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May 1944

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

The Month's Work—May, 1944

The Anti U-Boat Effort.—The highlight of the month has been the highly successful operations off the Norwegian Coast. It had been anticipated that the enemy would attempt to reinforce his flotillas in the Atlantic and Arctic waters. 18 Group accordingly launched an offensive which quickly produced results. Our aircraft were aided by the long hours of daylight and to some extent by the inexperience of the new U-Boat Commanding Officers, most of whom were probably on their maiden patrols. The quick succession of sightings on May 16, 17 and 18 were all followed by attacks, and it was clear that we had dropped on a fairly big movement of outward-bound U-Boats. Aided by aircraft from 15 Group and Iceland, the offensive was vigorously maintained by 18 Group, and by May 31, 21 U-Boats had been sighted and 13 attacked. During the operations Sunderlands of No. 4 O.T.U. gave a very good account of themselves. At the time of writing (June 6) the offensive is continuing and has produced four more sightings in June, all of which were followed by attacks. A more detailed account of the operations will be found on page 4.

2. Of the 20 other sightings which were made during the month, eight were in the Bay (seven at night). These produced seven attacks. A further eight sightings occurred in the mouth of the English Channel, about 20 to 30 miles north of the coast of Brittany. Seven of these were at night and provided four attacks. It would appear that a few U-Boats were tentatively disposed on reconnaissance patrols in the western end of the Channel, but recent searches have not re-located them.

3. There have been very few U-Boats in the North Atlantic during May, and not a single merchant ship was sunk in the areas covered by Coastal Command. The movements on the Northern Transit area however suggest that U-Boats are flowing into the Atlantic either to augment the concentrations in the Bay ports or to create a diversion by attacking the North Atlantic shipping routes. The long lull in the Bay and the Inner Bay will probably have ended by the time this issue of the *Coastal Command Review* is published. All the anti U-Boat squadrons will then be in action, and the fruits of their intensive period of training will be seen against the most important targets they have ever had.

4. **Anti-Shipping Operations.**—In May Coastal Command, aided by Swordfish and Avenger Squadrons of the Fleet Air Arm, attacked 85 enemy shipping targets, which is a record. Two merchantmen, one minesweeper and one auxiliary were sunk; three minesweepers, an escort vessel and an E- or R-Boat were seriously damaged, and 15 other vessels, including a destroyer, were damaged. Thus, in 31 days, 24 ships were hit—an impressive performance. Moreover, 78 of the attacks were made at night, which means that, owing to the difficulty of seeing results in darkness, the true total of ships damaged is probably greater than we claim. On May 4 for instance, an Albacore of No. 415 Squadron attacked a small ship without visible result, but it is now known that the vessel was sunk. This may well have happened on other occasions. In this attack the Albacore used bombs with the new Type 44 nose pistol, which causes the bomb to burst above the target instead of on impact. The new type of fuse did not have long to wait for its first success.

5. A very big proportion of the attacks—74 out of 85—was made in the area between Ushant and Borkum, which cannot now be a popular run for the German coastwise sailor. There were 36 attacks off the Dutch coast compared with 17 last month, and attacks in the Channel rose from 12 in April to 38 in May.

6. One of the outstanding actions of the month was the attack by Beaufighters of Nos. 144 and 404 Squadrons on enemy warships off Ushant on May 29. In the face of intense flak from a destroyer, three "M" class minesweepers and a torpedo-boat, the Beaufighters delivered a most determined cannon and R.P. attack. May 6 was another bad day for the German Navy, for one of its convoys was attacked near Borkum by the Langham and North Coates Wings twice within half an hour.

7. During the month over 1,000 aircraft were despatched on anti-shipping duties and their efforts may be regarded as an encouraging and effective curtain-raiser to our invasion operations which have just begun.

I.—ANTI U-BOAT

SUMMARY OF ANTI U-BOAT OPERATIONS BY COASTAL COMMAND AIRCRAFT

(Including Iceland, Azores, Gibraltar and U.S. Moroccan Sea Frontier)

MAY, 1944.

Duty and Base or Area.	Total Sorties.	Hours Flown.		U-Boats Sighted.		U-Boats Attacked.		Hours per Sighting.		Number of Sorties.		Col. 10. Sorties with Flak.
		Base to Base.	On Patrol.	Day.	Night.	Day.	Night.	Base to Base.	On Patrol.	When U-Boat Sighted.	When U-Boat Attacked.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Convoy Cover.												
United Kingdom	20	275	149	1	—	—	—	275	149	1	—	—
Iceland	12	172	69	—	—	—	—	—	—	—	—	—
Gibraltar and Moroccan Sea Frontier	98	1,030	572	—	—	—	—	—	—	—	—	—
Azores	24	288	134	—	—	—	—	—	—	—	—	—
TOTAL CONVOY EFFORT	154	1,765	924	1	—	—	—	1,765	924	1	—	—
A/U Patrols												
Northern Transit												
United Kingdom	351	3,858	2,303	19	2	12	1	184	110	19	13	13
Iceland	53	634	376	—	1	—	—	634	376	1	—	—
Northern Convoy												
United Kingdom	60	832	306	—	—	—	—	—	—	—	—	—
Iceland	42	573	277	—	—	—	—	—	—	—	—	—
Azores	10	122	77	—	—	—	—	—	—	—	—	—
Bay of Biscay												
United Kingdom	1,099	10,206	5,371	2	14	1	10	638	336	13	9	8
Gibraltar and Moroccan Sea Frontier	2	19	11	—	—	—	—	—	—	—	—	—
Central Convoy												
Gibraltar and Moroccan Sea Frontier	667	5,442	4,190	1	1	1(1)	—	2,721	2,095	2	1(2)	—
Azores	61	712	407	—	—	—	—	—	—	—	—	—
TOTAL A/U PATROLS	2,345	22,398	13,318	22	18	14	11	560	333	35	23	21
ADD CONVOY EFFORT	154	1,765	924	1	—	—	—	—	—	1	—	—
TOTAL EFFORT	2,499	24,163	14,242	23	18	14(1)	11	589	347	36	23(2)	21
				41 U-Boats Sighted.		25(1) U-Boats Attacked.						

Notes.—(*a*) The attack shown in brackets in columns 6 and 11, which is not included in the totals, was made on a contact which was believed to have been a U-Boat—but the target was not sighted. The attack will be the subject of an assessment.

(*b*) In addition to the above, a section of 2 Mosquitos on reconnaissance sighted and attacked a U-Boat with cannon in the Northern Transit Area. There were also 5 chance sightings, 1 by a P.R. aircraft and the remainder by Transit aircraft.

Summary—*continued.*

Assessments Received up to June 12

Month.	Known Sunk.	Probably Sunk.	Damaged, A.	Damaged, B.	Slight Damage.	Insufficient evidence of Damage.	No Damage.	Insufficient evidence of U-Boat.	Unassessed
March	2*	1	—	2	2	8	7	—	2
April ..	—	2	—	1	1	7	6	2†	1
May ..	3	2	1	1	1	2	1	—	15

Notes.—(*a*) * One of the U-Boats assessed as known sunk in March is shared with Surface Craft.
(*b*) † In the case of the two attacks in April assessed as Insufficient Evidence of U-Boat, the target attacked is believed to have been a surface craft and has been assessed as probably sunk in each case.

Analysis of U-Boats sighted during May

Particulars of Incidents.	U-Boats.		Sorties when Aircraft	
	Sighted.	Attacked.	Sighted.	Attacked.
On 31 occasions 1 U-Boat was sighted by 1 aircraft—18 aircraft attacked.	31	18	31	18
On 5 occasions 2 U-Boats were sighted by 1 aircraft—7 of the U-Boats were attacked by the 5 aircraft.	10	7	5	5
TOTALS	41	25	36	23

Squadron Results—May

				Sorties when U-Boat Sighted.	*Sorties when U-Boat Attacked*
(i) *United Kingdom*					
210	Catalina L.L.	Sullom Voe	.. ..	4	4
333 (Norwegian)	Catalina	Sullom Voe	.. ..	2 (3 U.B.s)	1
58	Halifax	St. Davids	.. ..	1	1
53	Liberator L.L.	St. Eval	.. ..	2 (3 U.B.s)	1 (2 U.B.s)
59	Liberator	Ballykelly	.. ..	4 (5 U.B.s)	3
103 (U.S.N.)	Liberator	Dunkeswell	.. ..	1	1
206	Liberator	Tain	.. .. ..	2	0
224	Liberator L.L.	St. Eval	.. ..	3 (4 U.B.s)	1 (2 U.B.s)
547	Liberator L.L.	Tain	.. .. ..	1	1
330 (Norwegian)	Sunderland	Sullom Voe	.. ..	3	1
423 (R.C.A.F.)	Sunderland	Sullom Voe	.. ..	2	1
4 O.T.U.	Sunderland	Alness / Sullom Voe	.. ..	2	2
172	Wellington L.L.	Chivenor	.. ..	1	–
304 (Polish)	Wellington L.L.	Chivenor	.. ..	2 (3 U.B.s)	2
407 (R.C.A.F.)	Wellington L.L.	Chivenor	.. ..	2	2
612	Wellington L.L.	Chivenor	.. ..	1	1
(ii) *Iceland*					
86	Liberator	Reykjavik	.. ..	1	–
(iii) *Gibraltar and Moroccan Sea Frontier*					
112 (U.S.N.)	Liberator	Port Lyautey	..	1	1
202	Catalina	New Camp	.. ..	1	–
63 (U.S.N.)	Catalina	Agadir	.. ..	–	(2) (Contact only.)
	Total by A/U aircraft		.. .. ..	36	23 (2)
(iv) *Other Sightings by Coastal Aircraft*					
333 (Norwegian)	Mosquito	Sumburgh	.. ..	2 (1 U.B.)	2 (Cannon only.)
541	Spitfire P.R.	St. Eval	.. ..	1	–

Anti U-Boat Operations off the Norwegian Coast

The offensive opened on May 16. The west coast of Norway was chosen because it was the most likely place to pick up any U-Boats which might be beginning their maiden trip to the Atlantic or to Arctic waters. Air patrols were laid on to cover the most probable positions of such U-Boats and the aircraft had full freedom of action, as it was the first occasion for many weeks that our own submarines were not present in the area.

Appropriately, a Norwegian-manned Sunderland, V/330, established the first contact in position 63° 05′ N., 03° 10′ E. at 1725 on May 16. The Norwegians delivered a very good attack on this U-Boat, which had been steering due north, and the after evidence indicated that she was damaged. From then on, 18 Group maintained the highest intensity of effort, both night and day, which was possible with the limited number of aircraft available.

At 0006 hours on May 17 another Norwegian aircraft, Catalina C/333, located a U-Boat also steering north and made a very good attack. The after evidence is consistent with possible slight damage. The position of this attack was 62° 26′ N., 01° 45′ E. At 0942 hours on May 18, Catalina S/210 located a U-Boat in position 63° 33′ N., 01° 46′ E. steering 300° and followed it up with an excellent attack. The U-Boat is claimed as sunk and this is confirmed by photographs.

The hunt was continued and next location was by Catalina M/210 at 0322 hours on May 21 in position 63° 44′ N., 04° 00′ E. The enemy's course was 330°. The Catalina delivered an attack which on the after evidence was a near undershoot 50 feet short of the U-Boat.

At 1246 the same afternoon Sunderland S/4(C) O.T.U. found a U-Boat in position 64° 04′ N., 04° 02′ E. steering 050°. The aircraft delivered a very good attack, claiming a straddle with after evidence of some oil. This is consistent with damage having been inflicted.

The next U-Boat was sighted by Catalina M/210 at 1118 hours on May 22 in position 64° 50′ N., 02° 11′ E., course 318°. An attack was delivered and a straddle claimed, but the details so far received are insufficient for an assessment of result to be made. It is believed that these last three attacks were made on the original group of U-Boats.

From these actions it appeared that these U-Boats were probably bound for the Arctic and the aircraft hunting areas were adjusted to meet the situation. At 1206 hours on May 23 a sighting only was obtained by Sunderland S/423 in position 64° 44′ N., 03° 47′ E. This U-Boat was steering 040°. The next victim was sighted and severely damaged by Catalina V/210 at 0740 hours on May 24 in position 65° 05′ N., 04° 49′ E. This U-Boat was on an evasive course of 200°, and as there were indications that she was badly damaged, it was thought that other U-Boats might be detailed to go to her assistance.

At 1344 hours on May 24, Sunderland R/4(C) O.T.U. located what was probably one of these U-Boats in position 62° 27′ N., 03° 00′ E., steering 330°, and delivered an excellent attack. The U-Boat was seen to blow up leaving a large amount of oil, wreckage and bodies. This was confirmed by photographs which indicate that she was destroyed.

Another U-Boat was sighted by Sunderland S/423 at 1420 hours in position 63° 58′ N., 03° 57′ E. on a course of 035°. The aircraft's attention was drawn to the spot by a disturbance in the sea which proved to be the crash of Sunderland R/422, which had apparently been shot down by this U-Boat just before. " S " delivered an attack, but it missed astern (confirmed by photographs) and the U-Boat was not damaged.

A maximum concentration of aircraft was laid on in the vicinity of the supposed badly damaged U-Boat and further sightings were made by Liberator C/59 at 0148 hours on May 25 in position 65° 18′ N., 06° 28′ E., followed by an attack which was abortive as all depth charges were dropped " safe " ; by Liberator S/59 at 0730 in position 65° 05′ N., 07° 28′ E., and again by S/59 at 0803 in position 64° 12′ N., 05° 42′ E. The former sighting was followed by an excellent attack which is claimed to have seriously damaged or sunk the U-Boat. There was no attack after the latter sighting as no depth charges remained.

At 2300 hours on May 24, H.M. Submarine *Virtue* reported the sighting of a U-Boat in position 61° 12′ N., 02° 06′ E., course 300°.

To support the theory that assistance was being sent to the badly damaged U-Boat, it was evident that surface craft were despatched, for L/59 sighted one destroyer and two E-Boats at 2100 hours on May 24 in 64° 15′ N., 06° 05′ E., course 320°, and S/59 sighted a surface vessel near the U-Boat which he had attacked at 0730 hours on May 25.

At 0935 hours on May 26 in position 61° 35′ N., 03° 28′ E., another U-Boat was sighted by Mosquitos of 333 Squadron (Norwegian) steering 045° at 8 knots. These two aircraft attacked with cannon fire and claim numerous hits on conning tower and hull. Sunderland N/330 sighted a periscope at 1412 on the same day in position 62° 37′ N., 02° 00′ E., but could not get close enough to attack.

At 0816 hours on May 27, S/59 sighted a U-Boat in position 62° 37′ N., 00° 57′ E., steering 010°, speed 6 knots. The Liberator delivered an attack which from the photographs appears to have been a near overshoot. It may have damaged the U-Boat, but there is no after evidence to support the theory.

From these sightings it was clear that more U-Boats were starting their passage to the northward and the hunting areas were adjusted accordingly.

At 1426 on May 28, Liberator B/206 homed on a radar contact and sighted a disappearing conning tower in position 62° 27′ N., 01° 18′ E., but could not get to the spot in time to attack.

The weather, which had been on the poor side, then deteriorated and Liberator H/59 at 1340 hours on May 31 in position 63° 04′ N., 03° 18′ E., saw a conning tower only when it was immediately underneath the aircraft and lost it in about 30 seconds. H/330 had a similar experience at 2215 in position 63° 35′ N., 02° 32′ E., and neither

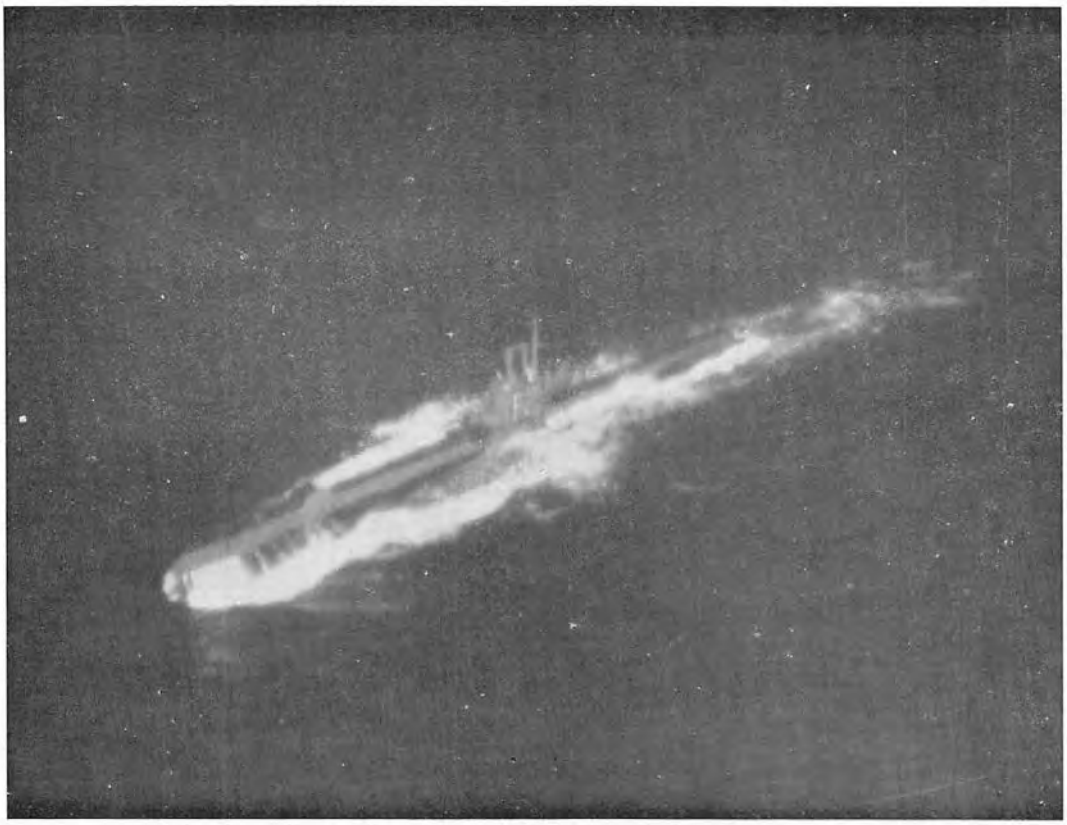
PLATE 1

Above. A successful attack by Sunderland R/4 (C) O.T.U. off the south-west coast of Norway on May 24.

Below. An attack by Catalina V/210 on the same day. This action also took place off the Norwegian coast and the U-Boat was probably sunk.

a

PLATE 2



This photograph of H.M.S. *Seraph* was taken by an aircraft of No. 53 Squadron in the course of training in the use of the 1½" photo flash cartridge for low-level night photography. This method is being developed for use in all-night anti U-Boat operations.

Allied escort vessels photographed in the Strait of Gibraltar by an aircraft of No. 202 Squadron.

aircraft could attack. However, Liberator Q/547 at 1731 hours sighted and attacked a U-Boat in position 62° 12′ N., 03° 07′ E., steering 360°, speed 10 knots. The U-Boat had disappeared five seconds before release and there are not yet sufficient details to enable an assessment to be given.

Finally, B/206 at 2250 hours sighted a periscope in position 63° 17′ N., 04° 40′ E., but was unable to get in an attack before a reasonable interval.

A summary of the operations is given below.

1725/16. V/330. Attacked. Damage claimed.

0006/17. C/333. Attacked. Damage claimed.

0942/18. S/210. Attacked. U-Boat sunk. Photographs confirm.

0322/21. M/210. Attacked. Insufficient evidence.

1246/21. S/4 (C) O.T.U. Attacked. Serious damage claimed.

1118/22. M/210. Attacked. Insufficient evidence.

1206/23. S/423. Sighting only.

0740/24. V/210. Attacked. U-Boat badly damaged. Photographs confirm a very good attack.

1344/24. R/4 (C) O.T.U. Attacked. U-Boat sunk. Photographs confirm.

1420/24. S/423. Attacked. Miss astern. Photographs confirm.

2100/24. L/59. Destroyer and two E-Boats sighted.

2300/24. H.M. Submarine *Virtue*. Sighting only.

0148/25. C/59. Attacked, but depth charges were dropped at safe.

0730/25. S/59. Attacked. Straddle claimed and U-Boat claimed as seriously damaged or sunk. Surface vessel nearby.

0803/25. S/59. Sighting only.

0935/26. N. and E./330. Attacked with cannon fire. Numerous hits claimed.

1412/26. N/330. Sighting only of periscope.

0816/27. S/59. Attacked. Insufficient evidence.

1426/28. B/206. Sighting only.

1340/31. H/59. Sighting only.

1731/31. Q/547. Attacked. Insufficient evidence.

2215/31. H/330. Sighting only.

2250/31. B/206. Sighting only.

Totals

Aircraft on U-Boats.—21 sightings. 13 attacks.

Aircraft on Surface Craft.—2 sightings. No attacks.

Submarine on U-Boat.—1 sighting.

Claims

4 sunk or probably sunk.

4 damaged.

Recent Attacks on U-Boats

On April 18 **Wellington V/172** was flying at 500 feet in good visibility when the Captain sighted a yellow flashing light 12 miles on the starboard beam. The Radar equipment was partially unserviceable so he homed visually and at half a mile switched on the Leigh Light. The light illuminated a submarine lying stationary in position 47° 05′ N., 06° 40′ W. She was painted light grey and looked very long, having a totally encased conning tower with no bandstands aft. The first wireless operator considered that the conning tower was slightly forward of amidships. There was also a bulge on the bows and in general appearance the submarine resembled a Japanese *I.52* type. No guns were seen but an unidentified object aft of the conning tower may have been one. In view of the unusual circumstances and the complete lack of activity on the part of the submarine the Captain decided not to attack on his first run. He returned on the reciprocal and again made no attack because the navigator in the nose mistook the encased conning tower for a lifeboat. One member of the Wellington crew had served in the Royal Navy and after he had replaced the navigator in the nose he reported with assurance that the target was a submarine of a very unusual type. He also confirmed the description given by other members of the crew. Since there was evidently no need to hurry the assault the Captain made a fourth run in order to deliver a deliberate attack in the most advantageous position. He came in over the submarine's port bow and from 75 feet released six depth charges spaced at 60 feet. The flame floats, which were dropped with the depth charges, were seen burning on either side of the submarine's track, which indicated that the depth charges had straddled. Three were believed to have exploded on either side of the submarine. The Wellington then climbed to 3,000 feet and dropped a flare but nothing was seen except the long shape of the target. The Captain then made a fifth run and illuminated the target at two miles. The ex-naval rating reported a long swollen cigar-shaped hull with no visible conning tower, as if the submarine had turned on its side and was almost completely submerged. Just over an hour after the attack the Wellington made a sixth run but the target had entirely disappeared. The surface of the water was discoloured over a wide area. The original light, however, could still be seen flashing very slowly. It looked as if it was on the top of a white post. An hour and a half after the attack the Wellington reached P.L.E. and set course for base.

Comments

The circumstances of this attack are most mystifying. The attack itself appears to have been an accurate straddle and should have been lethal.

Depth Charge Explodes on Impact

On April 24 **Sunderland A/423** (R.C.A.F.) was flying at 2,100 feet when the Captain sighted a wake 16 miles fine on the port bow. The second pilot confirmed with binoculars that the wake was that of a U-Boat steering due south at 16 knots. Her position was 50° 56′ N., 18° 36′ W. The U-Boat's conning tower had two bandstands both of which contained guns. The Captain held his course and height for about eight miles and manœuvred until he was five miles on the U-Boat's beam. The U-Boat turned hard to starboard in order to keep stern on to the aircraft and opened fire with medium flak which exploded with white puffs. The fire was accurate for line but fell short by three miles. No tracer was seen and the flak was fired in a box barrage. The rate of fire and the fact that the bursts were in clusters of six or seven suggest that the enemy was using a gun of the Bofors type which was probably on the lower bandstand. When the aircraft was between the U-Boat and the sun the latter slackened her rate of turn and the Sunderland began its run in. At 1,200 yards the aircraft opened fire with the four fixed nose guns and the two front turret guns with such effect that for the last 300 yards of the run the enemy's gunners did not reply. Up to this point the aircraft had been repeatedly hit but the Captain pressed home his attack taking only the minimum evasive action. He attacked from the U-Boat's port bow and from 50 feet released six depth charges spaced at 60 feet. One depth charge exploded on impact with either the sea or the U-Boat and the effect of this on the aircraft and crew prevented them from seeing the explosions of the rest of the depth charges. As the rear gunner got the forward part of the U-Boat in his sights there was a violent explosion which threw up everything movable in the aircraft—floorboards, I.F.F. set and crockery; these, together with some eggs and the crew, formed a new variety of omelette on the edge of which the rear gunner lay unconscious. The wireless operator was thrown from his perch in the astrodome, all the electrical circuits became unserviceable, the R/T cable was cut, seams in the wings were opened and the port flaps were put out of action. The main damage, however, was to the elevator and all the strength and skill of the Captain and the second pilot was needed to overcome this. The aircraft began to climb and even with full nose trim the Captain had to put pressure on the controls. Eventually all the crew were brought forward of the main spar in order to help maintain trim. When the aircraft was 300 yards away the front gunner saw a brownish pool with blue smoke hanging over it 70–100 feet astern of the U-Boat. While the aircraft was being brought under control the rear gunner, who had regained consciousness, saw the U-Boat down by the stern and listing. This was confirmed by other members of the crew. By then the Sunderland was once more on an even keel and had climbed to 600 feet. The Captain began a careful turn to get back to the scene of the action. This turn took about three minutes and the U-Boat was lost to sight and not seen again. When the Sunderland eventually reached the depth charge marks the crew saw a patch of light blue oil 300 feet by 100 feet with streaks 200 yards long lying about 400 yards north of the depth charge marks. They saw no swirl, no wake and no wreckage. After staying for 30 minutes and dropping markers the Sunderland set course for base.

Comments

The crew must have been keeping an exceptionally fine look-out to have sighted a U-Boat at such a distance. The tactics used on the approach were excellent in the face of accurate fire. The depth charge which exploded prematurely was probably a direct hit. In other cases where this has happened the U-Boat has been sunk, but it is not yet possible to assess this attack.

A Flare Attack

On April 26 **Halifax F/502** was patrolling in fine weather when a Radar contact was obtained 12 miles on the port bow. The aircraft homed and the contact soon split into two blips. At a range of 1½ miles the Captain dropped two Mark II flares from 1,200 feet and continued to home on the blip on the port side. The navigator was unable to sight the contact visually until it was too late to bomb, but the second pilot saw a wake with a brown-grey object in it which he thought had a built-up superstructure. The navigator, engineer and rear gunner also saw this craft which they believed was a surface vessel. As soon as the flares ignited accurate flak appeared, but the aircraft dived steeply so that most of the fire passed overhead. The Halifax then made a wide circuit to starboard, maintaining contact by Radar, and climbed to 2,500 feet to make a Mark X flare attack. After homing on the contact the Captain released four Mark X flares at five-second intervals and lost height to 1,200 feet. The Radar then showed that the flares would not be in the correct position relative to the contact. The Captain therefore decided to make a Mark II flare attack and released three flares accordingly. The enemy did not fire after the first run, nor when the Mark X flares were released, but when the Mark II flares ignited he again opened fire. The aircraft attacked over the enemy's starboard bow and from 1,200 feet released four 600 lb. A/S bombs with the aid of the Mark XIV bomb-sight. The navigator saw one explosion plume close alongside the U-Boat's starboard bow and two other plumes on the port beam. Several members of the crew saw a blue flash, a big piece of wreckage and enormous clouds of smoke. The U-Boat's flak ceased after the explosion and the surface vessel's soon after. This vessel was seen on the U-Boat's port bow. The Halifax continued on track and then turned on to the reciprocal. At 1½ miles the contact which had been attacked disappeared but the other was held. Over the scene of the attack the Captain dropped two more flares and a marine marker, by the light of which

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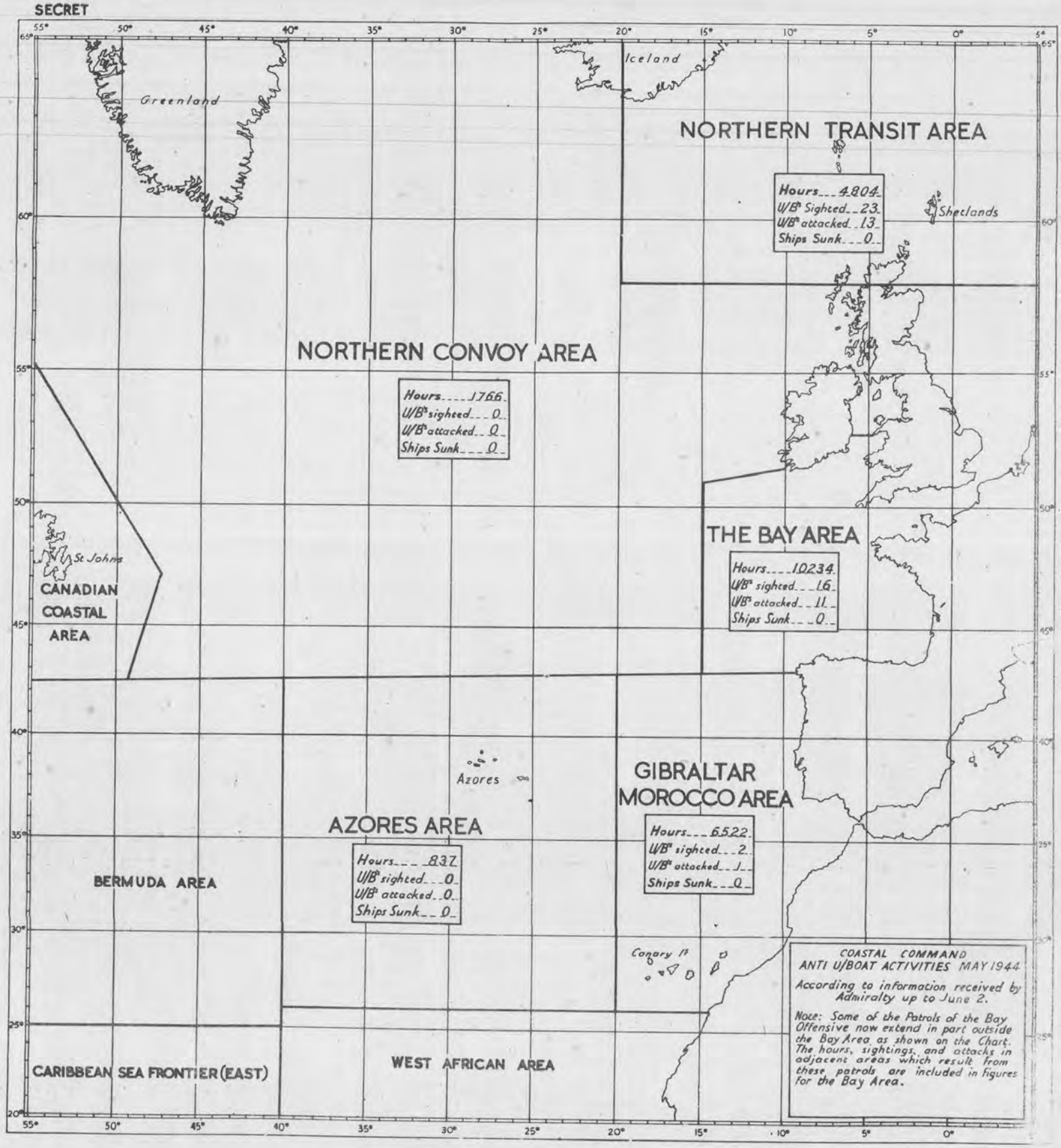

Greenland
Iceland
NORTHERN TRANSIT AREA
Hours 4804
U/B's Sighted 23
U/B's attacked 13
Ships Sunk 0
Shetlands
NORTHERN CONVOY AREA
Hours 1766
U/B's sighted 0
U/B's attacked 0
Ships Sunk 0
St Johns
CANADIAN COASTAL AREA
THE BAY AREA
Hours 10234
U/B's sighted 16
U/B's attacked 11
Ships Sunk 0
Azores
AZORES AREA
Hours 837
U/B's sighted 0
U/B's attacked 0
Ships Sunk 0
GIBRALTAR MOROCCO AREA
Hours 6522
U/B's sighted 2
U/B's attacked 1
Ships Sunk 0
BERMUDA AREA
Canary Is
CARIBBEAN SEA FRONTIER (EAST)
WEST AFRICAN AREA
COASTAL COMMAND
ANTI U/BOAT ACTIVITIES MAY 1944
According to information received by Admiralty up to June 2.
Note: Some of the Patrols of the Bay Offensive now extend in part outside the Bay Area as shown on the Chart. The hours, sightings, and attacks in adjacent areas which result from these patrols are included in figures for the Bay Area.

the mid upper gunner saw an enormous foaming swirl and two ends sticking up in the water as if the U-Boat's back had been broken. There was also a bright object to port of the swirl, which may have been a small boat. About a quarter of an hour later the Halifax dropped more flares and the crew saw a surface vessel about the size of a minesweeper or a corvette lying stationary with a small boat 100 yards off her port bow. After dropping further markers the aircraft set course for base in order to be out of the area before dawn. It had been damaged in several places by flak, but the crew were unhurt.

Comment

A very well executed operation with the use of flares. The crew drill and the co-operation with the Radar operator were excellent. The attack seems to have been accurate and the target destroyed. This was an admirable performance in the face of intense flak.

A U-Boat Pack Contacted at Night

In the early morning of May 3 **Liberator S/53** was patrolling at 500 feet when a Radar contact was obtained bearing Green 60° at a range of 13 miles. The visibility was three-quarters of a mile with thin patches of cloud occasionally revealing the moon. The aircraft manœuvred to get up wind of the contact and to approach up moon, losing height to 250 feet. The contact was held during the run-in and the Leigh Light was not switched on as the Captain considered that it would have been no use in the hazy conditions. At a range of just under one mile both the navigator and second pilot sighted what they took to be a very large U-Boat on the surface dead ahead in position 45° 24′ N., 08° 07′ W. The U-Boat was very wide in the beam with a sharply pointed bow and stern. Three dark patches gave the impression of three superstructures evenly spaced along the hull. She was moving very slowly with hardly any wake on a course of 240°. The aircraft attacked from just forward of the enemy's starboard beam and released from 250 feet six depth charges spaced at 60 feet. The low level bombsight was used. The enemy had not fired during the run in, but as soon as their guns would bear the starboard beam, mid-upper and rear gunners all put in good bursts. The rear gunner saw one big plume as the depth charges exploded and he considers that the stick straddled just astern of the U-Boat, the wash of the explosions covering the enemy's stern as the plume subsided. The Captain maintained his attacking course for 5½ miles, holding the contact, and then turned on to the reciprocal for another attack. At 3½ miles the contact became weak and the tilt was raised. The blip was picked up again but then it separated into two, both fine on the port bow. The Liberator homed on the contact nearest to its track and the navigator sighted a U-Boat half a mile away on the port bow steering 030°. This U-Boat was much smaller than the first one attacked, being of medium size, dark grey in colour, and with a compact conning tower. Three streams of orange-red flak came from a position near the conning tower but no guns were seen. The enemy's tracer first passed over the aircraft and then went below it, but all fire ceased after the aircraft had passed over. The larger U-Boat, which was to port, also opened fire from three different sources. At this point another vessel, possibly a U-Boat, opened fire from the starboard side but no contact was obtained on this target. During the attack on the second U-Boat the pilot successfully avoided being hit by undulating and released from 250 feet two depth charges spaced at 80 feet. He dropped these depth charges by eye as it was impossible to use the low level bombsight while taking evasive action. No one saw the depth charges explode but the port beam gunner saw a blue flash and felt an explosion shake the aircraft. He is confident that the depth charges were very near to the U-Boat's bow. The mid-upper and port beam gunners fired bursts at the U-Boat and the rear gunner put in a long burst as soon as his guns would bear, using the source of the flak as his point of aim. The larger U-Boat continued to fire until the aircraft was about 1,400 yards away. After passing over the second target the Radar operator raised the tilt and picked out three blips, two close together astern and the other away to starboard of the first two. The pilot circled, shadowing the U-Boats by Radar, and dropped a two-hour delay marine marker. The three contacts were held throughout and at one time there were four contacts on the screen. The Liberator began homing procedure at once but at 0455 hours it reached extreme P.L.E. and set course for base. At 0550 hours in position 46° 42′ N., 09° 53′ W. the Liberator encountered flak from two vessels which are believed to have been U-Boats. An unidentified aircraft with a yellow light was also sighted. The Captain took evasive action and continued his homeward course, sending sighting reports.

Comments

In the first attack the relative drift seems to have been 4° port and the aircraft homed so that the target was dead ahead at three quarters of a mile. In these conditions it is logical to expect a miss to port, but it is discouraging that a small relative drift should cause a miss on a beam attack.

In the second attack the relative drift was very small and the target should have been kept dead ahead during the homing. As there is no mention of the aircraft having homed with the U-Boat out on the port side, it must be assumed that the fact that the U-Boat was sighted 5° to port was due to inaccurate A.S.V. readings. Thus in each attack the relative bearing was about 4° different from the relative drift. As the first attack was a miss which could be attributed to this error, it is logical to suppose that the second attack also missed. The Flight Engineer's evidence tends to confirm this.

It it becoming more and more evident that relative drift must be allowed for, and this is not possible unless the A.S.V. readings are really accurate.

A Night Kill

On May 4 **Wellington M/407** was on anti-U-Boat patrol when the Radar operator obtained a contact bearing Green 40° at a range of 7 miles. The night was moonlit and cloudless, visibility being 2–3 miles. The Captain lost height to 400 feet and while homing on the contact he sighted the U-Boat on the surface two miles dead ahead. At 500 yards range, when the aircraft was down to 200 feet, a strong concentration of flak came up, mostly red tracer, and the Wellington's nose gun jammed on the first round. However, the Captain went in to attack straight up the U-Boat's track without using the Leigh Light, and dropped six depth charges spaced at 60 feet. It was impossible to see the points of entry of the depth charges because of the flashes from the rear guns as well as those from the U-Boat's cannon. When the depth charges exploded their plumes obscured everything and made it impossible to judge the position of the explosions in relation to the U-Boat. The enemy's fire ceased immediately and the Wellington climbed to 1,500 feet, keeping contact by Radar. However, after a minute or two, contact was lost at two miles range and the aircraft made a run over the estimated position of the attack. The Wellington's crew saw a patch of some heavy oily substance which looked not unlike the mould on rotting fruit; the patch was estimated to be half a mile long by 100 yards wide. The Captain made another circuit and illuminated the oil patch but could not see anything more. After staying for nearly an hour the Wellington dropped markers and returned to base.

The story might well have ended here, but at 1500 hours the same day Sunderland K/10 found a big horse-shoe shaped oil patch in the same position, 46° 04′ N., 09° 20′ W., with nine dead bodies and three live ones floating nearby. An hour later Sunderland P/228 came upon the same scene and dropped a dinghy and a food pack to the survivors.

Comments

An excellent approach and attack. There seems little doubt that this U-Boat was sunk.

Good Use of the Moon

On May 4 **Wellington A/612** was patrolling in good visibility over a calm sea when a Radar contact appeared bearing 15 miles on the port beam. The Captain homed and manœuvred in order to bring the contact between himself and the moon. During this time the moon was hidden by slight cloud and the Captain ordered the Leigh Light turret to be lowered. At 2½ miles, however, the cloud cleared and three members of the crew immediately sighted a U-Boat 2½ miles dead ahead in position 46° 35′ N., 08° 10′ W. She was steering 210° at 10 knots. The Wellington immediately attacked from the U-Boat's port quarter and from 50 feet released six depth charges spaced at 60 feet. The rear gunner saw two explosions close to the U-Boat's starboard bow, the plumes of which obscured almost the whole vessel. He also saw explosions on the port quarter. As the aircraft passed over, the U-Boat opened fire with intense and accurate light flak but failed to hit the Wellington. Two flame floats were seen burning on either side of the U-Boat. The Captain then made a steep climbing turn to port and when he was down moon of the U-Boat he and three other members of the crew saw smoke coming from the conning tower. At first this smoke was light and wispy but it later became dense. The U-Boat herself was turning to starboard in tight circles, listing at least 45° to starboard. She remained in this condition the whole time the aircraft was there. Five or 10 minutes after the attack the Wellington tracked over the U-Boat at 2,000 feet and the Germans opened intense and accurate flak. The rear gunner replied with a very long burst and the flak ceased. About 15 minutes after the attack the Wellington's crew saw the U-Boat trying to submerge, but her conning tower remained visible and she was unable to go lower. Meanwhile the smoke seemed to increase. Just before the aircraft left the U-Boat made a second attempt to submerge and the smoke again increased considerably. The aircraft then set course for base, having reached P.L.E.

Comments

A very well thought out Radar approach in which the moon was well used on the final run in. The attack seems to have been accurate and to have caused the U-Boat to turn tight circles. If the smoke really came from the conning tower hatch and not from the Diesel exhausts, an internal fire may have been the cause. The vain attempt to dive indicates that there was serious trouble inside the boat. It seems improbable that the U-Boat was listing 45° to starboard when delivering intense and accurate flak. The secondary blip may indicate that a decoy balloon was released.

A Determined and Well Executed Attack

On May 5 while flying at 1,500 feet in bright moonlight, **Wellington N/304** obtained a Radar contact bearing Green 5° at a range of 20 miles. The Captain manœuvred to bring the contact between him and the moon and lost height to 500 feet. When the range was 11 miles he decided to make the run dead into wind in order to reduce drift, and this put the moon 20° on the port bow. He continued to home at 200 feet and at three-quarters of a mile he sighted a wake dead ahead and immediately after, a fully surfaced U-Boat steering north-east at 15 knots. The position was 46° 34′ N., 07° 14′ W. The U-Boat, which seemed to be down by the stern, carried a gun forward of the conning tower. The conning tower itself was long, streamlined, and oval in

shape, and the Wellington's Captain had the impression that the bows were whale-backed. At half a mile the Leigh Light was switched on and was greeted by intense and accurate flak which narrowly missed the aircraft. At that moment the Radar operator reported that his blip had split into two. The second pilot returned the enemy's fire with the front gun and saw his tracers enter the points from which the Germans were firing. The Wellington attacked from abaft the U-Boat's starboard beam and dropped from 100 feet six depth charges spaced at 60 feet. The rear gunner states that he distinctly saw the points of entry of the depth charges and that they straddled the U-Boat slightly forward of the conning tower. He then saw two very big explosions very close on either side of the U-Boat. He emphasizes that the explosions were much bigger than those he had seen in an attack made a few days before. Just before the depth charges exploded the enemy ceased fire and the rear gunner put in a long burst as the Wellington passed over. The second pilot had kept up his fire as long as his gun would bear and as soon as he ceased fire he saw intense flak, both M.G. and cannon, coming from dead ahead. The Leigh Light was switched off as soon as the aircraft had passed over the target and this had the effect of temporarily blinding the Captain. He therefore had to attempt to evade the new flak while flying by instruments. At that moment he saw that the radio altimeter registered zero. It was in fact out of action, but the Captain did not know this at the time. Almost immediately after the second lot of flak began several members of the crew saw the dim shape of a second U-Boat steering the same course as the original target and about six to eight hundred yards away from it. The Wellington flew right over the second enemy and was fired at continually until it was about three miles away. It was hit in many places but none of the crew was hurt. Some of the flak is believed to have been 37-mm. Meanwhile the first U-Boat was seen to fire a single red star. The Wellington's rear gunner kept up his fire on the second U-Boat until his turret was hit and put out of action. The Radar operator had both contacts on his screen until the range was two miles, when the first contact disappeared. The Captain then turned and held contact with the second U-Boat until he tried to home for the purpose of dropping markers. Then at three miles range the contact disappeared. This was eight minutes after the original attack. In spite of damage the Wellington stayed in the area for 23 minutes sending reports and dropping marine markers.

Comments

Had it been possible for the Radar operator to spot the double blip a little earlier the Captain might have been able to avoid tracking over the second U-Boat, which seems to have caused most of the damage to the aircraft. According to the U-Bat the aircraft was not badly hit until after the Leigh Light was extinguished. The better shooting which followed when the light went out was probably due to the easy mark offered by the red-hot parts of the searchlight while it was cooling down. In this connection it is always advisable to turn the searchlight away from the target as soon as the switch is put off. On the other hand, if the searchlight had been kept on and directed at the second U-Boat it is likely that the enemy shooting would not have been nearly so good.

Two Attacks Through Intense Flak

On the afternoon of May 16 **Sunderland V/330** (Norwegian) was patrolling at 500 feet over a rough sea when a wake and then a U-Boat was sighted eight miles away on the port bow in position 63° 05′ N., 03° 10′ E. The U-Boat was steering due north at 15 knots and appeared to be a minelayer type about 300 feet long. She carried one big gun in the fore part of the conning tower and at least two 20-mm. guns aft in the bandstand. The Sunderland approached and opened fire with ·5 guns at 1,000 yards, the U-Boat replying with all her armament and hitting the aircraft on the bottom of the hull. At 800 yards range the front gunner opened fire and scored hits on the conning tower and the guns crews. Both sides took evasive action, the aircraft by jinking and the U-Boat by zigzagging and then by turning violently to port. The aircraft ran in over the enemy's port quarter at 50 feet and attempted to release four depth charges, but they all hung up. As the aircraft passed over the U-Boat the rear gunner fired into the conning tower and several of the German gunners were seen to fall overboard. During the run in the enemy's flak was very concentrated but after the aircraft had turned to port to attack again the flak was much lighter, only one gun being seen in action. The U-Boat continued to circle to port while the Sunderland came in again from the port quarter. During this second attack the front gunner was killed, the third pilot and flight engineer were slightly wounded, and the first pilot was temporarily blinded by bursts of cannon fire in the cockpit as well as flames and oil from the front turret. Nevertheless the pilot pressed home his attack and released four depth charges from 40 feet while the U-Boat was still on the surface. Three of the depth charge explosions were seen, the nearest being 15 feet away from the U-Boat's port quarter. Several of the Sunderland's crew saw the plume of this depth charge wash over the U-Boat's stern. Meanwhile the aircraft had been hit again in the starboard outer engine, which stopped; at the same time the starboard inner engine began to vibrate violently. Immediately after the second attack, when the explosion plumes had subsided, the U-Boat's bow submerged and then lifted clear out of the water at an angle of about 30°. The U-Boat lost speed rapidly and the bow returned almost to the horizontal. Although one member of the U-Boat's crew was seen in the conning tower no flak was encountered after this attack. About four minutes after the attack the U-Boat submerged stern first with a forward speed of about 5 knots. The Sunderland, owing to its extensive damage and casualties, set course for base immediately. The Captain had great difficulty in maintaining height and the crew were sent to ditching stations. After jettisoning 1,000 gallons of petrol, all spare ammunition, practice bombs

and smoke floats, the Captain was able to gain height and return to base on three engines.

Comment

A very good initial run. It was most unfortunate that the depth charges hung up after the aircraft had come through such intense flak. The good gunnery seems to have inflicted casualties on the U-Boat's gunners so that the second run was not so heavily opposed, though the reduced fire was just as accurate. The attack was very good and from the visual evidence No. 3 depth charge was sufficiently close to do serious damage to the U-Boat's stern. A very fine effort on the part of the crew both during and after the attack, and fine handling of the damaged aircraft on the way back to base.

A Kill

At 0900 hours on May 18 **Catalina S/210** was patrolling at 200 feet in conditions of good visibility, when one of the crew sighted a U-Boat 5–8 miles on the port bow. As the range closed the U-Boat optimistically opened fire. At first the shells fell into the sea a paltry three miles short of the Catalina, but later they came fairly close. The pilot took evasive action and manœuvred for an up-track attack while his front gunner returned the fire. He succeeded in hitting the enemy's conning tower and knocking at least one German into the water. At 200 yards both sides ceased fire, the aircraft because the pan was empty and the U-Boat probably because the gunners had been liquidated. The Catalina attacked from 50 feet while the enemy was turning to starboard, and dropped six depth charges, the first three of which fell on the U-Boat's port quarter and the second three on her starboard side amidships. The explosions from this perfect straddle completely enveloped the U-Boat in a great cloud of spray. The Catalina then circled to port taking photographs and watching the U-Boat sinking stern first. As she vanished beneath the surface with her bows at an angle of 40–50° a great oil patch appeared with 20–30 bodies in the middle, some of them wearing yellow Mae Wests. They had no dinghies and the only wreckage to be seen was a fairly big box-shaped object made of wood. The aircraft circled this for half an hour, after which there were only 12 bodies in the water.

Comments

By their good gunnery and exact aim this crew earned the reward of being able to watch their enemy sink.

A Very Near Undershoot

On the morning of May 24 **Catalina V/210** was patrolling at 900 feet when the Captain sighted first a wake and then a U-Boat 5–8 miles off the port bow in position 65° 08′ N., 04° 53′ E. The U-Boat, which was steering 200° at 12 knots, was a 500-tonner with a black hull and bright blue deck painting. Four guns were seen in the lower bandstand and two in the upper bandstand; there was also a heavy gun forward of the conning tower. As the aircraft closed, the enemy opened heavy but inaccurate fire at extreme range, keeping this up until the Catalina was about 200 yards away. At 600 yards the front gunner opened fire but his pan ran out at about 150 yards. The aircraft attacked over the enemy's starboard quarter and from 200 feet released six depth charges spaced at 50 feet with the aid of the low level bombsight. The stick undershot, but No. 6 depth charge fell alongside the conning tower on the U-Boat's starboard side, its impact splash falling on the enemy's deck. The explosions were very close together and three depth charges are thought to have exploded to starboard and one to port. The remainder were not seen. After the explosions the U-Boat seemed to spin to starboard and stop. After the plumes had subsided the conning tower was seen to have been remanned by a skeleton gun crew and the Catalina circled within range firing all her guns. The Captain then made two more attacks with the front gun and cleared the enemy gunners off the conning tower. After this the U-Boat began to sink stern first until the bandstand was awash and the bows were clear of the water. She went down for about one minute and then bobbed up bows first in the middle of an oil patch until the conning tower was almost clear. The deck aft of the conning tower remained under water. The Catalina made a fourth attack with guns but no Germans were seen on deck. Oil and a patch of very light green bubbles appeared, and about two minutes after the depth charge plumes had subsided, the Catalina's crew saw a brilliant orange flash on the waterline aft of the conning tower followed by another explosion which looked like an Icelandic geyser. The aircraft continued to circle the target for about ten minutes and the crew saw the U-Boat gradually going down stern first. The last they saw of her before she was enveloped in a snow shower was the tip of the conning tower.

Comments

Very good approach tactics and an excellent attack for line. Photographs confirm a very near undershoot but it is by no means certain that No. 6 depth charge exploded. It must have entered the water close to the starboard side to have put the splash of entry over the deck, and it may have hit the U-Boat's hull in its forward travel under the water and broken up. Or it may have lodged in the saddle tank, split its casing and gone off "soft." This would explain the orange flash and the geyser. No. 5 depth charge probably exploded within 30 feet of the hull, if the spacing was 50–60 feet. However, as the photograph reveals that the average spacing is about 80 feet, it is not certain whether this depth charge was lethal, though the subsequent behaviour of the U-Boat indicates that her internal machinery was more or less seriously damaged. There is no certainty that she was foundering when last seen, for in that case the crew would have abandoned ship. On the other hand the damage may have become cumulative and the U-Boat may ultimately have got out of control. Very good crew drill and excellent gunnery.

Submerged.

Periscope.

Surfacing.

Surfaced.

"Conning Tower" showing.

Swirl. Note that there is no wake.

More U-whales, photographed from a Blimp of the U.S. Navy.

PLATE 4 *Above.* Reykjavik town and airfield, looking north-east. May 1, 1944.
Below. Lagens airfield, Azores, looking south-east, photographed by 220 Squadron on May 5, 1944.

A Fatal Oil Trace

In the *Coastal Command Review*, Vol. III, No. 4 (April, 1944) there was an account of a hunt by aircraft and surface vessels which ended in the destruction of a U-Boat. It is now known that this vessel was *U 575* and it is possible to give the other side of the story.

Prisoners from this U-Boat state that in the early hours of March 13 a four-engined aircraft with a searchlight appeared flying very low towards the U-Boat. One officer remarked that it was so low that he thought at first that it was a surface ship with a light showing. In fact, it was Wellington B/172. The aircraft attacked and raked the U-Boat with machine-gun fire. The bridge watch returned the fire at 500 metres, but they did not use the 37 mm. gun as the aircraft was too near when they realised what it was. The U-Boat's First Lieutenant believes that he shot this aircraft down with 20 mm. fire. Some prisoners describe this as mere boasting, but others claim to have heard something hit the water soon after, and think it might have been the aircraft, which had circled and returned to drop its depth charges. After the attack *U 575* dived and heard no more of the Wellington which, in fact, was neither shot down nor damaged. No damage was apparent inside the boat but prisoners believed that a fuel tank had been punctured by machine-gun fire and that the U-Boat was leaving an oil trace.

Later the same morning *U 575* again surfaced, but within a matter of seconds she was once more attacked by a four-engined aircraft. This was Fortress R/206. *U 575* opened fire with her 20 mm. guns and the 37 mm. gun at about 3,000 metres. She manœuvred in order to present as small a target as possible and the aircraft circled twice before making its run. After firing only a few rounds the automatic feed mechanism of the 37 mm. gun jammed and thereafter it was able to fire only single shots. The aircraft attacked from the U-Boat's beam and dropped depth charges, one of which may have fallen on the starboard side and two off the port beam. The U-Boat was shaken but again no damage was visible. When the aircraft flew overhead the U-Boat crash dived and remained submerged until she was finally destroyed.

In the early afternoon when she was proceeding submerged, two depth charges dropped by Fortress J/220 exploded over the boat. No damage was done, but the crew were puzzled as to how they had been located, and it was at this time that they began to suspect that they were leaving an oil trace as a result of a previous attack. Their suspicion was fully justified for the Fortress crew had, in fact, sighted a moving oil trace and dropped depth charges on its point.

Meanwhile, one of the Fortresses as well as carrier-based aircraft had been homing surface vessels and an hour later *U 575* picked up propellor noises on her hydrophones. Within an hour depth charges began to fall, though the first patterns were not well placed. As the afternoon went on the depth charges came closer and closer, though they caused only minor damage. Shortly after 1800 hours the boat was at 180 metres and was bearing up well under her prolonged attack. Then suddenly a pattern of charges exploded so close that its effects were devastating. The lights were blown out, all the instruments were smashed and water leaked through the port propellor-shaft gland. The U-Boat was well down by the stern and the Captain felt—unjustifiably in the view of some of the more experienced ratings—that all was lost, and he gave the order to blow tanks. The U-Boat was now so far down by the stern that she responded only very slowly. At length she rose very gradually but the motors began to heat up rapidly and, it was stated, to burn. When the boat reached 80 metres she suddenly shot to the surface almost perpendicularly, and immediately after this the order was given to abandon ship. The final and lethal attacks had been made by aircraft from U.S.S. *Bogue* and by U.S.S. *Haverfield*, *Hobson* and H.M.C.S. *Prince Rupert*. Without the tell-tale oil trace, started by B/172 or R/206, it is unlikely that these ships would have been led to their quarry.

II.—ANTI-SHIPPING

SUMMARY OF ANTI-SHIPPING OPERATIONS BY COASTAL COMMAND AIRCRAFT

MAY, 1944

Weapon Carried.	Number of Sorties.			Number of Aircraft to Attack.				
	On Reconnaissance.	On Strike.	Total.	On Reconnaissance.	On Strike.	Total.	M/V Target.	Naval Target.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DAY OPERATIONS.								
Torpedo	7	12	19	—	12	12	12	—
R.P.	53	38	91	2	20	22	13	9
Bomb	64	—	64	—	—	—	—	—
Cannon and M.G. only	267 (1)	98	365 (1)	3 (1)	55	58 (1)	47	11 (1)
TOTAL DAY	391 (1)	148	539 (1)	5 (1)	87	92 (1)	72	20 (1)
NIGHT OPERATIONS.								
Torpedo	8	—	8	2	—	2	2	—
R.P.	103	12	115	2	2	4	1	3
Bomb	296 (2)	19	315 (2)	49 (2)	12	61 (2)	25	36 (2)
Depth Charge	7 (2)	—	7 (2)	1 (2)	—	1 (2)	—	1 (2)
D.C. and Bomb	4	2	6	3	1	4	1	3
Cannon and M.G. only	44 (2)	1	45 (2)	1 (2)	—	1 (2)	—	1 (2)
TOTAL NIGHT	462 (6)	34	496 (6)	58 (6)	15	73 (6)	29	44 (6)
ALL OPERATIONS.								
Torpedo	15	12	27	2	12	14	14	—
R.P.	156	50	206	4	22	26	14	12
Bomb	360 (2)	19	379 (2)	49 (2)	12	61 (2)	25	36 (2)
Depth Charge	7 (2)	—	7 (2)	1 (2)	—	1 (2)	—	1 (2)
D.C. and Bomb	4	2	6	3	1	4	1	3
Cannon and M.G. only	311 (3)	99	410 (3)	4 (3)	55	59 (3)	47	12 (3)
GRAND TOTAL	853 (7)	182	1,035 (7)	63 (7)	102	165 (7)	101	64 (7)

Note.—The figures in brackets, which are not included in the totals, represent attacks on shipping by aircraft on A/U patrols.

RESULTS CLAIMED FOR MAY

(Subject to Assessment)

Torpedo / *R.P.*	*Day :*	1 M/V (2,000 tons) sunk.*
Torpedoes	*Day :*	1 M/V (2,000 tons) sunk.* 1 M/V (3,000 tons) damaged.
R.P.	*Day :*	1 Coaster damaged.* 1 Destroyer damaged. 1 M/S seriously damaged.
Bombs	*Night :*	1 Auxiliary sunk.* 1 E/R Boat seriously damaged. 2 M/S.s seriously damaged. 6 E/R Boats damaged. 1 Vessel damaged. 2 M/S.s damaged. 1 T.L.C. damaged.
Cannon	*Day :*	1 E/V seriously damaged.* 2 E/V.s damaged.* 1 M/S sunk.

Note.—The claims marked * have already received final assessment.

ANALYSIS OF WEAPONS EXPENDED

Weapon.	No. of Aircraft to Attack.	Weapons Expended. M/V.	Weapons Expended. Naval.
Day Operations :—			
Torpedo, 8 ft.	12	12	—
R.P.	22	104 × 25 lb. "J"	66 × 60 lb. H.E.
Night Operations :—			
Torpedo, 8 ft.	2	2	—
R.P.	4	8 × 60 lb. H.E.	24 × 60 lb. H.E.
Depth Charge	7	4 × 250 lb.	23 × 250 lb.
Bomb	63	45 × 500 M.C. 43 × 250 G.P. 7 × 500 G.P. 18 × 20 Fragmentation.	11 × 500 M.C. 132 × 250 G.P. 5 × 500 G.P. 10 × 20 Fragmentation. 12 × 40 Fragmentation. 7 × 600 A/U.

APRIL ASSESSMENTS OF ATTACKS ON ENEMY SHIPPING

Day :—

Torpedo	M/V (2,000 tons) sunk. Sperrbrecher (1,800 tons) sunk. M/V (3,303 tons) seriously damaged.
Bombs	Nil.
R.P.	3 E/V.s sunk.
Cannon	M/V (863 tons) seriously damaged. 8 E/V.s damaged. 1 Sperrbrecher damaged.

Night :—

Bombs	1 M/S sunk.

Shipping Strikes in May

On April 26 the **North Coates Wing** attacked enemy shipping during an armed reconnaissance off the Dutch coast. The Wing comprised six Torbeaus of 254 Squadron, nine cannon Beaufighters of 143 Squadron, and nine Beaufighters of 236 Squadron with 25 lb. R.P. and cannon. Single-engined fighters provided escort. The Wing had completed its patrol and set course for base, when the leader of the escorting fighters sighted a convoy north of Ameland and directed the Beaufighters to it. There were about twelve ships in the convoy, six M/V's of between 1,000 and 4,000 tons and five or six escort vessels, including one *Sperrbrecher*. A great deal of heavy and light flak was encountered, and although the barrage opened rather late, it was maintained until all the aircraft were out of range. Nevertheless, the attack was very successful. A 2,000-ton ship was torpedoed, an M/V of 3/4,000 tons was set on fire and seriously damaged, and an armed trawler, which was set on fire, probably blew up. Apart from this, other M/V's and their escorts were hit by cannon fire. Photographs substantiate the claims made. One of the Torbeaus failed to return and six other aircraft were damaged, one of which crash landed at base.

Before dawn on April 27 **Halifaxes B** and **Q/502** made attacks on surface vessels in the Bay area. " B " sighted four vessels which are believed to have been destroyers or minesweepers. The pilot dropped a stick of four flares and attacked with five 600 lb. A/S bombs. Owing to the intense flak he was forced to take violent evasive action and did not see the explosions. " Q " made an attack on three other vessels, probably of the same type, which were illuminated by " B's " flares. Unfortunately the flares went out just as the bombs were released and again the explosions were not seen. However, " Q " made two circuits after the attack and saw that one of the vessels was on fire. The aircraft stayed in the area for about eight minutes, and before setting course for base the crew noted that the fire had got worse.

On April 27 **Wellington L/415** made a moonlight attack on one of three M/V's sighted off the Dutch coast. The vessel, a three-island type of 2,000/2,800 tons, was attacked with five 500-lb. M/C bombs, only three of which were seen to explode. One was a direct hit and the other two fell close on either side of the target. After the attack the pilot saw a big orange flash and the enemy vessel was soon enveloped in dense smoke. Undoubtedly the M/V was severely damaged as a result of this action.

By moonlight on May 4 **Beaufighter Y/143** made a determined attack against shipping in the Channel area. One 2,000-ton M/V, one trawler and four E-Boats were attacked with bombs. One of the E-Boats was hit and burst into flames. Subsequently the pilot saw two explosions on the boat and he made a second attack with cannon. As he went in he was greeted by intense return fire from the other boats. He then turned his attention to the armed trawler and scored many cannon hits on it. The E-Boat was seriously damaged and probably sank.

On May 6 the **Langham Wing** made a well co-ordinated attack on a heavily defended enemy convoy near Borkum. The convoy consisted of twelve merchant ships with 15 escorts. The Wing comprised 12 anti-flak Beaufighters of 455 Squadron and 12 Beaufighters of 489 Squadron six of which carried torpedoes and six cannon only. The aircraft attacked the forward ships of the convoy in the face of intense flak from the surrounding escorts. This, however, was silenced to a great extent by the anti-flak aircraft and the Torbeaus had little opposition on their run in. A 3,000 ton M/V was torpedoed and seen to be on fire and low in the water; another M/V of 2/3,000 tons was believed to have been hit by a torpedo and was also left on fire. A torpedo attack was made against a third M/V of 5,000 tons but no hits were seen. However, this ship was seen to be on fire before our aircraft left the area. The anti-flak aircraft did a good job and scored cannon hits on several of the escort vessels and M/V's. One Beaufighter of 455 Squadron failed to return.

This same convoy was attacked about half an hour later by the **North Coates Wing.** Twelve Beaufighters of 143 Squadron armed with cannon and 12 Beaufighters of 236 Squadron with 25 lb. R.P. and cannon comprised the striking force. There were not really enough anti-flak aircraft to deal with the 15 escort vessels but the Beaufighters gave a very good account of themselves. They damaged and set on fire two M/Vs. of 1,500/2,000 tons and one escort vessel, besides scoring many cannon hits on four other escorts. After the attack big columns of smoke were seen rising above the convoy. Flak was intense throughout the action and although all our aircraft returned to base, five of them were damaged.

On May 6 **Beaufighter J/404** made a moonlight R.P. attack off the Norwegian coast. The target was a stationary M/V of 2,500 tons. The pilot attacked from the landward side in an 8° dive and fired six 60 lb. R.Ps. Immediately after this he saw a small fire in the direction of the target, indicating that some of the R.Ps. had found their mark.

On the night of May 6/7 **Beaufighter U/144** sighted and attacked a small convoy near Stavanger. The leading vessel, an M/V of 2,500 tons, was chosen as the target. Despite intense flak from the escort vessels the pilot scored a hit with his torpedo and saw a yellow flash on the ship. This was followed by a tall column of smoke rising from amidships and the M/V is estimated to be seriously damaged.

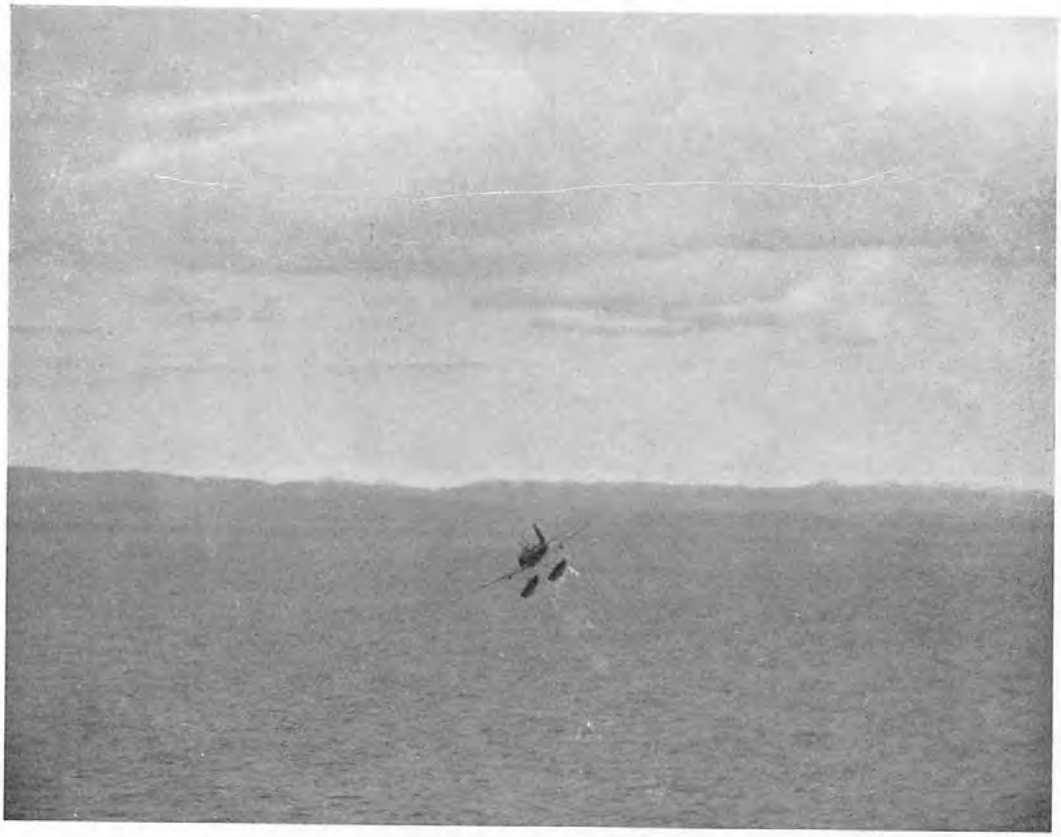
Off Borkum on May 8 **Beaufighters M** and **H/236** sighted ten 500-ton coasters disposed in two parallel columns. The Beaufighters went in on the enemy's beam and attacked the last two ships in the port line with 25 lb. R.P. and cannon. They scored hits with both types of weapon in spite of intense and accurate return fire. " M " was hit by flak in the port engine and wing, but the pilot was able to feather the port airscrew and return to base on one motor, being escorted all the way by " H." A very fine effort.

On May 9 **Wellington M/415** attacked a convoy of about eleven ships off the Dutch coast. By the light of the moon the pilot dropped five 500 lb. bombs on an M/V of 2,000/2,500 tons. The bombs

During an attack by Nos. 455 and 489 Squadrons on a convoy off the Frisian Islands on May 6, a trawler-type auxiliary was seen, for the first time, to be using a flame-thrower attached to the masthead. Reports from the crews and this photograph suggest that this weapon is unlikely to be very effective against aircraft.

In this attack off Ameland by Nos. 455 and 489 Squadrons on May 14, a merchant vessel of 2,000 tons and an "M" class minesweeper were sunk, the former by torpedo and the latter as the result of cannon fire.

A coaster-type auxiliary photographed during an R.P. attack by a Beaufighter of No. 236 Squadron off Borkum on May 8. The vessel was damaged.



An Arado 196 floatplane attacked and probably destroyed by a Mosquito of No. 333 Squadron off the coast of Norway on May 5.

This very fine close-up was taken by an aircraft of No. 455 Squadron during an attack on an enemy convoy (*see centre photograph on Plate 5*). It shows an "M" class minesweeper of the 216-foot type. These vessels can sweep contact, magnetic, and acoustic mines, but they are often misused as ordinary anti-aircraft escorts. Owing to their typically naval appearance "M" class minesweepers are constantly reported as destroyers or torpedo boats.

straddled the target and immediately afterwards a great pall of smoke billowed upwards completely enveloping the enemy vessel.

During the night of May 9/10 **Avenger P/848** made a bombing attack on three E- or R-Boats off the Dutch coast. The crew did not see the explosions of their bombs but immediately after the attack one of the enemy vessels was seen to be on fire for a short time.

On the night of May 10/11 **Wellington A/415** was patrolling in bright moonlight off the Frisian Islands when the pilot sighted a large scattered convoy near Borkum. He chose an M/V of about 3,000 tons as his target and attacked with five 500 lb. M.C. bombs. The first two bombs burst short of the stern of the ship, but the pilot did not see the other three explosions as he made a steep turn almost immediately after release. However, a great cloud of smoke rose from the target vessel after the attack, and it is claimed as damaged.

Off the Dutch coast on the night of May 14/15 **Avenger L/848** attacked an unidentified vessel with four 250 lb. bombs released in a dive. The pilot saw the four explosions but not their positions relative to the target. After the attack a heavy column of smoke rose from the target.

At midday on May 14 the **Langham Wing,** escorted by fighters, made a successful attack on a convoy of 4 M/V's and 16 escorts off Ameland. Six Beaufighters of 489 Squadron carried torpedoes, and a further six Beaufighters of the same squadron and twelve of 455 Squadron made up the anti-flak force. The Torbeaus attacked two 3,000-ton merchant ships, one of which was hit by a torpedo and left blazing furiously. The other M/V was probably also hit as a great column of thick smoke rose from it 200 feet in the air. Many cannon strikes were scored on several of the escort vessels and M/V's, and one " M " class minesweeper was left listing. One Beaufighter failed to return and four others were damaged; one of these belly landed on return to base.

On May 14/15 **Avenger C/848** made a night attack on two enemy ships off the Cherbourg peninsula. The aircraft dropped four 250 lb. bombs and scored a direct hit on the larger of the two vessels, an M/V of 1,200 tons.

On the night of May 19/20 **Swordfish Q/819** bombed a formation of five or six E- or R-Boats near Ostend. One minute later **Y/819** made an attack on the same boats, but neither of the crews was able to see the results of the bombing. However, the pilot of **K/819**, who arrived on the scene about ten minutes afterwards, saw one of the E- or R-Boats on fire. " K " also made a bombing attack and set two more of the vessels ablaze.

Before dawn on May 21 **Swordfish B/819** attacked six wakes, probably made by E-Boats, a few miles south-west of Le Touquet. Four 250 lb. bombs dropped in salvo resulted in a big explosion followed by a shower of sparks and a fire which persisted for some time after the attack.

On the night of May 22 **Albacore H/415** attacked six or seven E- or R-Boats some miles north of Cherbourg. The aircraft released a stick of six 250 lb. bombs across the track of the boats. The leading vessels were enveloped in the explosion but no further results were seen at that time. Less than half an hour later, however, **P/415** saw a vessel on fire about three miles from the position of the attack. The vessel, which was the same size as an E-Boat, sank while " P " was still in the vicinity. It is most probable that this was one of the boats attacked by " H."

At last light on May 23 **Albacore F/415** sighted five vessels, probably minesweepers, off the Cherbourg peninsula. In the face of intense flak the pilot attacked with 250 lb. bombs and scored a direct hit on one of the vessels. Violent evasive action prevented further results being seen. About three hours later " F " made another attack on minesweepers in the Bai de la Seine. The pilot dropped six 250 lb. bombs in a stick and scored a hit amidships on one of the vessels. Shortly afterwards he saw a big red explosion from the direction of the target.

Early on May 24 **Albacore R/415** attacked four or five E-Boats off Barfleur. The pilot dropped a stick of six bombs across the track of the leading boat. The second bomb fell within a few feet of the target, and the third almost certainly hit it. Subsequently the crew of " R " saw two small fires.

At last light on May 24 **Avenger C/848**, flying off the Hook, sighted a small convoy of two M/V's and seven E- or R-Boats. The pilot attacked one of the E- or R-Boats with a mixed load of 250 lb. and 500 lb. bombs and scored a hit on the stern of the target.

On the evening of May 29 thirteen cannon **Beaufighters** of **144 Squadron** and nine **Beaufighters** of **404 Squadron** armed with 60 lb. R.P. and cannon made a most determined attack on enemy warships off Ushant. Our aircraft were escorted by 29 Spitfires. The enemy force comprised one *Elbing* class destroyer, one torpedo boat and three " M " class minesweepers. 144 Squadron attacked first with cannon, hitting all the ships and leaving one of the minesweepers ablaze. The R.P. aircraft followed and scored at least six direct hits on the destroyer. The crews were forced to take violent evasive action and were therefore unable to see the results of their hits, but it is estimated that the destroyer was considerably damaged. The ships' gunners put up intense flak and shot down one of the cannon aircraft. One other pilot was wounded and his aircraft damaged, but he made a successful belly landing on his return. Three other Beaufighters were damaged.

III.—OTHER OPERATIONAL FLYING

Combats with Enemy Aircraft

On May 8 **Mosquito F/333** was on patrol off the Norwegian coast when the pilot sighted a convoy escorted by three B.V.138's, one of which was flying towards the leading ships. The Mosquito pilot made a complete turn to intercept this aircraft but he lost sight of it during the turn. Instead he found an Ar.196. Both aircraft made steep turns and eventually faced each other head on at 800 yards. " F " opened fire and scored many cannon hits on both wings of the enemy aircraft. The Ar.196, however, opened fire at the same time, hitting the cockpit and starboard fuel tank of the Mosquito with cannon shells. The windscreen was starred, the instrument panel and reflector sight smashed, and the pilot was wounded in the left eye by flying glass and in the chest and thigh by shell fragments. The observer sent off his sighting report under difficult conditions, and the pilot, despite his severe injuries, flew the damaged aircraft back to base and made a perfect landing. A most praiseworthy action.

When **Beaufighter V/254** was approaching a convoy in the Heligoland Bight on May 15 the pilot sighted six aircraft in two vics, one behind the other. He thought at first that they were fighters and headed straight for them, in the hope of breaking up the formation and evading them during the ensuing confusion. He opened fire at 1,000 yards and saw strikes on the nose of the leader. As the range closed he identified the enemy aircraft as Ju.52's fitted with minesweeping rings. " V " broke through the first vic and attacked the port aircraft in the rear section, opening fire at 300 yards and closing to 75 yards. The Ju.52 was hit repeatedly and was seen to ditch. The other enemy aircraft broke formation and scattered without returning " V's " fire.

Photographic Reconnaissance

May was a most successful month for photographic reconnaissance and the April record has been easily beaten. 183,058 negatives were made in May, compared with 111,277 in April. From Benson alone, 440 sorties were flown. All the major ports from Danzig to Bordeaux were photographed, as well as Copenhagen, Oslo, Kristiansand, Stavanger and Bergen. Many new airfields were covered, including those in the south of France, where considerable constructional activity was seen in several cases. Damage assessment sorties also produced good results, excellent photographs being taken of marshalling yards and industrial targets in France and Germany.

The following reports were written by members of the aircrews concerned.

540 Squadron. Mosquito

We were briefed overnight to photograph targets in the Würzburg and Nurnburg areas, St. Polten, airfields round Vienna, Wiener Neustadt, Graz, Klagenfurt, and the airfields at Graz and Zeltweg. We were to land at San Severo.

We took off at 0545 hours in order to be over the area at first photographic light as cumulus cloud was likely to form early in the day. We climbed to 26,000 feet, crossed the French coast at Le Crotoy and set course for Würzburg. We were flying straight into the sun which was still low on the horizon and this, combined with the fact that there was much fog and low stratus below us, made map reading very difficult. However, we pinpointed ourselves at Mainz through a convenient break in the cloud and carried on to Würzburg. There was 8/10ths strato-cumulus over this area as well as 10/10ths cirrus and we could not photograph the pinpoint we had been given. At Nurnburg, however, the cloud broke to 5/10ths and we were able to run over four targets in this area at 26,000 feet beneath heavy cirrus. We then altered course for St. Polten. The cirrus and low cloud had cleared considerably there and we were able to make two runs at 28,000 feet. Vienna was clear of cloud apart from an obstinate patch of medium cloud over Deutsch/Wagram airfield. We photographed the town as well as Aspern, Schwechat, and Fischamend airfield. We had to make three attempts before we succeeded in covering Wiener Neustadt. We then set course for Graz which was unfortunately covered by a sheet of strato-cumulus. We went over to Zeltweg and found similar conditions there and at Klagenfurt. We tried Graz again but it was no use.

While we were over this area we saw big formations of Fortresses coming from the south on their way to Vienna. One of the formations flew beneath us and we photographed it. Soon afterwards, when we had set course for San Severo, six Mustangs detached themselves from the fighter escort and chased us. As a precaution we opened up to maximum continuous cruising speed. The Mustangs stayed about four miles behind and did not seem to gain on us. The pilot called them on the V.H.F. several times without receiving a reply, so after a quarter of an hour we decided to slow down and let them identify us. We throttled back and as they approached we fired two recognition cartridges. Two of them passed us to starboard and dipped their wings in a friendly manner. The third Mustang, however, which was still some distance behind, made a quarter attack. We turned quickly towards him, firing our last cartridge, and his bullets passed harmlessly below. He then apparently identified us and broke away. Relieved, we carried on to San Severo, and landed there at 1020 hours.

542 Squadron. Spitfire

I was airborne from base at 1115 hours and climbed to 31,000 feet, crossing out at Foulness Point at 1134 hours. Half an hour later I crossed the enemy coast at Schouwen at the same height. I then flew at 500 feet below trail height to Wesel,

where I altered course for Hamm, intending to pass to the north of the Ruhr and approach the first target from the east. At Hamm I decided to photograph the marshalling yards as there was 10/10ths blue sky. I made a run over the target from north-east to south-west and saw in the mirror about six or eight bursts of black flak. These bursts were at the correct height but to port and about a mile astern. I map-read my way to Unna and did two runs over this target at 30,000 feet without opposition. During the second run over Unna I saw the smoke screen at the Möhne Dam starting up, but it was not very effective.

Dortmund airfield was the next objective, and as I had to photograph the town of Dortmund as well, I attempted a run from east to west, so that the end of the run would include the town. Towards the end of this run, whilst I was flying at 30,000 feet, I was greeted by about 40 bursts of black flak. The bursts were very accurate for height and direction and close enough for me to see the red flash. I made a steep diving turn to starboard (to the north towards Lunen) by way of evasive action and increased the revs. to maximum. The flak gunners followed every move very closely until I was at 24,000 feet over Lunen with an I.A.S. of 370 m.p.h. They then ceased fire. With full boost and revs. I made a wide climbing turn to starboard until I was at 40,000 feet south of Unna. From there I made a diving turn on to the target (Dortmund town) and levelled out at 38,000 feet for the run. However, I again met a large number of very accurate bursts and was forced to turn away. This time I made a climbing turn to port to 44,500 feet, and approached the target from the south-west. I dived on to the target at full throttle, levelling out at 39,500 feet with an I.A.S. of 275 m.p.h. and I was again immediately engaged by flak. The bursts were slightly behind at first, but they became so accurate that I again had to take evasive action. Throughout the run I made diving turns to port and starboard, down to 37,000 feet. North of the town I turned off to starboard and circled to get into position for a third run, at the same time climbing to 39,000 feet. I then dived steeply at full bore to 34,000 feet and was just levelling the aircraft and holding a steady course for photography when a very accurate burst of flak nearly turned the aircraft on its back. I righted the aircraft and did a tight turn to starboard through 90°, followed closely by the flak. The bursts were still in close attendance when I turned south again and made a photographic run over Bochum and Hattingen. After covering these targets I flew south away from the Ruhr and then turned back to the north-west and made a run over Duisberg and Hamborn at 34,000 feet. At 1325 hours I set course for Antwerp. On the way I did one run over Venlo airfield and another over Antwerp docks at 30,000 feet. I crossed the enemy coast at Zeebrugge at 1400 hours and photographed the port, as well as some suspicious-looking black smoke rising from a wood south-west of Bruges. I flew over the English coast at Bradwell Bay at 28,000 feet and landed at 1430 hours.

Air/Sea Rescue

During the month of May 240 aircrew were rescued by the Air/Sea Rescue Service out of a total of 510 known or suspected to have force landed in the sea.

Whenever the U.S.A.A.F. are operating over the North Sea, standing patrols are flown by both the Royal Air Force Air/Sea Rescue aircraft and by United States spotter aircraft. Since this scheme has been in operation many airmen from both fighters and bombers have been saved.

Notable Rescues in May

At 1945 hours on May 19 a report was received by 11 Group that a Fortress had been seen to ditch in position 54° 40′ N., 06° 40′ E., and the crew were thought to have got into their dinghies. This position was about 60 miles from the Danish coast. A vain search was made that night but the next day a very extensive search was laid on and at 1603 hours a Fortress reported, "Am over dinghy position 54° 39′ N., 05° 40′ E." **Hudsons** from **279 Squadron,** one carrying an airborne lifeboat, were immediately diverted to this position and in a very short time had homed on the Fortress and were orbitting two dinghies. Three other Fortresses were also on the scene. At 1812 hours an airborne lifeboat was dropped, and at 1835 hours the whole crew was in the boat and under way. They were given a course of 250° and during the night continuous air cover was provided by **Warwicks** of **280 Squadron.** At one time, to keep the boat on course, a line of flame floats was dropped by a Warwick and at 0540 hours on the following morning another Warwick of 280 Squadron reported that the airborne lifeboat was alongside one of three Danish fishing vessels in position 54° 00′ N., 03° 50′ E. At 0600 hours the survivors were taken on board one of the fishing vessels which proceeded almost due east. The circling aircraft immediately fired shots across her bows and the vessel stopped. The captain of the Danish vessel made other attempts to sail eastwards, but each time he was deterred by the guns of the Warwick. **H.S.L.s 2551** and **158** had been sailed the previous night and by 1500 hours they were in the area. At 0914 hours they were sighted by the orbitting aircraft, accompanied by an escort of four Thunderbolts, and the survivors were soon aboard one of the H.S.L.s and on their way home. Fighter cover was provided throughout the voyage and the whole crew was landed at 1640 hours.

During the time the airmen were on board the Danish vessel they were given fresh bread and butter, hot cereal and coffee or tea with sugar. The Danes provided beds and dry clothing, and did everything they could for them.

At 2350 hours on May 24 a **Warwick** of **280 Squadron** reported that it was orbitting lights and pyrotechnics in position 53° 21′ N.,

01° 52′ E. The aircraft was instructed to continue orbitting the lights and was told that a relief aircraft was being sent. The Duty Naval Commander at the Area Combined Headquarters was informed and an H.S.L. was sailed immediately. A further report was received from the aircraft that it had sighted two dinghies containing survivors. At 0135 hours on the following morning the aircraft was relieved by a **Hudson** of **279 Squadron** which homed the H.S.L. to the position. The rescue was completed at 0330 hours. Thus good co-operation between aircraft and marine craft, and the correct use of torches and pyrotechnics by the survivors resulted in 10 members of a Fortress crew being saved during the hours of darkness.

On May 28 a Fortress returning over the North Sea from operations over Germany sent S.O.S. in position 52° 35′ N., 02° 58′ E. This was picked up by one of the spotter aircraft from Saffron Walden and passed to base. An aircraft was immediately diverted to the position and within a very short time it sighted two dinghies containing live occupants. An H.S.L. was vectored to the position, and she very soon rescued a whole crew of 10.

On the evening of May 29 in position 53° 39′ N., 04° 12′ E., returning American bombers reported sighting two dinghies tied together with four airmen in one and five in the other. Owing to shortage of petrol they had to leave the dinghies at 2105 hours but in the meantime a **Warwick** of **280 Squadron** had been despatched. This aircraft found the dinghies after a short search, despite the very dark night, kept contact, and homed an H.S.L. to the scene. The H.S.L. rescued the survivors at 0100 hours on the following morning. A very fine rescue under difficult conditions.

Most of the merchant shipping encountered by our reconnaissance aircraft and frequently attacked off the Frisian Islands, passes through the Kiel Canal on its way to and from the Baltic and the Norwegian ports. These photographs show the complicated lock systems at either end of the canal. The upper picture shows the western end at Brunsbuttel, and the lower the eastern entrance at Holtenau. Both photographs were taken by 542 Squadron.

PLATE 8 Dove Bay in Eastern Greenland, 76° 30′ N., 20° 00′ W. These photographs were taken in July.

IV.—SPECIALIST AND GENERAL ARTICLES

19 Group v. H.M.S. Viking

During April an exercise was held by 19 Group to test the efficiency of our anti U-Boat aircraft and tactics. Those who took part will have been told of the results, but the lessons are valuable to everyone engaged in the war against U-Boats; aircrews and ground crews, operational and non-operational, can learn from this exercise.

The part of the U-Boat was played by H.M. submarine *Viking* whose Commanding Officer, in spite of cramped conditions, carried with him an R.A.F. officer to observe the results of the trials. The following article embodies the relevant parts of this officer's report:—

At 0840 we let go from the jetty escorted by a motor trawler, and passed the boom at 0900. The passage was uneventful and we carried out diving and trim trials at 1500 until we parted company with our escort at about 1840 in the evening. The next morning at 0630 we reached our patrol area and dived, and I began to settle down to normal submarine routine. A short description of this may help those who have not had the privilege of serving with one of H.M. submarines to appreciate the discomforts which are part of a submariner's normal life.

Probably the greatest hardship is lack of space in which to live and breathe. *Viking* is 207 feet long with a maximum internal diameter of 15 feet, the pressure hull being nearly round. Throughout almost the entire length of the boat half of this space is taken up by two big batteries, six main ballast tanks, two quick diving tanks and many trim, fresh water and fuel tanks. A third of what is left is occupied by engines and main motors; a quarter of the rest by torpedo tubes and their allied gear. This leaves a very small space to be divided into control room, officers' quarters, crew's quarters, galley, petty officers' quarters and lavatories. Space overhead is further restricted by pipes to all the ballast tanks with their high and low pressure air lines and associate valves, both hydraulic and hand operated, battery cables and a mass of other gear.

The control room has to house wireless, Radar, asdic, echo sounder, steering and hydroplane operating gear as well as a watch of ten men. The living quarters are therefore minute, the ward-room, where four officers must live and sleep, being some eight feet by six feet, while twenty men live in the fo'csle some 20 feet long by 7 feet wide forward and 10 feet wide aft. The hammocks alone seem to fill all the available space and the only way to get between them is to crawl. The lively behaviour of the boat in a seaway makes movement even more difficult; she literally whips about and it is not uncommon for the officer in the shipside bunk in the ward room to be slung clean out and deposited in the alley way outside. Moreover, the deck is so greasy with diesel oil that even in a slight sea it is a bit of an art to keep on your feet.

Normally, the submarine dives all day, which at this time of the year means nearly 16 hours, from 0600 in the morning to 2200 at night. During this time the crew of 40 is using up the very limited supply of oxygen in the air which is trapped in the boat. It is not long before the effects of oxygen starvation can be felt. It becomes even more of an effort to move about and reading a book is difficult as you find yourself reading the same lines over and over again. The effects are very similar to flying at a high altitude without oxygen. To avoid fouling the air more than is absolutely necessary neither smoking nor cooking is allowed. The lavatories must be used as infrequently as possible as they are operated by pressure air and when blown they release a bubble of air which may be seen on the surface. Smells are impossible to prevent and crew, engines, diesel oil and batteries all make their contribution, so that when the hatch is opened on surfacing fresh air tastes foul and you get a heavy coat of fur on your mouth which makes the first cigarette taste disgusting. Moreover when the boat is submerged a powder is put down to absorb some of the carbon dioxide in the boat but it succeeds mostly in making the crew cough violently. Moisture condenses inside the hull of the boat and after a few days there is a perpetual drip everywhere which is most annoying and which makes all the blankets of the bunk wet.

For the last two days of our patrol *Viking* was engaged in an exercise in which she was to attempt to pass through an area 90 miles deep which would be flooded with aircraft. She was to avoid being attacked and had 48 hours in which to complete her passage. The limiting conditions of the exercise were that the submarine was to arrive in a fit state to operate offensively for 24 hours. To fulfil this condition the Commanding Officer decided that he would consider himself beaten if his battery density fell below 1,200 points or his high pressure air below 2,000 lbs. per square inch in all groups.

On the first day of the exercise the crew was in high spirits and quite confident that the submarine could get through and beat the air cover. When we spent the first hour on the surface from 0630 to 0737 without seeing an aircraft, the crew's optimism seemed to be justified. At this point the Air Force shares were at their lowest, though we were forced by an aircraft to dive at 0753. From this time onwards there was a very different story to tell. Each time we surfaced we were forced under within half an hour and were unable to do more than temporarily stop the battery discharging: moreover, the high pressure air was failing. Half an hour on the surface was not long enough to allow us to make up the loss of high pressure air through blowing the main ballast tanks and starting the diesel engines. By 1800 on the first day we had had such a harassing time that the Commanding Officer decided to remain dived until nightfall. His aim was to rest the crew and to try to put in a much needed charge during the hours of darkness. We did not surface again until 2200 and we had barely settled down to charging when we were again interrupted by aircraft, forced to go full speed ahead on both motors and to crash dive at 2227. A look round through the periscope five minutes later showed an aircraft searching the area with its Leigh light. We tried surfacing again at 2308 but we were forced down six minutes later by an aircraft closing on us. We then realised that the hunt was on in earnest. As

we were now badly in need of time to charge up the battery and the high pressure air, the Commanding Officer decided to run the submarine as slowly as possible in the hope that the search might be lifted later on. We therefore switched off almost all the lighting in the boat and proceeded dead slow on one motor. At 0513 on the next day we surfaced to charge, but seven minutes later we were forced under and we resumed our groping along in the darkness. At 0934 we surfaced for another try. At 0935, almost before the hatch was open, we were forced down again. The Commanding Officer then decided that the game was up as the battery was below 1200 and all four high pressure air groups were low. He made out a signal to 19 Group admitting that he was beaten, but decided to make one more attempt before sending it. At 0946 we surfaced again and were not forced to dive until 1008. This breather put the crew in better spirits and built up some high pressure air. Moreover the weather, which had until then been fine, began to deteriorate so we decided to make another attempt. We therefore surfaced again at 1205 with five miles to go and we decided that if we did not make the course we would surrender to the first aircraft that intercepted us. Then we had a final stroke of luck which just got us through. By careful evasive action in the bad weather we managed to keep an aircraft off from 1243 to 1312. This was the first time that evasive action had proved successful. At 1312 a Liberator flew past one mile away on the starboard beam and we fired our recognition flare in token of surrender. To our surprise the crew did not see us and we therefore felt that as the battery was now back to 1200 and all high pressure air groups were built up, we had successfully completed the course, if only by the skin of our teeth."

This exercise brings home the vital necessity of closing every loophole in a patrol. *Viking* got through because at the beginning and end of her passage she was left unmolested. Bad weather, unserviceability, inefficient Radar or visual look-out can be disastrous. Patrols must be maintained at full efficiency. One slack crew can nullify the work of 20 good crews: the strength of a whole Group is in the end the strength of its sleepiest look-out.

The exercise also shows that intensive air patrols are extremely harassing to the enemy and will seriously reduce his fighting efficiency even if the weather or other factors beyond human control allow him a loophole through which to escape. *Viking's* Commanding Officer states in his report that "further progress in the afternoon and night would have been uncomfortable, and a U-Boat meeting such opposition would find it exhausting and demoralising."

No crew should ever again ask, "What good are we doing flying over the sea day and night without seeing anything?" Nineteen aircraft took part in the exercise and only two of them actually sighted the submarine: neither of these was able to make an attack, but the submarine's efficiency was none the less seriously impaired.

The log kept by "Viking" during the exercise is printed below.

First Day

0630 In position by D.R. Submarine on surface. Course 105° T., speed 11 knots.
0737 Radar reports aircraft bearing 210° T., distant 17 miles, not closing—remained on surface.
0753 Radar reports aircraft bearing 325° T., 12 miles, closing. Submarine dived. The aircraft was not seen as it was still not quite light.
0834 Surfaced. Course 105° T., speed 11 knots, 50° zigzag.
0846 Aircraft bearing 295°, 8½ miles.
0847 Aircraft sighted visually but not identified. Submarine dived.
0955 Surfaced. Course 105° T., 11 knots, zigzag 50°.
1026 Liberator sighted bearing 170° T., 9 miles, at about 500 feet, closing.
1026½ Submarine dived. This aircraft was not picked up by Radar, possibly owing to the fact that an inexperienced operator was on the set.
1215 Periscope sighted Liberator crossing submarine's track flying south then north.
1313 Surfaced for sun sight.
1317 Dived. A Liberator was sighted visually bearing 090° T., 15 miles, flying south.
1410 Periscope sighted a Liberator 4 miles away flying north.
1744 Surfaced. Course 104°, 11 knots, 50° zigzag.
1758 Radar reports aircraft bearing 265° T., distant 19 miles, closing.
1800 Sunderland sighted visually bearing 264° distant 16 miles.
1802 Submarine dived. Sunderland at 13 miles.
1805 Aircraft sighted through periscope still flying eastwards at about 1,500 feet.
2205 Surfaced. Course 104°, speed minimum, about 1·5 knots, to charge; battery now 1225. Wind easterly 5 m.p.h., sea calm, swell slight, sky 3/10 high and medium cloud, visibility unlimited, full moon and very light. Submarine about one-third buoyancy.
2226 Radar reports aircraft bearing 260°, 7½ miles, closing.
2227 Dived, aircraft at 6 miles range.
2233 Came up to periscope depth and sighted Leigh Light of aircraft about 2 miles away sweeping the sea. Decided to remain dived for a short time.
2308 Surfaced. Course 104°, 1·5 knots. Radar contact 220°, 2½ miles range, opening.
2310 Blip lost bearing 220°, 7½ miles.
2311 Radar contact aircraft bearing 340° T., 10 miles, closing.
2314 Aircraft 6½ miles, submarine dived. All electricity closed down. Minimum speed, one motor, battery 1218.

Second Day

0513 Surfaced. Course 104° T., dead slow, charging.
0517 Aircraft bearing 190°, 11 miles, closing.
0519 Second aircraft sighted.
0520 Submarine dived, aircraft bearing 300° T., distant 5 miles, closing. Everything closed down to conserve battery, dead slow on one motor only.
0934 Surfaced. Course 104° T., minimum speed for steerage way. High-pressure air below safe limits, all four groups, 2,000 lbs. Aircraft bearing 230°, 5 miles, closing.

0935 Submarine dived. Aircraft bearing 300°, 5 miles, closing. Captain decided that the game was up and made out a signal to 19 Group giving in, then decided he would have one more attempt. Battery 1200 approximately.
0946 Surfaced. Course 104°, dead slow with maximum charge and both compressors full on.
0953 Aircraft bearing 335°, 17 miles, opening; submarine kept stern on to echo.
1006 Aircraft bearing 300°, 11½ miles, opening; kept stern on to blip.
1007 Aircraft bearing 035°, 10½ miles, closing.
1008 Aircraft bearing 030°, 8½ miles, closing. Submarine dived.
1205 Surfaced, course 104° T., zigzag 50°, speed 7 knots.
1243 Aircraft bearing 295°, 9 miles, closing.
1245 Aircraft bearing 275°, 8½ miles, opening.
1301 Aircraft bearing 245°, 5½ miles; turned stern on to blip.
1303 Aircraft bearing 180°, 5 miles, opening.
1305 Blip lost at 7½ miles. Weather, 10/10 cloud, base 800 feet, continuous moderate rain. Wind 115° T., 10–15 m.p.h.
1308 Aircraft bearing 205° T., 7½ miles. Signal to Headquarters, 19 Group, exercise completed.
1312 Aircraft bearing 170° T., 2 miles, closing.
1313 Liberator sighted at 1½ miles flying up track. Submarine fired identification in the hope that he might try an attack.
1314 Liberator flew past submarine on starboard side 1,000 yards away at 500 feet without sighting the submarine.

Schnörkel

In 1943 the effectiveness of Radar as a means of finding surfaced U-Boats forced the enemy to remain submerged as much as possible. Towards the end of that year U-Boat commanders often surfaced to charge the batteries for only about two hours soon after darkness and again for two hours just before dawn. They considered that even four hours out of the 24 was too long to be surfaced. The enemy therefore made efforts to devise a means of charging the batteries when submerged.

The first experiments were made in the Baltic about the late summer of 1943. School boats were used, and they were equipped with separate tubes to take in air and to expel the exhaust gases. These tubes extended above the surface of the sea while the U-Boat herself remained submerged. (The original gear was probably an adaptation of some captured in a Dutch submarine in 1940.)

In January, 1944, enough equipment was available in Kiel and St. Nazaire to fit U-Boats with Schnörkel on a big scale. The first operational U-Boat so fitted (*U 264*) sailed from St. Nazaire on February 2, 1944. On February 19 she was sunk by ships of the 2nd Escort Group. Since then several other U-Boats which carried the gear have also been sunk.

As finally developed for use in U-Boats Schnörkel (which means literally the "twiddle at the end of a signature," or architecturally, "a scroll") consists of two tubes fastened together and hinged to the deck just forward of the port side of the bridge. When erected and in use, the top of the air intake tube is level with the top of the fully extended periscope whose view it partially masks. The tube, which is about 14 inches in diameter, is covered by a cowl containing an automatic valve, designed to prevent sea water getting in accidentally. The exhaust tube, which is immediately abaft the air intake tube, is about 6 feet shorter and bends over at the top so that the exhaust gases are discharged downwards towards the deck. When in use its top is just below the surface of the sea.

The Germans are reported to be developing a Schnörkel with air intake only, the exhaust being discharged directly into the water in order to eliminate smoke.

When a U-Boat is about to charge her batteries with the aid of Schnörkel, she is brought to periscope depth and proceeds dead slow ahead on motors. The Schnörkel is raised by a winch controlled from inside the U-Boat and is locked home. The tubes are free flooding when secured on deck and must be drained into the bilges before they are used. The valves connecting the tubes to the normal air intake and to the exhaust pipe of the diesels are then opened and the diesels are ready for starting.

The U-Boat is then driven by the diesels, which charge the batteries at the same time. A speed of 3 to 4 knots can be maintained in the Atlantic and rather more in perfect conditions in the Baltic. The great advantage of the apparatus is that while the U-Boat is charging her batteries only about 6 feet of tube is visible above water, instead of the whole of her superstructure.

There are, however, many disadvantages. If, for instance, a wave causes the air intake valve to shut, the engines must be stopped immediately. But before this can be done the air pressure inside the boat drops violently and causes the men acute discomfort. A good engineer officer can mitigate this trouble by careful trimming, but if there is a sea of more than strength 3, it is almost impossible to use Schnörkel at all. If the Commanding Officer does use it in these conditions, the continuous stopping and starting of the engines and the consequent violent falls in air pressure will make conditions in the boat so appalling as to reduce the men to physical and mental wretchedness. U-Boat men are also afraid that Schnörkel will give a good Radar contact. They are all the more nervous about this as, when the U-Boat is submerged and using Schnörkel, she cannot use her Naxos search receiver (which covers the 10 cm. band) for detecting hostile Radar. Some Schnörkels, however, may carry search receiver aerials on the top so that the boat can use her Borkum and Wanz sets, which cover metre wavelengths.

In view of these disadvantages Schnörkel is not popular with U-Boat men, and there is therefore no reason for aircrews to feel depressed about it. That the enemy has been forced to introduce this curious apparatus is a measure of the success of our anti U-Boat hunting forces. But although Schnörkel causes so much physical discomfort that it may well reduce fighting efficiency, nevertheless it unquestionably makes U-Boats less visible from the air. Our answer must be greater vigilance and greater Radar efficiency.

Buoys and Balloons Carried by U-Boats

German U-Boats are now carrying various buoys and balloons, any of which may be encountered by Coastal Command crews. It is possible that other types may have been developed, but definite information is lacking.

Weather Reporting Buoy

The oldest buoy still in use is the weather reporting buoy (*see* plate 9 opposite). This is carried by U-Boats and dropped in some previously determined position. It contains a barometer, thermometer, anemometer, and a W/T transmitting set which sends out the observations. There is also a self-destructive charge which has not, however, prevented a specimen of this type of buoy from coming into our possession.

W/T Contact Keeping Buoy

This buoy, known to the Germans as the *Schwannboje*, is about the size of a 500-lb. bomb and may either be dropped by an aircraft or thrown overboard by a U-Boat. It is essentially similar to the weather reporting buoy and transmits a constant signal on which U-Boats can home. It is used when a U-Boat or aircraft has made contact with a convoy but dare not remain in order to home the rest of the pack. The buoy was first used in the late summer of 1942, but is now rarely carried by U-Boats. It is still used by the Luftwaffe.

Contact Keeping Buoy

This buoy is known as the *Fübo* or *Fühlungshalterboje*. It is smaller than the two previously mentioned but its function is roughly the same as that of the W/T contact keeping buoy. It consists of a cylinder about two feet high by one foot in diameter, beneath which is a rod about two feet long. This rod is screwed into the base of the cylinder and ends in a flat iron plate about one foot in diameter and $\frac{3}{4}$ in. thick. This serves to keep the buoy upright in the water. The apparatus is carried in three separate parts which are screwed together before use. When the buoy is thrown overboard, a rip-cord, fitted to the top of the buoy, is pulled, and lights a fuse similar to that incorporated in the German hand grenade. At a definite time after this, often stated to be half an hour, the mechanism inside the buoy throws up either a coloured flare or multi-coloured Very lights. Certain U-Boats have been known to carry as many as fifteen of these buoys.

Radar Decoy Balloon. (R.D.B.)

This object, which has been standard U-Boat equipment since about August, 1943, consists of a balloon about three feet in diameter attached to a small float by 90 feet of wire. On the wire are strips of metal foil or mesh. The balloon is inflated with hydrogen and the whole apparatus is thrown overboard when the U-Boat believes that she has been spotted by Radar. Alternatively, a number of these balloons may be used when there is reason to believe that there are enemy aircraft in the vicinity which might be induced to chase these false targets. Their life is about six hours.

Radar Decoy Spar Buoy. (R.D.S.)

This is the latest type of decoy and it was first reported in January, 1944. A number of U-Boats are known to have carried between 15 and 30 buoys of this type. In general appearance it is similar to a dan buoy, having a float about two and a half feet in diameter by one foot thick. Through this is fitted a wooden spar which stands about twelve feet above the water and to which are attached groups of metal rods protruding at various angles. Beneath the float is a hollow metal tube about six feet long and five inches in diameter, to give the buoy stability. The life of this buoy is not known accurately, but it is probably at least a day and possibly a good deal longer. It appears that they are to be sown in large numbers during a U-Boat's passage through the Bay so that the area will be filled with false targets. It is considered that this buoy will be even less effective than the Radar Decoy Balloon. It may be of slightly more use against shipborne than airborne Radar.

Besides these known Radar targets it is reported that the German destroyer *T.25* threw overboard a large float just before she was sunk. This float had on the top an arrangement of wire netting about six feet square. Its purpose is not yet known.

The enemy's confidence in his decoys varies. Some commanding officers are certain that they have heard depth charges being dropped on the false targets after their boats have dived away from aircraft attacking at night. Most U-Boat men feel some added confidence when they are able to leave decoys behind on the surface. There is, however, no record of an aircraft having been deceived by any of these ingenious devices.

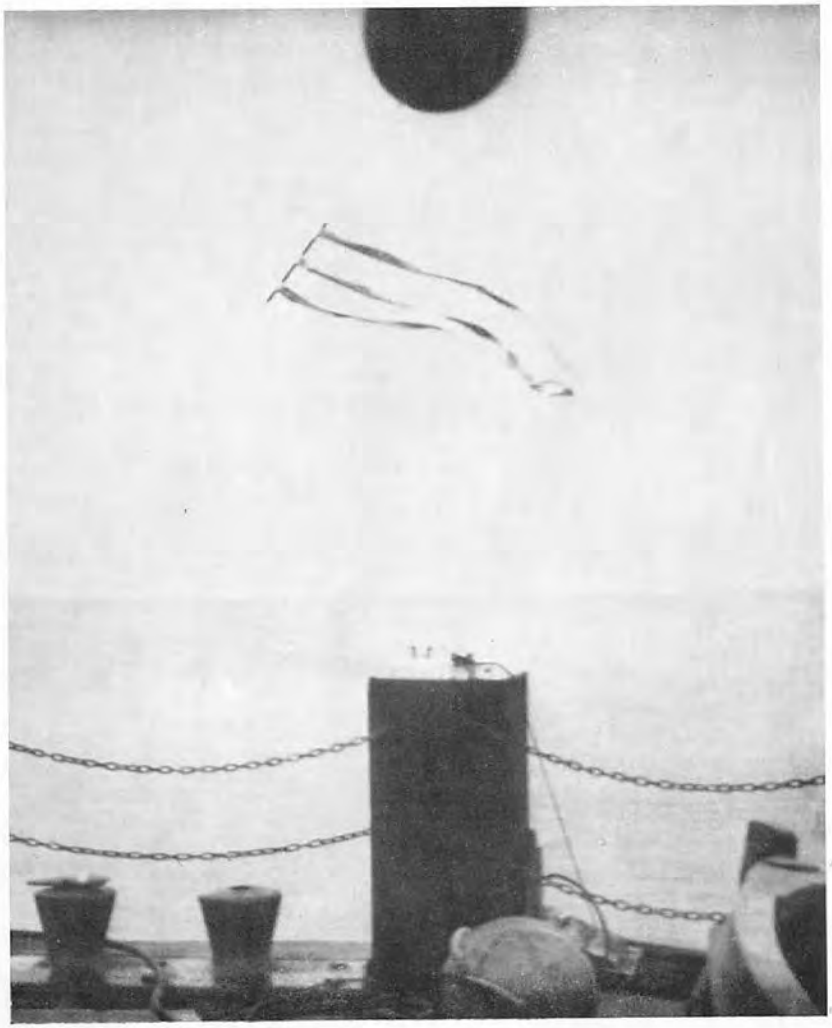
The Coastal Command Development Unit

The Coastal Command Development Unit was formed in November, 1940, to undertake the service trials of Radar equipment and to devise the best methods of using it on general reconnaissance aircraft. The Unit's duties were later increased and now include nearly all the service and tactical trials required by Coastal Command.

Since its formation the Unit has travelled widely in Wales, Ireland and Scotland, but it has now dug itself in at Angle in Pembrokeshire, where it hopes to stay. Not only is the airfield approached on three sides by the sea, which is ideal for a unit which has to do most of its trials over water, but the nearby naval base at Milford Haven makes it easy for the Unit to get the co-operation from surface vessels and convoys which is necessary for its researches. Moreover a tame submarine operates within easy reach and any trials involving flying boats can be done at Pembroke Dock which is only twelve miles away. The Air/Sea Rescue Marine Craft sections at Tenby and Fishguard are most helpful in bringing back gadgets which have to be dropped in the sea and then recovered for inspection.

The C.C.D.U. is administered by 19 Group, which is also an advantage, for this Group operates almost all the types of aircraft in which the Unit is interested. This is valuable as it enables the Unit to keep in easy touch with the operational problems of many different types as well as to

German Weather Reporting Buoy.



Radar Decoy Balloon.

See letterpress on the opposite page.

PLATE 10 The photographs on this page were taken off the east coast of Greenland in August. The upper picture shows a glacier in position 75° 56′ N., 21° 03′ W. The lower photograph is of a glacier in Lyell Land in position 72° 47′ N., 25° 25′ W.

scrounge spare parts for its own multifarious fleet of aircraft. Angle is also within reasonable range of the technical units like the Telecommunications Research Establishment, the Royal Aircraft Establishment and the Aircraft Armament Experimental Establishment.

The question is commonly asked, why have a special Coastal Command trial for equipment that has proved satisfactory in other Commands? The answer to this is that the operations of Coastal Command are specialised and rarely resemble those of other Commands. Apparatus which is invaluable in a bomber raid over Berlin may well require modification before it can be used on anti U-Boat work over the middle of the Atlantic.

Nor is it possible for the individual Commands to rely on the results of the research establishments, for the machinery for developing new equipment does not work that way. The system is that first the Air Staff of a Command decide that they require a device to perform some specific function. The matter then goes to the Air Ministry which decides whether the project is to be officially recognized as an operational requirement. The facts are then placed before the scientists and technicians of the Ministry of Aircraft Production whose task it is to devise the equipment. If they succeed in finding the answer, they make exhaustive tests to decide whether the device is sound *technically*. They cannot, however, decide whether it will be satisfactory under normal squadron maintenance or whether it will produce results in the hands of average aircrews under operational conditions. If the new device is for Coastal Command it is at this stage that it is passed to the C.C.D.U. The other Commands have their own units. If the C.C.D.U. reports favourably, the new equipment is put into production and ultimately appears in operational aircraft. In many cases the instructions on the use of new equipment are based on the recommendations made by the C.C.D.U. as a result of their trials. This is broadly the history of a new device, but each individual development has its own involved and complicated story.

Squadrons are sometimes heard to ask why, with all this technical help available, the C.C.D.U. conducts trials with equipment which they themselves are already using. The answer is that the C.C.D.U. exists to conduct trials while the squadrons exist to conduct operations and training for operations. With these two commitments it is impossible for them to devote the time or the aircraft or the crews to the long but interesting work involved in trials. The C.C.D.U., however, is equipped for the job. The staff consists of an engineer officer, an armament officer, two Radar officers, a specialist navigation officer, and ex-operational aircrew, most of whom are officers. There are also two "boffins," the senior being known officially as the Scientific Adviser. Each set of trials is allotted to those members of the staff who have the necessary qualifications and they devote themselves to the job in hand without interference. In this way each test is closely supervised by experts and the facts recorded. Only thus will sound conclusions be drawn. The planning of trials and the accurate logging of data in the air is work which must be learnt and practised. Aircrew rarely do this efficiently until they have become thoroughly trial-minded. Squadron crews are rightly interested chiefly in operations and if they meet with setbacks when doing trials, they may well make an adverse report on a piece of equipment which a little more perseverence would have proved to be very valuable. The C.C.D.U. has learnt that snags occur inevitably and that patience and an open mind are indispensable if the difficulties are to be overcome and the equipment given a fair and genuine test.

Some of the trials involve very widespread flying. In June, 1943, for instance, the Unit had to investigate the coverage of the northern Gee chain, which involved flights to Norway, Denmark and Holland. In October a similar investigation of the south-western chain took C.C.D.U. aircraft to Gibraltar. An inquisitive interest in the German Consol system necessitated flying to Gibraltar, Algiers and the Azores in January of this year. Recent work on a Loran chain entailed a flight to Iceland, and before the trials are over another trip to the Azores will be necessary. A.S.V. trials have occupied a very big place in the work of the Unit. The aim of the trials is to collect full performance data, to produce instructions on the best way to operate equipment and on its tactical application, and to eliminate snags. The Unit has also done much work on both day and night photography, and constantly reviews the problem of night attacks on U-Boats with various illuminants.

The work of C.C.D.U. is strictly controlled by the Air Staff of Coastal Command Headquarters, who are responsible for issuing trial instructions. The reports which are produced when the trials are over are submitted to Coastal Command. Coastal Command in turn pass the reports to Air Ministry, who finally decide on their distribution. In these days C.C.D.U.'s reports go all over the world.

Repairing a Catalina in Mid-Air

While taking off fully laden from Halavo Bay on January 12 a R.N.Z.A.F. Catalina struck a buoy just as the aircraft became airborne. A gash 17 feet long by 8 inches wide was torn in the hull. The hole extended from just forward of the front step, right down the hull to the after step and any attempt to land in this condition would have resulted in the aircraft sinking immediately. There were therefore three courses open to the Captain :—

1. To stuff the hole with sleeping bags and land close inshore, running the aircraft up on the beach before it sank ;
2. To land on an aerodrome ;
3. To effect a repair with the materials available which would prevent the aircraft from making water too fast while additional flotation gear was brought alongside.

The following account of the repair is reproduced from the Captain's report.

"As the first course might, and the second certainly would, result in the loss of the aircraft, the third course was decided on and work started right away. It was obvious that we had a long job on our hands.

Strengthening and Patching the Hull.—An investigation was made of the damage and it was considered that by using the canvas from the bunk, cotton waste and bed rolls as padding, and sections of the catwalk for strengthening, a reasonably strong repair could be made. With a hacksaw the catwalks were cut to the right width to fit between the undamaged stringers on either side of the gash. The hacksaw, however, limited the depth of cut possible and the blade itself had to be used. This went all right until the one and only blade broke. After this we used a hammer and screwdriver as a cold chisel to cut the metal.

The worst position to repair was the rear step, which was difficult to strengthen, so that any possibility of a tail-down (stall) landing was washed out. This meant that a front step landing would have to be made and our energies were therefore concentrated on making the repair there as strong as possible. Canvas from one of the bunks was cut and laid over the gash, followed by a section of sleeping bag and then the plate cut from the catwalk. This plate was then forced down and held in place by an assortment of odds and ends, such as spanners, tommy bars, hammers and files, which were wedged in between the stringers, under and over each other until we were satisfied that the job was at least as strong as the original hull plate, though not quite as waterproof. Cotton waste dipped in oil was then rammed in around the edges of the repair until it was packed solid. The area aft of the forward step as far back as the end of the living compartment was repaired in the same way but with fewer cross-members as we were running short of spanners and tommy bars, and also because time was a factor to be considered.

The blister compartment presented a somewhat more difficult problem because of the very curved shape of the hull here and the fact that the hole extended under the footplate of the port gun. We could not fit the cut-down catwalk plates here but used instead the plywood "kitchen" table as the top plate with canvas and sleeping bags underneath as before. The hole in the vertical position of the rear step took most of a sleeping bag to itself. All this took about six hours and the hull was then considered in a fit condition to stand up to a landing. In case we made water faster than was expected, the 7-man dinghy was inflated in the blister compartment and lashed down, the 2-man dinghy being similarly lashed down in the living compartment. With this added flotation plus the still intact watertight compartments (*i.e.*, tunnel, navigator's, pilots' and bow compartments) it was thought that the aircraft would take a long time to sink.

Preparation for Landing.—Preparation was now made for the landing. The aircraft was taken up to a safe height, harnesses and packs put on, the engine in front of the jettison pipe stopped and feathered, and fuel jettisoned until only 100 gallons remained. Ammunition was also dumped but it was not considered necessary to jettison guns or equipment. Finally the master compass was removed to prevent damage by water.

Arrangements had been made on R/T with the U.S.S. *Chandeleur*, an aviation tender anchored in the harbour, to have ready several large rubber dinghies, rope, etc. These were to be brought alongside immediately on landing and made fast to the aircraft. While circling the area before landing, the *Chandeleur* was requested to stop all boat traffic as several boats proceeding at high speed were setting up a bad chop, and, since the landing would be a flat one, bouncing would have resulted with, possibly, unfortunate consequences.

After traffic had stopped and the water calmed down somewhat, a normal approach and landing was made close to the *Chandeleur*. The repair to the front step did not move in the least and the aircraft was taxied fast with the stick forward to keep the aircraft on this step. When near the group of boats which were standing by, the throttle was closed, and the aircraft settled back, beginning to make water faster than could be handled by the bilge pumps, but not dangerously so. By the time the dinghies were alongside there was 18 inches of water in the living compartment and blister, but the aircraft showed no sign of sinking.

The dinghies were secured and the aircraft towed alongside the *Chandeleur* and hoisted aboard without further incident.

The time from striking the buoy until touching down was 8 hours 15 minutes."

(C527(3)) 1,450 6/44