round the starboard pedal and the front gun mounting. The rope was made taut by using the axe handle in the loop as a tourniquet. The Second Pilot then sat on the rope, and cased himself up and down as required. By this means the Captain was able to concentrate on the instruments without any strain.

At 0845 hours dawn broke and showed the cloud disappearing and a calm sea beneath. The airspeed was then 105 knots and the Captain decided that it would be better to nurse the engine rather than let the airspeed mount up. He therefore reduced the boost to $3\frac{1}{2}$ lbs., leaving the revs. at 2,400; this gave a speed of 100 knots. The cloud base was 2,000 feet and height was reduced to 1,800 feet. At 0915 hours a ship was sighted about 10 miles away on the port bow. By this time, however, the Captain and crew felt quite confident and plodded on towards Tiercera at 100 knots, eating the remainder of their rations. No one had felt very hungry at 0800 hours.

At 0930 hours the first Q.D.M. came through putting the aircraft south of track. A quarter of an hour later Santa Maria Island came into view. It was a long way off, but it was a very beautiful sight. By 1000 hours the airspeed had increased to 108 knots so the revs. were reduced to 2,350, giving an airspeed of 104 knots. At 1040 hours the aircraft was passing San Miguel Island. This island has a small emergency landing ground—a great temptation for any pilot flying on one engine. In this case, however, the Captain thought that he would be almost certain to prang if he landed there, so he decided to carry on to Tiercera, which meant another 100 miles flying over the sea.



This photograph of a *Narvik* destroyer at about 25 knots shows the wave pattern very clearly. The points at which measurements are taken are marked. Owing to the high speed at which the vessel is travelling the most accentuated line of the wake occurs at "B"—a much more acute angle than the limiting $19^{\circ} 28'$ line.

Since the whole pattern follows a regular system, measurements can be made at "A," "B" or "C" or any other point provided the correct multiplying factor is used, but the more acute the angle chosen for measurement the less accurate the result is likely to be.



The liner *Queen Elizabeth* was travelling at about 20 knots when this photograph was taken. By following the line of the second wave towards the ship it will be seen that it originated in the vicinity of point "A." Owing to the great size of the ship her speed is a good deal higher than it appears.



These photographs show radar sites in the enemy early warning system on the Norwegian coast. The upper one was taken by 144 Squadron, and the lower two by 333 Squadron. The top two show "Freya" installations at Sando and Fedje respectively. The lower one shows a "Chimney" near Kristiansand South. Both these types can measure distance and bearing, but not height. However, they do not interfere very much with the operations of G.R. squadrons, since they would not detect an aircraft flying at 1,000 feet until it is some 60 sea miles from the coastline, and an aircraft flying at 250 feet would be immune until within about 35 miles. Within the latter range, however, it is an odds-on chance that an aircraft would be detected however low it flew. The difference between the "Freya" and "Chimney" is that the latter is thought to be more efficient in detecting aircraft flying at great heights, but it is doubtful whether it is any better than the "Freya" at picking up aircraft at the lower heights at which our strike aircraft operate.

After flying for 4 hours 40 minutes on one engine the Wellington reached Lagens airfield at 1140 hours. Some hectic pumping was needed to lower the undercarriage and flaps, but the aircraft made a successful glide landing.

The Engineers' Comments

The Captain of this aircraft undoubtedly knew his engine and its operational limitations, and he used his knowledge to advantage. Because he had taken the trouble to become thoroughly conversant with the engines of the aircraft he was operating, he was able to land himself and his crew safely at their destination. It was a very good show.

During the first two hours any pilot in this predicament should concentrate simply in keeping the airspeed at about 98 knots. To do this with 600 gallons of fuel on board the boost should be about +4 to +4½ and the revs. 2,400. The oil temperature and pressure should cause no trouble, but the cylinder head temperature may get rather high. The maximum allowed is 290°, but it should be kept down to 280° if possible. Only the pilot can decide the question of the gills. He should open the gills slightly and see how the aircraft behaves. If the drag proves too much, the risk of the cylinder heads overheating must be accepted.

Otherwise there is no doubt that a small gill opening is very much kinder to the engine.

In this instance it would have been better not to give all the auxiliary oil to the failing engine. It is wiser to keep four or five gallons in reserve for the good engine as it will burn more when its boost and revs. are increased. When this Wellington touched down at Lagens the starboard "oil low" light came on, showing that there were only seven gallons left in the starboard tank. This would last some time in normal conditions, but would burn up fast at higher settings.

It was impossible, even with full rudder, to keep the aircraft on course when the revs. and boost were higher than 2,400 and +4.

The rated altitude of the Hercules XVII is 1,500 feet, and therefore a pilot need not worry if he cannot get boost above that height. If conditions permit he should fly at between 1,500 feet and 2,000 feet.

The report does not mention petrol consumption, which is the basis of increased power. At the stated revs. and boost the consumption would be about 120 gallons an hour, which allows an endurance of five hours. This doubtless influenced the pilot in his decision not to land at San Miguel Island.

Enemy Views on the Radar War

When interrogated on Radar subjects, prisoners of war are unanimous that the development of German Radar is at least a year behind that of Allied equipment. A good example of this was given by an experienced E-Boat officer who had formerly been in destroyers as a gunnery officer. "What is the use," he said, "of having the best guns in the world, as we have, if the control gear is so out of date that we can be shot out of the water before we even know where you are?"

German Radar in U-Boats

Most German U-Boats carry Radar sets, but up to the end of 1943 they were seldom used, as commanding officers were scared stiff that the apparatus would disclose their positions. The earlier sets had forward-looking aerial arrays on the front of the conning tower, allowing observation over only about 10° on either bow.

Mattress Aerial

About the middle of 1943 the enemy began to fit the new type of mattress aerial to U-Boats. This is a rectangle about 5 feet by 3 feet, trainable through 360° and retracting into the port side of the bridge fairing when not in use. This aerial is used with the standard Gema set which works on a wavelength of 80 cm. (the standard German naval wavelength) and it has a PRF of 500. In these conditions an azimuth accuracy of about plus or minus 3° may be obtained by a good operator. The range is probably only about 5 miles against a surface vessel and 10 miles against an aircraft at 1,500 feet.

It is probable that the Germans are now fitting their U-Boats with a better Radar set, which uses a similar aerial but works on a wavelength of 50 cm. It is a modification of the FuG.200, a G.A.F. set. It is hard to say why this is being done although one wireless petty officer recently

remarked rather plaintively that their G.S.R. sets radiated so badly that they might just as well use a Radar set and be killed as a wolf instead of as a lamb.

German Search Receivers (G.S.R.) in U-Boats

The Germans tried to counter our highly effective ASV about the middle of 1942 by fitting a search receiver which would give warning that they had been located by ASV. The earliest types of set covered a wave band of about 130-260 cm. and the presentation was by means of earphones. The snags of these early sets, chiefly the R600 made by Metox (cf. the U-Boat men's song "Ich habe mich ein Metox 600, Für Biskaya engagiert"), were that searching the whole wave band was a tedious and slow job, which had to be done by hand, and that the Southern Cross type of aerial had to be brought down the conning tower hatch each time the boat dived. On various occasions the cable is known to have got stuck and prevented the hatch from closing properly. Nevertheless, useful information was given by the set, both in the shape of warnings of ASV, and also in enabling the Germans to get information about the wavelengths on which we were working. Expert operators believed that they could tell what sort of vessel or aircraft had picked them up, and whether it was approaching or retiring; they suggested that this would not have been possible if our sets had been fitted with attenuators.

Wanz I

The next big advance in G.S.R. came about April, 1943, with the introduction of the drum type of aerial, which was permanently fitted to the port side of the bridge fairing. But this had no directional properties. Later, in September, the Wanz I set was introduced. This set had a

waveband cover of only 120-180 cm., but it had CRO tube presentation and automatic search, the whole wave band being covered 24 times a second. Once a contact was obtained the search was continued by hand and earphones were used in addition to the CRO tube.

Wanz II and Borkum

About the time the Wanz was introduced the great G.S.R. panic set in; and panic is not too strong a word for what has been happening ever since. U-Boats were forbidden to use the Metox G.S.R. (and another pattern used extensively in surface ships, the Rohde and Schwarz) because the sets radiated, and because the Allies were D/Fing these transmissions. The faith of the U-Boat crews in their technicians slumped heavily and their trust was not improved when, on the same grounds, orders were issued that the Wanz I might be switched on for only 10 seconds out of each minute. The non-radiating Wanz II (which is practically identical with the Wanz I from the user's point of view) could not be brought into service until about the end of November and a set called the Borkum was introduced to tide over the gap. The Borkum gave a wave band cover of 30-300 cm., with presentation by loud speaker. It did not allow the wavelength of contacts to be measured and in the Mediterranean, where there is continuous transmission from land-based Radar stations, it gives a continuous warning.

A figure eight aerial is fitted to the back of the Radar mattress, for use with these two sets, enabling rough bearings to be obtained.

Naxos

Another set, the Naxos, was also introduced about October, 1943. Its presentation is similar to that of the Borkum and it covers a waveband of 8-12 cm. It has a separate aerial of a rather makeshift type, which has to be brought down the conning tower hatch for diving. This aerial, which is about 30 cm. long and fitted to the periscope housing, should give a rough indication of bearing.

There is little information available on the range, etc., of these sets, the most important reaction of all their users being either that they radiate or do not radiate.

Radar in Surface Ships

Except for the equipment of *Elbing* class destroyers and blockade runners, not much is known about this. It all appears to work on 80 cm., and to be very poor. For example, the Radar in the *Elbing* class destroyer *T.25* could be trained only through 180° in the horizontal plane and not at all in the vertical. Its bearing accuracy was small, it trained very slowly and in the opinion of both officers and men it was no use at all. It was never used against aircraft. Bigger ships presumably have better equipment, which is said to give acoustic bearing against surface targets, but it is doubtful whether it is any better against aircraft.

G.S.R.

This is normally Rohde and Schwarz equipment with a wide waveband cover and slight directional properties. The serial is a square consisting of four separate sections arranged in a square round the foremast. It had been used on *T.25* at night to assist them in putting up a blind barrage in approximately the right direction.

Conclusion

In conclusion, it may be said that the Germans have a sense of inferiority in the face of our Radar technique, although they are now equipped with search receivers which should be fairly effective. Possibly because the enemy is careless in his watch-keeping, he is frequently let down and he complains loudly about his equipment. It should not be forgotten that the enemy monitors our W/T transmissions. The flotilla leader of a group of destroyers or any bigger surface unit may be expected to do this monitoring, and it is an even more effective method of detecting our presence than the best G.S.R. or Radar.

Evasion Exercise in Northern Ireland

In a recent exercise in Northern Ireland thirty-one men (represented by instructors and pupils) were supposed to have escaped from an internment camp in Eire, and to be making for R.A.F. Station "X." Their objects were to escape in an aircraft, to sabotage whatever they could, or to steal a secret document. Their only information was a rough sketch map which one of them had hurriedly copied from a wall chart in one of the offices in the internment camp. This sketch showed roads, railways, a lake and two airfields.

The escapers were split into ten groups and each leader was given a compass, a flying map (scale 1/250,000), sixpence, and a piece of chalk to mark any effective sabotage. The party had to wear service trousers but were allowed any upper garment they pleased. The groups were dropped at points inside a 4-mile radius of R.A.F. Station "X" with instructions to wait until 1130 hours and then begin the exercise. The Intelligence Officer and the Local Defence Adviser then went to the Operations Room and waited for some action, which was not long in coming.

At 1205 hours a message was received from an Inspector of A.M. Wardens announcing the capture of F/Lt. C., F/O C., and F/O M. These three had arrayed themselves in white sweaters and gym shoes and had hoped to run into the camp in line abreast, posing as P.T. enthusiasts. Unfortunately they found themselves on a railway line instead of a road. There was further difficulty when they found that a train was also using the railway. They were soon joined in captivity by Sgt. W., and F/Sgt. M. who were caught at 1210 hours. The latter had first climbed a tree to get their bearings and had then set off eastwards. They dodged a party of Home Guard and, on turning north, they cut (with chalk) the R.A.S.C. telephone lines alongside the railway. They then picked up the Drem lighting and followed the lead-in lights. They were doing very well until they walked into a Beaverette whose crew arrested them. But two service police with Sten guns failed to ask them for their 1250s.

F/Sgt. S. was the next casualty, at 1215 hours. His party of four split up and he stayed with F/O R. These two set off along the road, taking care to keep behind the hedge. After travelling only 50 yards they were surprised to meet the other two members of the party. This convinced them that it was best to travel alone. F/Sgt. S. struck off westwards, in full view of a farm. The farmer's dog promptly began to bark and his owner called out, "Hey, what are you doing there?" F/Sgt. S. ignored them both and began to walk in a circle until he finally arrived back at the farmhouse, causing the dog to bark again. He then collided with another member of the party who guided him to the edge of the football field which adjoined the airfield. He crossed this boldly and reached the perimeter after crossing a field and a railway line. Here he found a Wellington which he promptly "destroyed." Just as he was about to repeat the good work he was confronted by the drawn revolver of an A.M. Warden who asked him for his 1250.

P/O P. started westwards and first passed a milk float containing a civilian and a girl who took no notice of him. Next to appear was an R.A.F. transport which drove up to a house and disgorged an airman, leaving the driver in his seat. Both ignored P/O P. He then sighted an aircraft and guessed that he had reached a dispersal area. While hiding in a ditch he watched a Beaverette arrive and inspect a Nissen hut and he saw an airman enter a nearby Stirling. P/O P. crawled through the hedge, reached the Stirling and "sabotaged" it, as well as three other Stirlings and a Wellington. These actions were watched by a farm labourer working beside one Stirling who wished him "Good-morning." Encouraged by this, P/O P. moved further into the airfield where he met a civilian walking towards him. He lighted a cigarette and attempted to stroll by but he was asked for his 1250. This civilian was a detective.

F/O F., F/O O., and Lt. T., were dropped at 1040 hours near a ruined house. Here they found that somebody had thoughtfully provided them with two serviceable smoke generators which they commandeered. At 1130 hours they started towards the airfield and passed a workman who ignored them. They then saw a Stirling at a dispersal point and approached it by crawling through hedges. A civilian was working beside the aircraft but he showed no interest in the intruders. The aircraft was promptly sabotaged. The saboteurs then decided to let off the smoke generators to divert attention and they began to read the instructions for operating them. Unfortunately they read with such concentration that they did not notice the approach of a detective in plain clothes.

Lt. M. separated from his party and made off across the fields towards the airfield. He crossed the railway line and sighted a Wellington with an A.M. Warden running towards it, blowing his whistle. Turning away from this activity, Lt. M. came to the Wellington dispersal area. Here he found two aircraft but as they were both unserviceable he turned up a runway. An armoured car was passing but did not challenge. Lt. M. then found a Wellington and two Stirlings. Still strolling on, with no one taking any notice, he picked up an empty milk bottle and went

towards three Martinets parked inside a hangar. At this point an S.P. appeared and asked who he was and why he was carrying the milk bottle. His story of being a workman making tea was not good enough and the S.P. arrested him.

After being dropped, F/O P. and F/O B. began to walk up the road towards a farm in which two dogs were barking vigorously. The dogs were soon "sabotaged" with the help of some haversack rations and after walking a quarter of a mile beside the railway, the escapers met a cart containing two farm labourers who passed the time of day. At 1200 hours they separated. F/O B. turned back east of the railway and reached the bridge below the railway station. At that moment a girl went by on a bicycle but she answered B's cheery greeting with a frigid silence. He then passed an old man who was friendly and quite unsuspicious. From this point the camp gate was visible, complete with picket. F/O B. waited until he was unobserved and then walked up to the railway platform to find out the name of the station. On discovering that it was "X" he made an encircling movement and began to climb a wire fence at the airfield boundary within a few yards of two Wellingtons. While he was on top of the wire an A.M. Warden challenged him. He said that he was working for an aerodrome contractor. The Warden thought hard on this, hesitated, and then decided against it.

After leaving F/O B., F/O P. approached the aerodrome from the west, passing several civilians with whom he had no difficulty. On reaching the railway line he walked along the track for half a mile and came across a bucket, a sack and some iron bolts. Carrying these he crossed two fields and came to a farmyard where a man was chopping wood. This man took no notice whatsoever as P. walked boldly through. He crossed more fields and arrived within 200 yards of a Wellington dispersal. He then crossed the aerodrome. He walked on down the perimeter and watched some civilians playing football. He was standing under the wing of a Liberator, about to use his piece of chalk, when an A.M. Warden came out of the canteen and asked him for his 1250.

Lt. S. dressed as a hiker and strolled along until he met a postman. He questioned the postman as to a suitable long walk, expressing a desire to visit the local Lough and asking for directions. These were readily supplied by the postman who suggested (a) going via "C," or (b) via the airfield. Acting on this Lt. S. walked across the fields to a point half a mile S.E. of "K." Here he joined a party of workmen around a fire and toasted his lunch sandwiches. An armoured car passed by but took no notice of the lunch party. Lt. S. borrowed a cap from one of the workmen and walked down to the D/F station, which was adjoining, blowing it up with a chalk time-bomb. He then walked along a river to "K" church looking for a quiet spot to climb the boundary wire. He was just climbing over when Cpl. D. arrested him.

Sgt. B. got into the aerodrome without trouble. Nearby was a group of eight Wellingtons and one Botha, all of which Sgt. B. set on fire. While doing this he attracted the attention of an A.M. Warden, so he hid for fifteen minutes.

When he thought the warden had gone he began to walk again, but he had gone only a few steps when the warden came up behind and captured him.

F/Sgt. H. and Sgt. W. started off north-eastwards after climbing a tree for bearings. They reached a single line railway track and met a postman from whom they enquired the way to R.A.F. Station "X." They were given full directions and soon saw W/I masts. Though the escapers were seen by several people, a workman, a member of the R.A.F. Regiment and a crowd of workmen standing round the H/F D/F hut, no one asked any questions. The S.P.s then appeared and began to trail them, so they cut through a farmyard in which they saw the farmer and his wife. They asked if the adjacent buildings were R.A.F. Station "X." The farmer replied, "Yes, do you want work?" They replied that they wanted to see some friends but the farmer and his wife were growing suspicious of them so they left hurriedly and walked straight into the arms of Cpl. D. and his Sten gun. Cpl. D. seems to have been everywhere.

P/O J., F/O P. and Capt. M. started cross-country without seeing anyone. They passed a D/F station on their left and skirted round the aerodrome, which they could see. Still unobserved they reached a road which they crossed singly at three-minute intervals. They then walked into the aerodrome and as F/O P. had scrounged a dust coat and a surveyor's measure they made for the runway which was being repaired. Here they joined several workmen and began to measure the runway. Apart from hostile stares, which may have had something to do with union cards, they were accepted. By this means—two measuring and the others making entries in a note-book—they crossed the aerodrome unchallenged and sabotaged a Wellington. They were moving happily towards a Liberator when a car drove up and A.M. Police-Sgt. M. jumped out. On seeing him they carried on calmly with their surveying. But the police-sergeant was not to be fooled and he asked Captain M. for his 1250. Subsequent interrogation revealed that at this point Lt. D. committed a major boob. In company with other captured evaders he was in Police-Sgt. M.'s car. On seeing the surveying party he remarked in a loud voice, "Blow me—there's old Wally!"

Lt. D. himself had a short career the highlight of which came after leaving Point 4 and separating from Lt. S. when he was fortunate enough to meet the garrulous postman who again provided ready-made instructions. This postman was a menace. Following his directions, Lt. D. cut across fields towards an aircraft which he saw coming in to land. After crossing the perimeter he selected a Stirling just as a civilian came smartly out of a nearby aircraft, produced his own identity card and demanded Lt. D.'s.

F/O W., who had taken the trouble to secure some tattered civilian clothes and a cap, made the best attempt of the day. He was finally captured a few yards from the Ops. Room, after two inspections by the Station Admin. Officer. The following is his own report:—

"I was dropped at 1115 hours with one other officer. We immediately went down a railway embankment to a disused hut where we ate

rations until 1135 hours. A linesman then stuck his head in, said "Good morning" and wandered off up the track towards R.A.F. Station "X." We split here and with a thick stick over my shoulder I followed the linesman until he disappeared. I could then see the exact position of the aerodrome as aircraft were taking off and landing. As I rounded a bend on the way to "X" I was nearly run down by a two-ton truck train, but I allayed the driver's suspicions by waving to him. At the first bridge over the line past our starting point I saw someone crossing and re-crossing the track about half a mile ahead. I climbed up the embankment on to a secondary road. I set off along this road away from "X" towards the Lough and found a broom which I substituted for my stick. I met a woman hanging out washing in the front garden of the house and turned off the road across the fields, this time making for the aerodrome. It took me 25 minutes to get out of the next two fields as they were surrounded by almost impossible brooks. It also became very awkward when half a dozen bulls began to converge. At 1245 hours I entered the outskirts of the aerodrome by climbing over the double barbed wire entanglement, crossing the railway track over a gate and so getting into a dispersal area. I found a rusty sickle embedded in a gatepost and added it to my broom. These and a match which I was chewing constituted my disguise for the next hour, although anyone could have seen that the broom would not sweep nor the sickle cut. I slouched and limped through dispersal with my gardening tools over my shoulder and disposed of two Wellingtons and an Oxford. I saw only one airman about 100 yards away. Not knowing the direction of the objective I followed the perimeter track along the south side through groups of workmen, and destroyed three hangars on the way. I eventually reached the big main hangars east of Flying Control and, although airmen and armed police on bicycles passed, no one took any notice. Two officers went by at arm's length but hurried on when I spat in their path. After wandering round various buildings and getting lost, I asked a workman in a gutteral voice the way to the Operations Block. He told me readily so I crossed the road and made for some wireless masts. A be-medalled Squadron Leader passed me on a bicycle and he seemed to be suspicious. I therefore hurried down a path between living huts and began to sweep and scavenge around the dustbins. Five minutes later I went out to the road again but was passed once more by the Squadron Leader who rode past, thought better of it, and turned back to demand my identity card."

F/O R. also did well with the dust-coat, note-book and pencil technique. Starting north-westwards from Point 10 he followed a stream until he came to the railway. There he found himself within a few yards of an R.A.F. guard, and discovered the presence of another by seeing a bayonet sticking up above a rise. Across the stream another guard gave himself away by whistling. F/O R. waited until the whistling guard had reached the other end of his beat. He then crossed the railway and arrived at the boundary. He got in through a convenient gap in the barbed wire and found a group of Bothas and Wellingtons with civilian workers close by.

When their backs were turned, F/O R. "destroyed" four aircraft with his chalk and "set fire" to a petrol bowser and a tractor. The next stop was a concrete path near No. 2 hangar where civilians were working. They showed no interest when he began to survey the job and make notes in the note-book. On getting close to No. 2 hangar he saw two A.T.A. pilots with some Oxfords. F/O. R. left the Oxfords alone, but he treated the hangar and the adjacent Nissen huts with chalk time-bombs. He then went to another hangar where some civilians were at work and again he escaped suspicion by making notes on scrap paper. Taking notes all along the perimeter track, he reached Flying Control, pausing to sabotage a Stirling and a Whitley. But Mr. McC. had been watching and thought it time to ask for his 1250.

Summary

The evasion exercise was considered to be a success. It served not only as a practical test

of the security of R.A.F. Station "X," but also because it also provided excellent practice for the greatest possible number of pupil aircrew.

With such a large number of participants using such a widely scattered dispersal area of the station, it is not surprising that so many aircraft, buildings, etc., were sabotaged. This was not necessarily because of the laxity of the defenders but equally because of the ingenuity of the attackers who were backed by knowledge of R.A.F. airfields and their dispersal areas.

Little credit is given to those who merely broke into the airfield and were captured soon after. And with one exception the exercise was not marked by any outstanding exploit. But the report shows that all entered into the spirit of the exercise and that they did their best to attack what was undoubtedly a well-defended and security-minded airfield.

The Value of Bombing Practice

The *Coastal Command Review* No. 12 of April, 1943, contained an analysis of some 72 attacks made on U-Boats between January 5, 1943, and April 14, 1943. The attacks had been assessed by the Senior Naval Staff Officer at Coastal Command Headquarters, and it was found from the analysis that bomb aimers who dropped less than 10 practice bombs during the preceding month made 38 per cent. good attacks, 24 per cent. moderate attacks and 38 per cent. bad attacks. Bomb aimers who dropped more than 10 bombs made 60 per cent. good attacks, 25 per cent. moderate attacks and 14 per cent. bad attacks.

Since then 168 daylight attacks made between May 1, 1943, and December 31, 1943, have been similarly analysed. Again the results show that even the minimum of practice (*i.e.*, 10 bombs) produces better results. These latest figures show that bomb aimers who had dropped less than 10 bombs during the preceding month made 51 per cent. good attacks, 13 per cent. moderate attacks

and 36 per cent. bad attacks, while bomb aimers who had dropped more than 10 bombs made 65 per cent. good attacks, 20 per cent. moderate and only 15 per cent. bad attacks.

On page 8 of this issue a U-Boat kill by U/422 is described. The crew of this aircraft was attached to an A.P.C. for one week during February. On arrival their average range error in fixed target bombing was 68 ft., and they made no perfect straddles. Before they left the camp their range error had been reduced to 31 ft. and their last practice resulted in 14 perfect straddles. In the operational attack it happened that the bombs were released by a more experienced pilot who was screening the captain on his first operational trip. It cannot therefore be said that the U-Boat was killed because of the bombing done at the A.P.C., but the whole crew drill was so perfectly co-ordinated during the attack that it is certain that the time spent in practising contributed greatly to the ultimate success.

Dinghy Drift

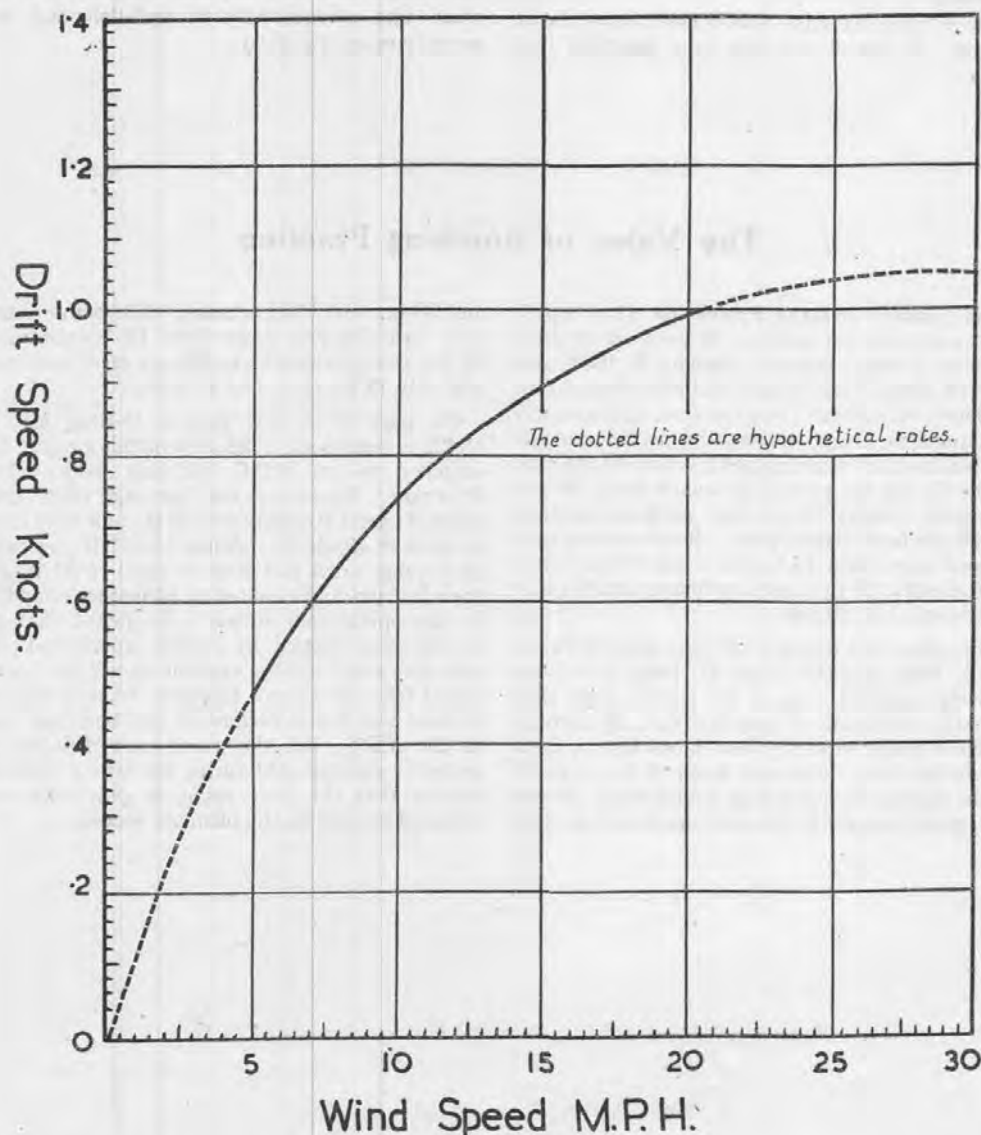
The graph and diagram are self-explanatory. Other types of dinghies used in Coastal Command do not drift at the same rates as the "H" and "K," but the differences have not yet been found with any certainty. However, the following very approximate mean differences from the "H" cum "K" rates can be taken as a rough guide:—

"L" type dinghy	Deduct 25 per cent.
"O" type dinghy	Deduct 20 per cent.
"J" type dinghy	Add 20 per cent.
Rectangular Liberator type	Add 50 per cent.

This percentage should be added to, or subtracted from, the rates of drift shown in the graph.

Provisional Generic "H" and "K" Dinghy Rates of Drift (without Drogue).

From experiments carried out during 1943.



Notes on Dinghy Drift Rates. Winds 5 to 20 m.p.h.

This curve is provisional and shows generic drift rates of the "H" and "K" Dinghies without Drogues. The drift rates of the "H" Type dinghy with a crew of five or two men are similar. It is possible that the rates of the "K" dinghy may vary with the size, weight, and attitude of the occupant.

In winds above 20 m.p.h. the rates of drift in open water should be reduced by approximately 10 per cent.; but this should be more than covered by the margin of safety added to the search area.

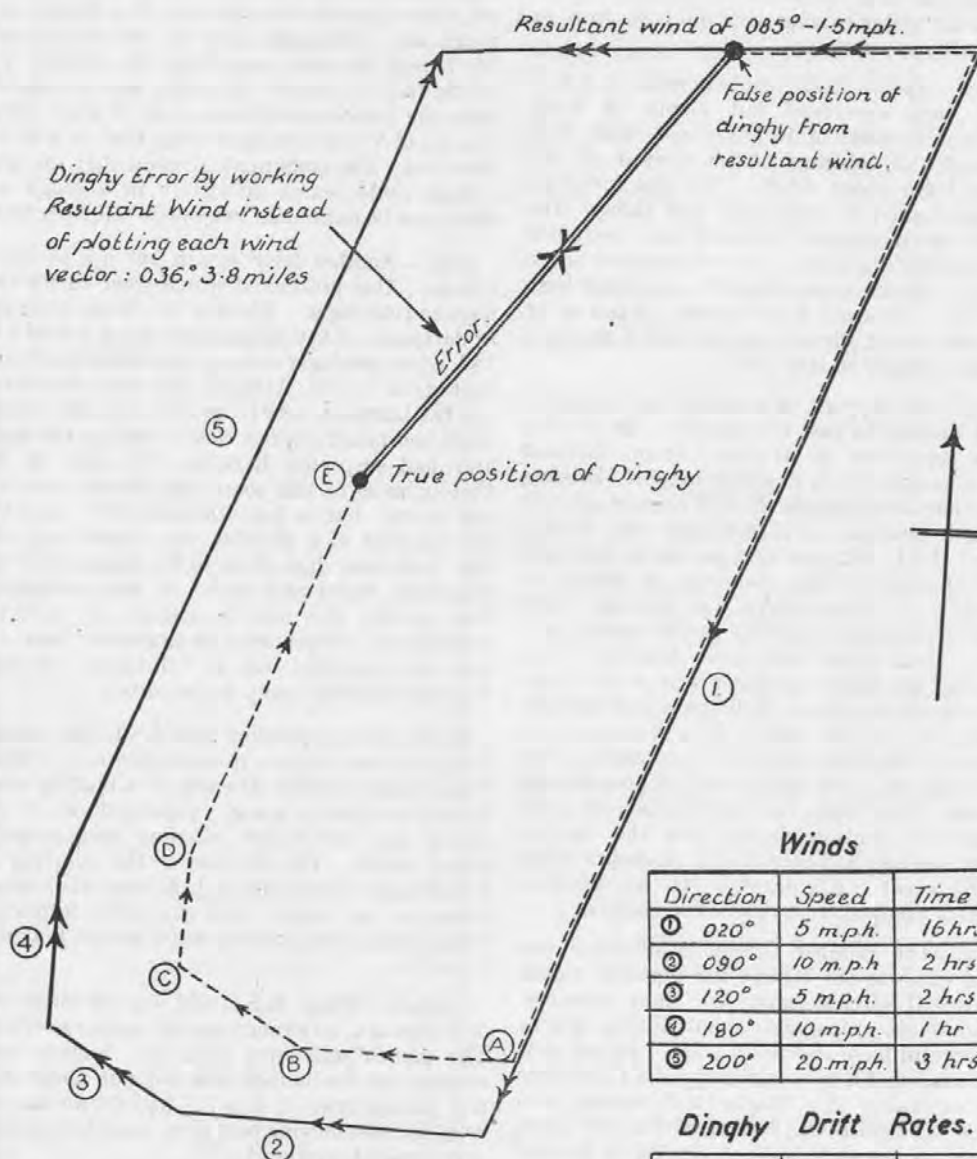
A measure of deflation decreases drift rates by 30-50 per cent.

The standard drogue decreases the rate of drift of the "K" dinghy by approximately 30 per cent. and that of the "H" by about 10 per cent. in wind velocities between 10-20 m.p.h. In wind velocities below and above these figures the rate "H" becomes, for all practical purposes, the same as without a drogue.

The height of the recorder Anemometer was 6 ft. above the sea. Met : winds, which are given for a height of 30 ft., should, therefore, be reduced to their velocity at 6 ft., when the curves are being worked.

Diagram showing correct way of Vectoring Winds

When calculating dinghy drift rates



Scales. 1 inch = 10 miles Wind.
1 inch = 1 nautical mile Drift.

Note. These drift rates are taken from graph (Ref L.B.S.I.)

Early experiences of an Officer at an A.S.R. Marine Craft Unit

February, 1942.—Have taken over command of H.S.L. 124 at Gorleston, Yarmouth. This launch already has an impressive record and a string of roundels on the wheelhouse mark her rescues. One of these rescues was a little unusual. While the launch was out on a search, a Heinkel circled her and then flew away on a steady course. A deck hand pulled the trigger of his Vickers gun but fortunately the gun was not cocked. The launch turned away for safety but the Heinkel returned, circled once more, and flew off on the same course as before. This time H.S.L. 124 followed and the Heinkel pilot led them to a dinghy load of British airmen.

Rough seas and cold winds this month. On one call the sea water coming over the bows froze on the wheelhouse windows.

March—April.—Both blank months so far as rescues were concerned but plenty of work. Many long searches of 10 hours and more with no result. A visiting officer arrived at the base to learn about A/SR. He was fortunate (or unfortunate) to strike the real thing. The weather was rough and the search was continued from first light to dusk. The officer spent seven hours in a seasick coma wedged in a compact heap in the w.c. We carried him ashore. Later on he told us he would advise aircrews that if they got into their dinghy to stay in it.

May.—Air support in searches has increased greatly during the past two months. An Air/Sea Rescue squadron of Hudsons from Bircham Newton has given very thorough support. Briefing instructions now include the call signs of aircraft helping in searches—a considerable aid. H.S.L. 124 and H.S.L. 132 were sent out on the information "Hudson circling four men in dinghy in position" But there was nothing there and we returned to find that it had been a false report. Both crews were most dejected. Two days later we made our first rescue of the year. Six Polish airmen from a Wellington were brought in from over the minefield. This rescue was an instance of excellent aircraft co-operation. One Hudson met us seven miles from the position and led us on. Four miles from the position we could see another Hudson diving over the dinghy. One of the Poles had been diving overboard wearing only a pair of silk drawers. He was smoking cigarettes dropped from one of the Hudsons.

June.—The Bomber Command offensive was on and this was our busiest and proudest month to date—31 aircrew saved by three launches. In spite of the propaganda about Air/Sea Rescue aircrews still have lessons to learn. In one case a Hudson found a crew and dropped a Lindholme outfit consisting of a dinghy and floating containers. The outfit was floating within easy reach of the crew but they had not touched it because they thought "it might be a new sort of depth charge." On one day each of the three launches brought in an aircrew. Fleet sweepers were moored two and three abreast along the quay when the third launch berthed. As two airmen were carried ashore on stretchers, hundreds of sailors lined the decks and cheered. The action was spontaneous and the moment unforgettable. A few days later the three launches were busy again—called to a

destroyer casualty. Ten injured men were taken off and the Naval Command sent a signal of congratulations. Discussing the success of this month the officers at the base decided that the largest contributory factor was the air support received in searches. The visibility of a dinghy from a motor launch in a moderate sea was proving surprisingly small. H.S.L. 130 found aircraft circling an empty dinghy. The dinghy with the aircrew in it was within 200 yards but the motor boat crew did not spot them for some twelve minutes. Air photographs taken at the time clearly showed both dinghies and H.S.L. 130 on the same negative. Crews of the circling Hudsons must have been very puzzled. After this experience we made experiments with men in a dinghy in a rough sea. Although those in the dinghy saw the launch $2\frac{1}{2}$ miles away when the dinghy was on the crest of a wave, the dinghy was not sighted from the launch until it was only 75 yards away in spite of Verey cartridges being fired to give the direction. The tests made it plain that the area a boat could search effectively in a rough sea would not be more than two square miles per hour.

July.—Another busy month but not so many rescues. One protracted search went on for two days and one night. The first two boats went out in darkness. They became separated and H.S.L. 185, while passing a convoy, was illuminated and shot at but not hit. At dawn, 150 miles from base, the two launches were lying hove to a mile apart. Each had heard engines close to during the night and had suspected E-Boats. In spite of the thoroughness of this search the British crew was not found, but a lone German W/T operator, the survivor of a Heinkel, was picked up. He had been nine days alone in his dinghy and was somewhat dazed and weak. It was remarkable how quickly this man recovered. In fact, the Intelligence Officer who interviewed him the next day described him as "distinctly cheeky." He was certainly lucky to be alive.

It was on this operation that H.S.L. 124, coming home on two engines in darkness over a minefield, passed within 10 yards of a floating mine. Nearer to base a heavy submerged object was struck and the centre shafting and propeller pulled adrift. The friction of the coupling on a bulkhead caused a fire and the boat was brought home on one engine with the crew forming a bucket chain and pouring water on the bulkhead to cool it.

August.—When H.S.L. 124 was 50 miles east of Yarmouth, a German aircraft passed overhead. The launch was lying hove to. Engines were started but the launch was not put under way. Air photographs of H.S.L.s had shown that the wake of a fast moving boat gives away her position. Jerry passed overhead.

November—December.—The winter months brought smaller hopes of rescues owing to the cold, the rough seas, and decreasing hours of daylight. Christmas brought numerous messages of good cheer from crews picked up in the year. One Christmas card from a Polish crew read: "Thank you and your boys for the pick up. We reply by New Year presents over to Germany."