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COASTAL COMMAND REVIEW

Vol. III, No. 6—June 1944

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

The Month's Work—June, 1944

The Anti U-Boat Effort

The first few days of June were spent in putting a final polish on training and in generally girding up the loins in preparation for a very strenuous time. The long-awaited D-Day arrived, and the pre-arranged air patrols were intensified and contracted into an area close off the enemy coasts. Ever since then an all-out effort has been maintained.

2. Dönitz undoubtedly intended to deploy his Biscay U-Boats up Channel as soon as the landing disclosed the exact position of the Second Front. Their job was to cut the initial assault force from contact with England and to prevent any build-up. To reinforce the Biscay fleet he hurried out new U-Boats from the pool maintained in the southern Norwegian ports. At the same time he appears to have maintained defensive lines of U-Boat's patrolling off the Biscay and Norwegian coasts in case of further major landings.

3. U-Boats putting to sea from the Biscay ports met such a blast from Coastal Command aircraft that the enemy's intentions were defeated from the beginning. During the first four days from D-Day, anti U-Boat aircraft attacked 25 out of 38 U-Boats sighted. These actions resulted in seven U-Boats being probably destroyed and six seriously damaged. Eighteen of these attacks were at night and in every case the U-Boat fought back desperately with flak. Thereafter no U-Boats showed themselves on the surface during the day and very few during the night. The evidence of prisoners of war shows that the enemy found the penetration of the Channel a nightmare.

4. Since D plus 4, only periscopes, schnörkels, oil slicks, etc., have been reported, and they amount to a further 57 sightings and 33 attacks. Of all the targets that Coastal Command has to deal with, the elusive and vanishing periscope is the most difficult. It is always a case of making a snap attack on a vague aiming point and the after results are seldom positive. Precise assessment becomes impossible, and it is difficult to analyse individual attacks. All the same, during this period at least two U-Boats have been sunk and two or three possibly sunk or badly damaged. In short, since the staggering blow delivered during the first four days, the subsequent operations of U-Boats against invasion traffic have been strangled. The much-vaunted U-Boat fleet has failed to interfere with our sea communications to France.

5. Meanwhile, 18 Group were ably dealing with the Norwegian based U-Boats. The offensive actually began on May 16 and last month's *Review* gave an account of the operations up to the end of May. It has been carried on most successfully during June in spite of bouts of fog and bad weather. 22 sightings and 15 attacks have been made, resulting provisionally in seven U-Boats being sunk and four seriously damaged.

6. While it is invidious to select samples where everyone has done so amazingly well, two records are outstanding. No. 162 Squadron R.C.A.F. have sighted six U-Boats and sunk four of them at the cost of three of the aircraft being shot down. Ten survivors escaped from two of these aircraft, but the third crew were never found. The other notable performance was that of Liberator G/224, which killed two U-Boats within half an hour at night and got good night photographs of both attacks.

7. Events are too recent to provide detailed stories of the historic Channel battle and the operations off the Norwegian coast, but it will be possible to give a fuller account at a future date.

Anti-Shipping

8. During June the offensive has been considerably increased. Just under 2,000 sorties were flown on anti-shipping duties and over 400 aircraft delivered attacks.

9. The outstanding strike of the month was the combined attack of the North Coates and Langham Wings off the Dutch coast at Schiermonnikoog on June 15. In this action the Beaufighters sank an 8,000 ton merchantman, an E-Boat depot ship of just under 4,000 tons, and an "M" class minesweeper; four other minesweepers were damaged. Not one Beaufighter was lost. The chief reason for this very fine victory was the presence of a really adequate anti-flak force which thoroughly discouraged the enemy gunners.

10. Most of the attacks were made at night and were attended by the usual difficulty of seeing the results, so that we may hope that we have again inflicted more damage on the enemy than we are able to claim. In spite of this the claims are impressive. Two merchantmen, one minesweeper, one E- or R-Boat and one M.L. were sunk; one E- or R-Boat and three patrol vessels are claimed as seriously damaged; forty-six other vessels including two destroyers, one 1,000-ton tanker and several minesweepers, are claimed as damaged.

11. Out of 191 targets attacked, 132 were in the Channel area and 43 off the Dutch and Belgian coasts. The remainder were in the Bay. It is indeed gratifying to see that the Elizabethan tradition of privateering in the Narrow Seas is being so successfully carried on by His Majesty's aircraft.

I.-ANTI U-BOAT

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

JUNE 1944

Duty and Base or Area.	Total Sorties. (1)	Hours Flown.		U-Boats Sighted.		U-Boats Attacked.		Hours per Sighting.		Number of Sorties.		Col. 10. Sorties with Flak. (12)
		Base to Base. (2)	On Patrol. (3)	Day. (4)	Night (5)	Day. (6)	Night. (7)	Base to Base. (8)	On Patrol. (9)	When U-Boat Sighted. (10)	When U-Boat Attacked. (11)	
<i>Convoy Cover</i>												
United Kingdom	30	223	122	—	—	—	—	—	—	—	—	—
Iceland	2	32	18	—	—	—	—	—	—	—	—	—
Gibraltar and Moroccan Sea Frontier	78	764	442	—	—	—	—	—	—	—	—	—
Azores	29	301	129	—	—	—	—	—	—	—	—	—
<i>Channel Convoy Screen</i>												
United Kingdom	721	2,147	1,635	—	—	—	—	—	—	—	—	—
TOTAL CONVOY EFFORT	860	3,467	2,346	—	—	—	—	—	—	—	—	—
<i>A/U Patrols</i>												
<i>Northern Transit</i>												
United Kingdom	527	5,542	3,282	22	—	15	—	252	149	23	16	15
Iceland	36	337	186	—	—	—	—	—	—	—	—	—
<i>Northern Convoy</i>												
United Kingdom	256	1,961	1,168	2	1	1	—	654	389	3	1	2
Iceland	2	26	14	—	—	—	—	—	—	—	—	—
Azores	35	436	222	—	—	—	—	—	—	—	—	—
<i>Bay of Biscay (excluding Channel and Approaches)</i>												
United Kingdom	408	3,678	2,011	5	19	5	14	153	84	24	21	18
<i>Channel and Approaches</i>												
United Kingdom	2,197	21,145	16,300	48	24	28(4)	14	294	226	63	40(5)	18
<i>Central Convoy</i>												
Gibraltar and Moroccan Sea Frontier	395	3,366	2,111	—	—	—	—	—	—	—	—	—
Azores	8	85	49	—	—	—	—	—	—	—	—	—
TOTAL A/U PATROLS	3,864	36,576	25,343	77	44	47(4)	28	302	209	113	78(5)	53
ADD CONVOY EFFORT	860	3,467	2,346	—	—	—	—	—	—	—	—	—
TOTAL A/U EFFORT	4,724	40,043	27,689	77	44	47(4)	28	331	229	113	78(5)	53
				121 U.Bs Sighted.	75 (4) U.Bs Attacked.							

Notes.—(i) Attacks on contacts where the target was not sighted but a U-Boat is believed to have been present are shown in brackets in columns 6 and 11. These attacks, which are not included in the totals, will be the subject of an assessment.

(ii) In addition to the above there were 16 chance sightings; of these 9 were by Coastal Aircraft engaged on other duties and 7 were by Transit Aircraft.

Summary—continued.

Assessments (Received up to July 10)

Month.	Known Sunk.	Probably Sunk.	Damaged A.	Damaged B.	Slight Damage.	Insufficient evidence of Damage.	No Damage.	Insufficient evidence of U-Boat.	Un-assessed.
April	—	2	—	1	1	7	7	2*	—
May	3	4	2	1	2	5	5	—	4
June	4	5	—	3	2	5	9	—	51

Note.—In the case of the two April attacks assessed as insufficient evidence of U-Boat, the two targets attacked, which are believed to have been surface craft, have each been assessed as Probably Sunk.

Squadron Results—June

			Sorties when U-Boat Sighted.	Sorties when U-Boat Attacked.
848 (F.A.A.)	Avenger	Thorney Island	.. 1	1
855 (F.A.A.)	Avenger	Hawkinge ..	.. 1	1
162 (R.C.A.F.)	Canso	Wick	.. 6	5
210	Catalina	Sullom Voe ..	.. 3	2
333	Catalina	Sullom Voe ..	.. 3	2
(Norwegian)	Mosquito	Sumburgh ..	.. 2	2
58	Halifax	St. Davids ..	.. 2	2
502	Halifax	St. Davids ..	.. 4	3
53	Liberator L.L.	St. Eval	.. 6	4
59	Liberator	Ballykelly ..	.. 5	1
86	Liberator	Tain	.. 4	3
103 (U.S.N.)	Liberator	Dunkeswell ..	.. 6	3 (3)
				(See Note 1.)
105 (U.S.N.)	Liberator	Dunkeswell ..	.. 4	2
110 (U.S.N.)	Liberator	Dunkeswell ..	.. 7	5 (1)
				(See Note 1.)
206	Liberator	St. Eval	.. 3	2 (1)
				(See Notes 1 & 2.)
120	Liberator L.L.	Ballykelly ..	.. 3	2
224	Liberator L.L.	St. Eval	.. 13	8
311 (Czech)	Liberator	Predannack ..	.. 3	2
547	Liberator L.L.	St. Eval	.. 2	2
248	Mosquito	Tain	.. 1	1
		Portreath ..	.. 4	4
				(See also below.)
10 (R.A.A.F.)	Sunderland	Mount Batten ..	.. 2	1
201	Sunderland	Pembroke Dock ..	.. 1	1
228	Sunderland	Pembroke Dock ..	.. 4	4
330 (Norwegian)	Sunderland	Sullom Voe	.. 1	0
423 (R.C.A.F.)	Sunderland	Sullom Voe	.. 1	0
461 (R.A.A.F.)	Sunderland	Pembroke Dock ..	.. 3	3
4 O.T.U.	Sunderland	Alness	.. 2	1
172	Wellington L.L.	Chivenor	.. 3	2
179	Wellington L.L.	Predannack ..	.. 5	3
304 (Polish)	Wellington L.L.	Chivenor	.. 4	3
407 (R.C.A.F.)	Wellington L.L.	Chivenor	.. 2	2
524	Wellington	Davidstow Moor ..	.. 1	0
612	Wellington L.L.	Chivenor	.. 1	1
Total by A/U Aircraft			.. 113	78(5)

Chance Sightings of U-Boats by Coastal Aircraft on Other Duties

			U-Boat Sighted.	U-Boat Attacked.
235	Beaufighter	Portreath ..	.. 6	0
248	Mosquito	Portreath ..	.. 3	1
				(See Note 2.)
404	Beaufighter	Davidstow Moor ..	.. 1	0

Notes

(1) The attacks shown in brackets were carried out on a contact, where the target was not sighted but a U-Boat is believed to have been present.

(2) One of the U-Boats attacked by 206 Squadron was first sighted and attacked with cannon by 4 Mosquitos of 248 Squadron on Anti-Aircraft Patrol.

(C52973)

Analysis of U-Boats Sighted by A/U Aircraft during June

Particulars of Incidents.	U-Boats.		Sorties when Aircraft	
	Sighted.	Attacked.	Sighted.	Attacked.
On 83 occasions 1 U-Boat was sighted by 1 aircraft—55 aircraft attacked.	83	55	83	55
On 12 occasions 2 U-Boats were sighted by 1 aircraft—10 of the U-Boats were attacked by 8 aircraft.	24	10	12	8
On 1 occasion 3 U-Boats were sighted by 1 aircraft—the aircraft attacked 2 of the U-Boats.	3	2	1	1
On 5 occasions 1 U-Boat was sighted by 2 aircraft—9 aircraft attacked the U-Boats.	5	5	10	9
On 1 occasion 1 U-Boat was sighted by 3 aircraft—2 aircraft attacked the U-Boat.	1	1	3	2
On 1 occasion 3 U-Boats were sighted by 2 aircraft—1 of the aircraft attacked 1 of the U-Boats.	3	1	2	1
On 1 occasion 1 aircraft sighted 2 U-Boats and was joined in an attack on 1 of the U-Boats by a second aircraft.	2	1	2	2
TOTALS	121	75	113	78

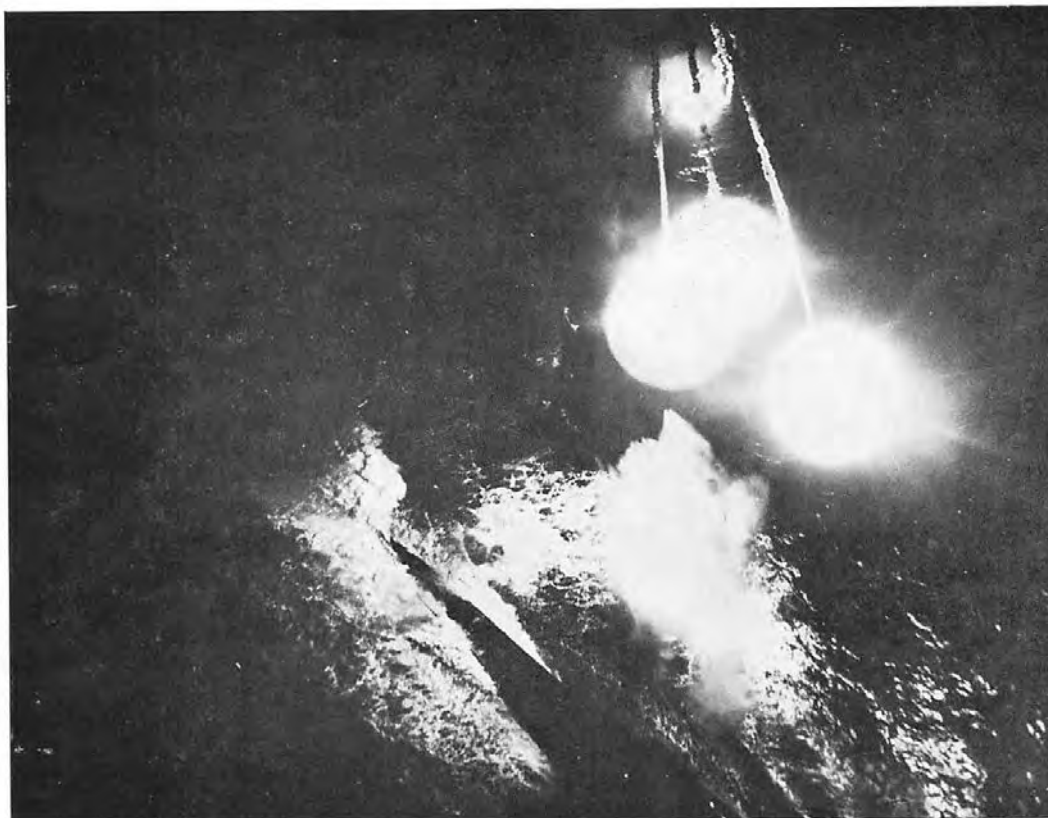
Recent Attacks on U-Boats

On May 25 **Liberator S/59** was patrolling in daylight over a rough sea when the Radar operator obtained a contact 22 miles away on the port bow. The aircraft homed and at 15 miles the blip split into two. At twelve miles the second pilot sighted through binoculars two vessels in line ahead, and at eight miles they were identified as an escort vessel 600 yards ahead of a U-Boat. The enemy force was in position 65° 05' N., 07° 28' E., steering 115° at eight knots. The U-Boat was thought to be a 740-tonner with one big gun forward and a multiple mounting on the single bandstand. The **Liberator** captain circled out of range and sent off sighting reports. He then flew into a squally cloud with the intention of making a surprise attack. Unfortunately he came out astern of the target and continued to circle to wait for another opportunity. This came some 50 minutes later when the ships were approaching a squall. When the captain saw that the escort vessel was about to enter this patch of very low visibility, he lost height to 120 feet and headed towards the U-Boat. At a range of 1½ miles the vessels, which had closed to within three hundred yards of each other, opened fire. The U-Boat was firing heavy and light flak, the heavy shells bursting with black puffs astern and below the aircraft, while the light flak fell short. The escort's black bursts were in line with, but above, the **Liberator**. As the U-Boat's fire was low the captain decided to remain at 120 feet. At 1,100 yards the front gunner opened fire, but his shots fell short. He tried again at 800 yards and continued until the range was down to 250 yards. He claims hits on and around the conning tower and his efforts certainly reduced the enemy's fire. Moreover, when the aircraft passed over the conning tower the three men who had been seen in the bandstand were no longer there. Meanwhile the beam gunner

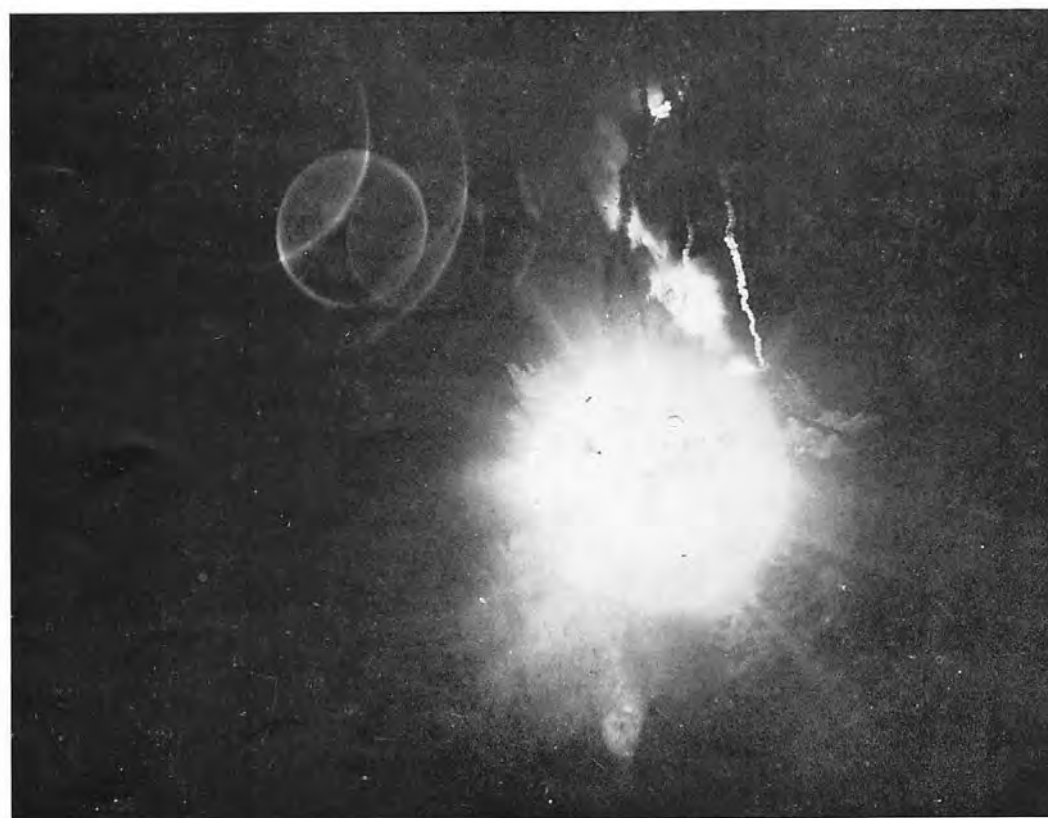
fired at the escort vessel and claims to have hit her. The aircraft attacked over the enemy's starboard quarter and from 120 feet dropped six depth charges spaced at 60 feet. Eight depth charges had been selected but the last two hung up. The low level bombsight was used. The rear gunner was firing into the conning tower and did not see the points of entry, but he saw the explosion plumes rise 10-15 yards short of the target on the starboard quarter. It was also seen that the plumes enveloped most of the length of the U-Boat, including the forward gun, as they descended. The captain held his attacking course for about fifteen seconds before turning and it was then discovered that two depth charges had hung up. The circuits and settings were checked and found to be correct. Meanwhile the U-Boat had begun a gentle turn to port which she continued as long as the aircraft was in the area. A wide streak of light green oil appeared in her wake and soon extended to a width of about 300 yards. The U-Boat was turning in an arc of about one mile radius and had completed half a circle before she lost way. The escort vessel closed her and was alongside when the **Liberator** left. The captain could see no possibility of any more help from the weather and as his release gear was defective he set course for base as soon as he reached P.L.E.

Comments

Although this was a fine performance, the captain of the aircraft was most fortunate in that the U-Boat did not submerge while he was waiting to attack. The Coastal Command Manual of Anti U-Boat Warfare, Article 4, paragraph 1 states that U-Boats must be attacked as soon as possible after sighting. The risk of being hit by flak must be taken and may be countered as far as possible by weaving and undulating.



These remarkable photographs were taken by the light of 1.7" flares during an attack by Sunderland S/201 on June 7. Examination of the two photographs shows that the depth charges straddled and that the U-Boat was probably sunk. The chances of all conditions being favourable for getting pictures such as these are very small indeed and may not occur again for a long time.





These photographs were taken during the action in which Canso B/162 sank a 500-ton U-Boat on June 11 in northern waters. They are the first photographs which show a schnörkel. The apparatus can be seen lying in its housing forward and slightly to port of the conning tower. A picture of an erected schnörkel in operation is shown on Plate 5.



Bright Yellow Explosion

The weather on the morning of May 27 was most unpromising for there was 10/10ths cloud at 250 feet and the visibility at about 0800 hours was between one and two miles. **Liberator S/59** was patrolling northern waters in these conditions when the Radar operator picked up a big, sharp contact 15 miles on the port bow. The aircraft homed, losing height through cloud, and held the contact until it was lost in the sea returns at a range of three miles. The aircraft then broke cloud and the crew sighted a U-Boat a mile and a half away bearing Red 70°. Her course was 010° at six knots and the position was 62° 37' N., 00° 57' E. The U-Boat was probably a 740-tonner with twin cannon mounted on the bandstand. Machine gun fire was also encountered but the guns themselves were not seen. During the run in the Liberator's nose gunner fired a short sighting burst at 1,000 yards and as the range closed he put in bursts of 30-40 rounds, scoring hits on the conning tower. One member of the U-Boat's crew was seen between the conning tower and the bandstand and as the aircraft approached he fell forward on to his face. The enemy replied with intense flak most of which passed under the port wing, but No. 1 engine was hit. The Liberator attacked from abaft the U-Boat's starboard beam and from 60-70 feet dropped six depth charges spaced at 55 feet. The low level bombsight was used. The rear gunner opened fire as soon as he heard the

navigator say "bombs gone" and continued to fire until the target was out of range. The points of entry of the depth charges were not seen, but it is stated that two of the explosions were very close to the U-Boat while the other four overshot. The plumes completely enveloped the target from the conning tower to the stern. After the aircraft had passed over the U-Boat the starboard beam gunner saw a bright yellow explosion amidst the plumes. He states that it looked about half the size of the plumes and that it seemed to originate a few feet above the surface of the sea. The aircraft then turned sharply to port and it was seen that the U-Boat's bows were sticking out of the water at an angle of about 20°. After this a fire in one of the engines diverted the crew's attention for about a minute and no one watched the U-Boat. When next seen she was submerging on an even keel with no forward movement. The aircraft continued to circle and the crew saw a big patch of blue-green oil as well as depth charge scum, but no swirl was visible. Owing to the damage to his aircraft the captain then set course for base.

Comments

Good approach tactics. It is possible that the flash seen in the midst of the depth charge plumes was caused by the explosion of ready-use ammunition on the deck of the U-Boat.

Attack on a Submerging U-Boat

In the afternoon of May 31 **Liberator Q/547** was patrolling in northern waters when the Radar operator picked up a very sharp contact bearing Green 100°, range 17 miles. The aircraft homed and at 5 miles range the crew sighted a U-Boat dead ahead in position 62° 10' N., 03° 17' E. She was steering due north at 10 knots. The crew sighted her through a rain cloud and could see only the conning tower which was long, low and without a step or bandstand. She was probably of the modified 740-ton type and was painted dark grey. No guns were visible. As the Liberator approached, the U-Boat began to submerge, maintaining her original course. The aircraft attacked from Red 160° and dropped from 100 feet six depth charges spaced at 55 feet. The U-Boat had been submerged for five seconds when the depth charges were released, but the

low level bombsight was used. During the run in the top and front turrets fired 400 rounds. The points of entry of the depth charges were not seen but the rear gunner saw the first explosion plume rise on the edge of the swirl furthest from the aircraft. The remaining five plumes were well forward of the swirl on the aircraft's track. After the attack two spherical black objects were seen floating near the after edge of the swirl, but there were no other results.

Comments

After evidence seems to confirm that the stick was a close miss astern. The U-Boat would, however, get a severe shake up. It is not possible to identify the two black objects seen after the attack as any part of a U-Boat or her gear.

A Straddle

At about 0200 hours on June 3 **Canso T/162** (R.C.A.F.) was patrolling northern waters in visibility of 12 miles, when a U-Boat was sighted four miles on the port bow steering due north at 15 knots. Her position was 63° 59' N., 01° 37' E. She was a 517-tonner with a tall conning tower painted black and she carried machine guns on the bandstand. No guns were seen on deck. At 1,000 yards the Canso opened fire with the front guns and scored hits on the conning tower. The U-Boat turned to starboard on to a course of 135° and kept her stern towards the

aircraft. She opened up intense and accurate machine-gun fire during the run in and tracer passed under the aircraft's wings. The captain took evasive action by undulating and escaped damage. He attacked from stern to bow up the U-Boat's track and from 60 feet he released four depth charges spaced at 100 feet. The crew, however, estimate that the actual spacing was 88 feet. The points of entry were not seen but the explosion plumes straddled and completely enveloped the target. The first two explosions were short, the third was about 10 feet aft of

amidships on the port side, and the fourth was within 10 feet of the starboard bow. After the attack the captain held his course for fifteen seconds and then turned steeply to make a machine-gun attack on the conning tower. The U-Boat appeared to lift bodily and to swing to port losing almost all forward way. She then submerged on an even keel, leaving at least five survivors floating in the water and waving at the aircraft. When the U-Boat submerged she left a small oil patch which had grown very much larger by the time the aircraft left nearly four hours later. There was also an oil slick which

began where the U-Boat submerged, continued for about a mile, and then ended in a patch about 100 yards square.

Comments

A bold and determined run in under flak, followed by an excellent attack. On the visual evidence of the position of explosions this attack should have been lethal. The five or more survivors were very probably manning the bridge and the guns. The large amount of oil indicates extensive damage to fuel tanks and may be evidence that the U-Boat sank.

An Excellent Flare Attack

On the night of June 7 **Sunderland S/201** was flying at 450 feet just below 10/10ths cloud when a Radar contact was obtained bearing Red 106°, range 9 miles. The aircraft homed and the contact was firmly held until the range was down to half a mile, when the blip disappeared. The aircraft was then at 100 feet and began to drop flares. Immediately afterwards the crew saw an unmistakable swirl and the second pilot actually made out bubbles rising to the surface. One minute later another **Sunderland, N/461** dropped flares in the same area. The aircraft sent amplifying reports and began baiting tactics. Contacts which later proved to be from **N/461** occasioned several false alarms, but some 2½ hours after the original attempt "S" obtained a firm contact bearing Red 70°, range 11 miles. The captain immediately homed, the Radar operator holding the contact throughout the run and giving faultless homing instructions. When the range was half a mile flak appeared from dead ahead, but the tracer passed high and to port of the **Sunderland**. The aircraft turned slightly to starboard, dived and began dropping 1.7-in. flares which illuminated a U-Boat 600 yards fine on the port bow. She was steering due east at 10 knots in position 45° 13' N., 08° 30' W. At the moment of sighting she began to turn hard to starboard and at the same time opened fire with her after guns. She is believed to have been a 740-tonner with gun positions forward and aft. The forward guns were probably twin 20 mm., but the much higher rate of fire from the after position suggests that a quadruple mounting was in action. The **Sunderland** turned in to

attack and a six-second burst from the fixed and the turret guns silenced the enemy's fire so that the last two hundred yards of the run was unopposed. Nevertheless, the front turret gunner kept up his fire to discourage the German gunners, if any, from opening up again. The **Sunderland** attacked over the enemy's port quarter and from 75 feet released six depth charges spaced at 60 feet while the target was fully illuminated by about 15 flares. The crew did not see the points of entry but a photograph (see plate 1) shows one depth charge entering the water close alongside the U-Boat's port quarter. Three members of the crew saw the explosion plumes, and at least four separate plumes were seen in a line roughly crossing the position of the target. The rear gunner also saw the U-Boat's silhouette completely blotted out by plumes. Three or four seconds after the depth charges had been released, and just before the explosions were seen, there was a heavy thud in the aircraft as if it had been hit. Throughout the attack flares were dropped and continuous Radar watch was kept. The blip was held all through the run in but it disappeared immediately after the actual attack and was not picked up again. The crew were able to see the marine marker which had been dropped with the depth charges, but in spite of an hour's search they saw nothing more of the target.

Comments

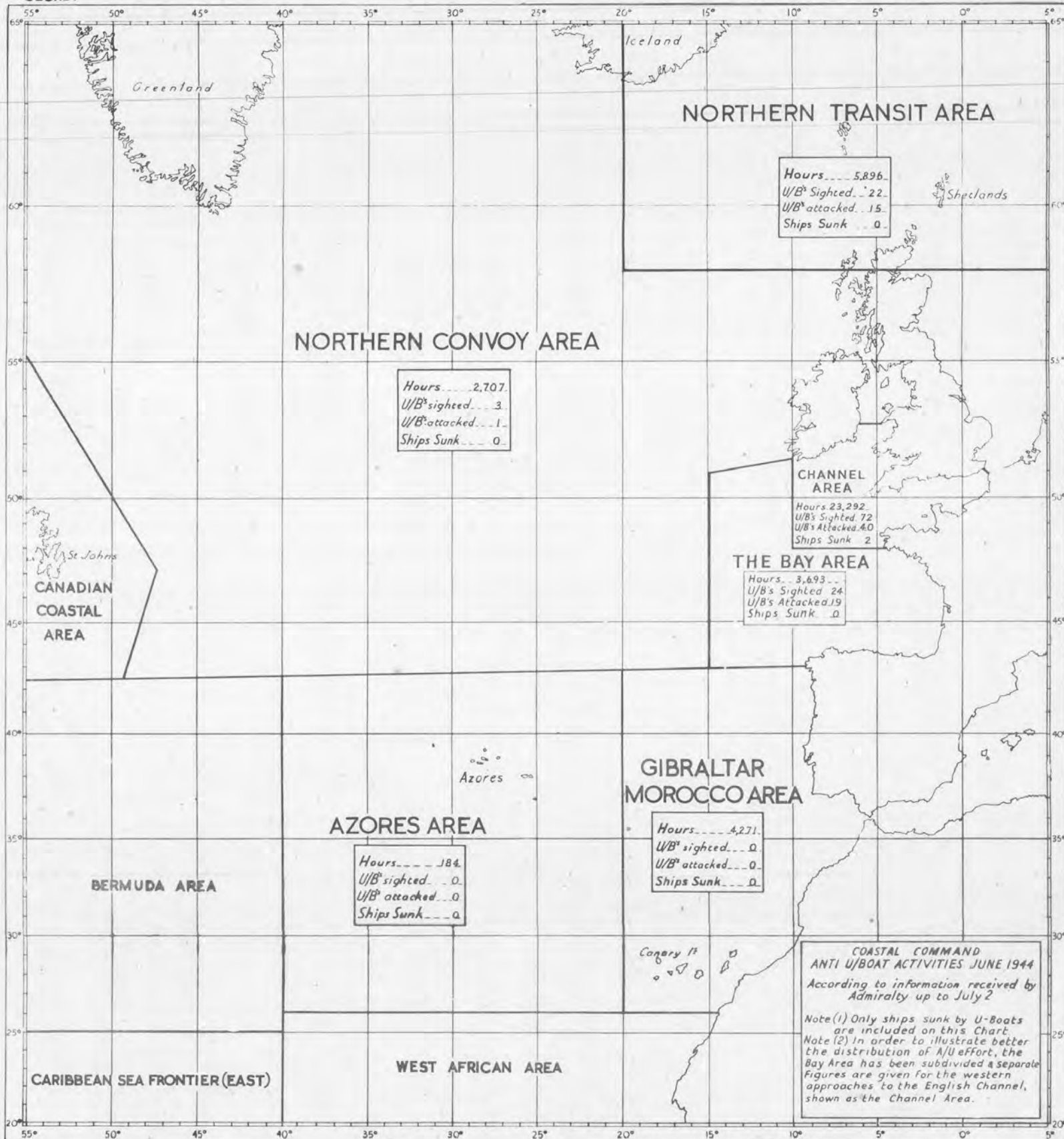
The team work in this attack was excellent. The photographs confirm a straddle and it is practically certain that the U-Boat was destroyed.

Another Good Flare Attack

Shortly before midnight on June 7 **Sunderland G/228** was patrolling by moonlight when the Radar operator picked up a weak contact 15 miles on the starboard bow. The captain held his course for about five miles until the blip became constant. He then set course for the target and lost height to 100 feet. The surface of the sea was a patchwork of bright moonlight alternating with big black cloud shadows and in spite of every effort to get the target in the moonpath, no U-Boat could be seen. The captain made repeated alterations of course in trying to locate the enemy and at half or three-quarters of a mile range he released 1.7-in. flares. These revealed the

U-Boat bearing Green 20° in position 45° 43' N., 04° 15' W. She was thought to be a 500-tonner and she was steering due west at 10-12 knots. The **Sunderland** immediately altered course towards the enemy who, as soon as the first flare ignited, began firing wildly well to port of the aircraft. The **Sunderland** replied with the fixed guns and the front turret which temporarily silenced the U-Boat's gunners. At 200 yards, however, they again opened fire, this time accurately, and hit the aircraft in eight places. The **Sunderland** attacked from the U-Boat's starboard beam and from 100 feet released six depth charges at 55 feet. The low level bomb-sight

SECRET



was used. The bomb-aimer estimated that the centre of the stick overshot slightly but the mid-upper gunner, who was in the best position to see the results as he was not blinded by the flares, saw one small explosion plume subsiding on the enemy's starboard side and a big plume on the port side just abaft the conning tower. The U-Boat's stern seemed to lift out of the water and she heeled to starboard. A big patch of oil 200 feet across was then seen and emerging from this there was a thin oily wake 400 feet long at the end of which lay the U-Boat, either stationary or stopping. Her gunners fired six rounds of tracer vertically in the air nowhere

near the aircraft. Four and a half minutes after the attack small Radar contacts were picked up but half a minute later both the U-Boat and the contacts disappeared. The Sunderland stayed in the area for another 2 hours and 20 minutes but saw nothing more. About fifteen minutes after the attack the Radar indicated what was probably an enemy aircraft which dropped yellow and blue flares and seemed to be circling the marine marker.

Comments

The approach was good and the 1-7-in. flares were very well used.

Moonpath Attack

Shortly before midnight on June 7 **Sunderland R/228** was flying at 800 feet when the Radar operator picked up three contacts five miles ahead. Soon afterwards the crew saw lights and then three vessels about six miles away up moon. Even with the help of binoculars it was not possible to say more than that the ships were escort vessels. A minute later another contact was picked up eight miles away on the port bow. By using Radar bearings the captain manoeuvred into a position down moon of the target and after six minutes he sighted a U-Boat five miles away on the starboard bow in position $45^{\circ} 15' \text{ N.}$, $04^{\circ} 10' \text{ W.}$ She was steering 145° at 15 knots. Apart from the fact that she was probably a 740-tonner, no details of her superstructure could be seen, as dark patches of shadow on the water made observation difficult. Keeping the U-Boat in his starboard bow the captain positioned the aircraft for an attack and used a patch of shadow in which to reduce his height to 300 feet. At 1,000 yards range he turned to starboard, the first pilot directing him towards the enemy's exact position. When the target was clearly visible in the moonpath the Sunderland ran in to attack. At 900 yards the front gunner opened fire and saw some of his bullets ricochetting from the conning tower. The tracer, however, interfered with the pilot's view and at 400 yards the gunner was ordered to cease fire. The Sunderland then left the shadow patch and from 50-70 feet released six depth charges spaced at 55 feet. The aircraft attacked over the U-Boat's port bow and tracked over the target slightly forward of the conning tower. The enemy did not return the Sunderland's fire until just before the depth charges were released, which would seem to indicate that the attack was a complete surprise.

The rear gunner saw the depth charges straddle the conning tower and he opened fire as the aircraft passed over. The return fire was high and inaccurate until the depth charges exploded, but at least it was directed at the Sunderland. After the explosions the tracer went vertically into the air, and then ceased abruptly. The explosions seemed to lift the enemy's stern out of the water and several of the Sunderland's crew saw the target enveloped in the plumes. The U-Boat began to circle to starboard and then attempted to submerge. Her fore-casing disappeared but the conning tower and after-casing remained visible and, apparently, level. The path of the U-Boat was clearly indicated by a wide strip of smooth water which may have been caused by oil. The U-Boat continued to circle to starboard for ten minutes, then steadied for one minute and began circling to port, losing way and settling lower in the water. The Sunderland dropped a marine marker one mile down moon and maintained visual contact with the enemy from that sector. The U-Boat slowly lost speed and settled until about an hour and a half after the attack only her conning tower was visible above water. Soon after this the Radar contact, which had been getting smaller and smaller since the attack, faded altogether. At the same time the U-Boat disappeared from view though her path was still visible. No other aircraft appeared on the scene in spite of Homing procedure, so the Sunderland set course for base when it reached P.L.E.

Comments

The tactics on the approach were very good. The after results point to serious damage and it is possible that the U-Boat eventually foundered.

Six-Pounder Attack

On the morning of June 7 **Mosquitos O and L/248** were patrolling in formation at 500 feet with strato-cumulus cloud at 800 feet. At six miles range a wake was sighted and the formation altered course to investigate. The wake was then identified as that of a U-Boat trimmed fairly low and steering 250° at eight knots. Her position was $45^{\circ} 49' \text{ N.}$, $02^{\circ} 46' \text{ W.}$ Almost at once the U-Boat began to zig-zag violently and

kept up this evasive action throughout the subsequent attacks. She also fired a white Very cartridge. The Mosquitos were prevented by the low cloud base from climbing and thereby making steeper dives. "O" went in first so that the leader, who was following, would be able to counter any action the U-Boat might take to evade the attack. "O" attacked from the enemy's port quarter at a range of 1,200 yards,

diving from 500 feet, but after one round the 6-pounder jammed. The shell was out for line and missed to port. As the Mosquitos dived the U-Boat opened fire from twin 20 mm. cannon and "O" therefore made two dummy attacks with the intention of distracting the gunners and drawing off their fire from "L". The latter attacked in a dive from 700 feet to 50 feet, closing the range from 1,500 yards to 100 yards. The pilot fired six rounds which appeared to miss to port, though the points of entry of the later rounds were hidden by the earlier splashes. "L" then climbed away to port and dived again, firing another six rounds. This time the pilot estimated one or two hits on the waterline amidships and two at the base of the conning tower. In his third attack the pilot fired six more rounds, two of which he believes hit the top

of the conning tower. As the Mosquitos came in for the fourth run the U-Boat began to crash dive under full helm and had submerged fully before the aircraft fired again. Nevertheless, the pilot put three rounds into the estimated position. The Mosquitos then circled and saw that the yellowish brown oil which had appeared after "L"'s second attack had formed a slick some hundreds of feet long. Nothing else was seen, but when the U-Boat dived she left one member of her complement in the water. The aircraft then left for base where it was discovered that "L" had been hit in the port wing and the port engine nacelle.

Comments

These attacks must have considerably shaken the U-Boat's crew as well as inflicting damage.

Two Perfect Attacks in Half an Hour

On June 8 **Liberator G/224** was flying at 500 feet when the Radar operator obtained a contact 12 miles dead ahead. The visibility was three miles, as there was a full moon and very little cloud. The Liberators lost height and altered course slightly first to port and then to starboard in order to keep the target in the moonpath. At three miles the captain sighted a surfaced U-Boat fine on the starboard bow in position 48° 27' N., 05° 47' W. The U-Boat, which was steering due west at 10-12 knots, may have been a 1,200-tonner and fire came from a large bandstand as well as from the conning tower and possibly from aft of the bandstand. The Liberators immediately attacked over the enemy's starboard beam and from 50 feet released six depth charges spaced at 55 feet. The low level bombsight was used. As the aircraft tracked over the target slightly forward of the conning tower, the nose gunner fired at about eight men who were seen on the bridge: two of them were hit and fell. The U-Boat returned the fire as the aircraft passed over. The rear gunner states that three depth charges fell on either side of the target about 10-15 feet forward of the conning tower. Five seconds later the explosion plumes were thrown up on each side of the U-Boat, which lifted in the water and began to disintegrate. When the plumes reached their full height they completely hid the target from view. The Liberators circled once and on returning to the flame float the crew saw patches of thick black oil in which things were floating. These objects could not be identified owing to the thick oil. The aircraft remained in the area for five minutes and then resumed patrol.

About twenty minutes later the operator picked up another Radar contact six miles fine on the starboard bow. The Captain held his course until

the range was three miles and then he turned 30° to port in order to get into position to attack up moon. At 2½ miles, however, the navigator sighted the U-Boat bearing Green 60° and in those circumstances the Captain did not consider it possible to make an up-moon attack. He therefore turned a tight circle to port and ran in from the enemy's starboard quarter. The U-Boat, which was steering 295° at eight knots was possibly a 500-tonner with one bandstand. Most of the flak—seven or eight streams of it in all—came from the conning tower. Using the low level bombsight the aircraft released from 50 feet six depth charges with the same settings as in the previous attack. As the Liberators tracked over the target the nose gunner put 150 rounds into the enemy's conning tower. The U-Boat replied with light flak and white tracer. The rear gunner saw the depth charges straddle, four hitting the water to starboard and two to port. About four seconds later the explosion plumes began to rise on each side of the hull about ten feet aft of the conning tower, which was hidden from view as the plumes increased. As the aircraft was circling to port after the attack, the crew saw the U-Boat listing heavily to starboard. The bows then rose out of the sea to an angle of about 80° and the vessel slid back stern first into a mass of confused water. The Liberators then searched the area with the Leigh Light and illuminated three dinghy-loads of survivors floating amid much oil and wreckage. A quarter of an hour after the attack "G" once more resumed patrol.

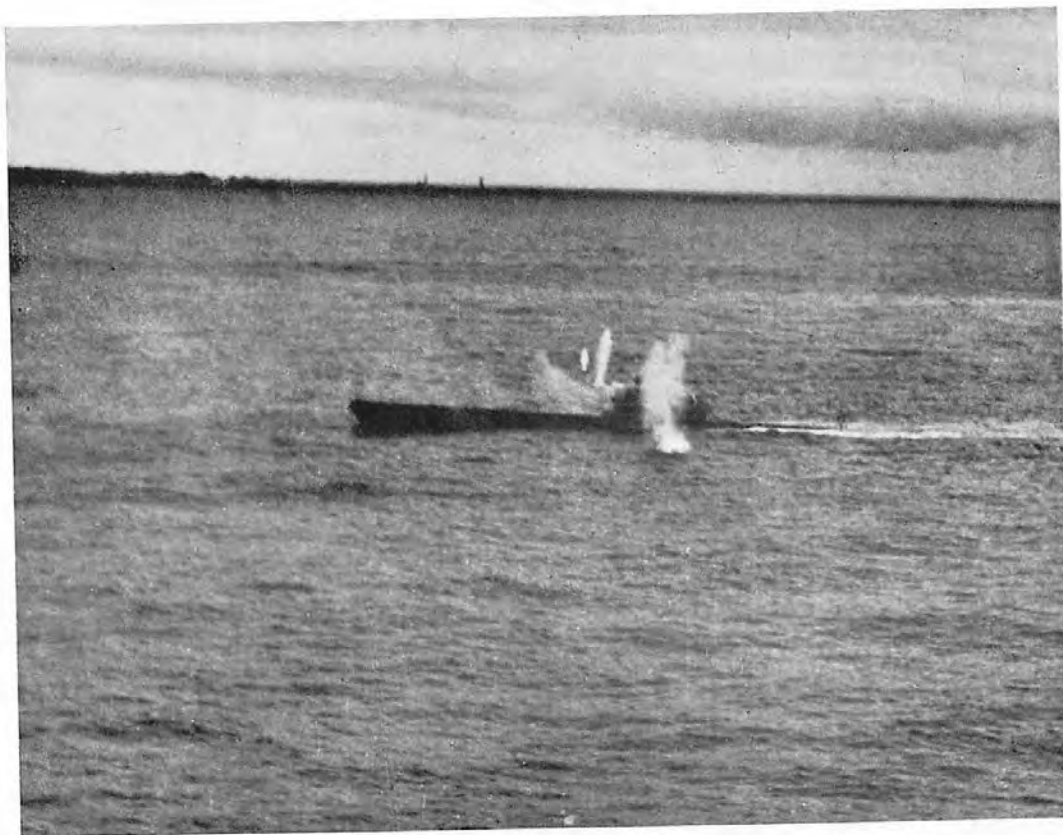
Comments

Two perfect attacks. The crew of this aircraft are to be congratulated on their very fine effort.

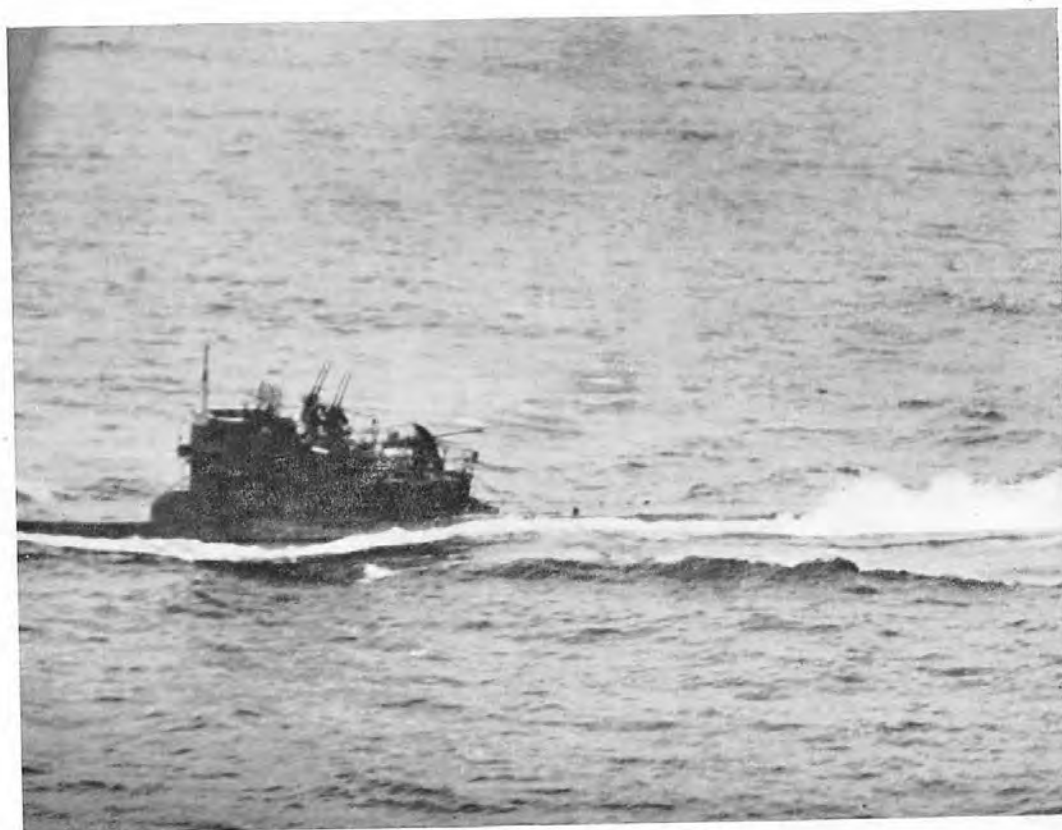
A Kill by Four Mosquitos and a Liberator

At midday on June 10 **Mosquitos T, S, V and W/248** were on anti-aircraft patrol when "T," the leader, sighted a suspicious object close to Ushant. "T" flew away to investigate leaving "S" to lead the formation. Immediately after-

wards the three remaining Mosquitos sighted a U-Boat in the act of surfacing in position 48° 31' N., 05° 11' W. The U-Boat was steering 200° at 4 knots and carried two twin 20-mm. guns on the upper bandstand and a bigger gun on the



These photographs are of a U-Boat attacked off Ushant on June 10, first by four Mosquitos of 248 Squadron and then by Liberator K/206 (see letterpress on page 8). The U-Boat was sunk. The upper picture shows the Mosquito attack and the lower is of particular interest as it is the first photograph taken which shows a U-Boat's Radar aerial erect and out of its housing on the port side of the conning tower.

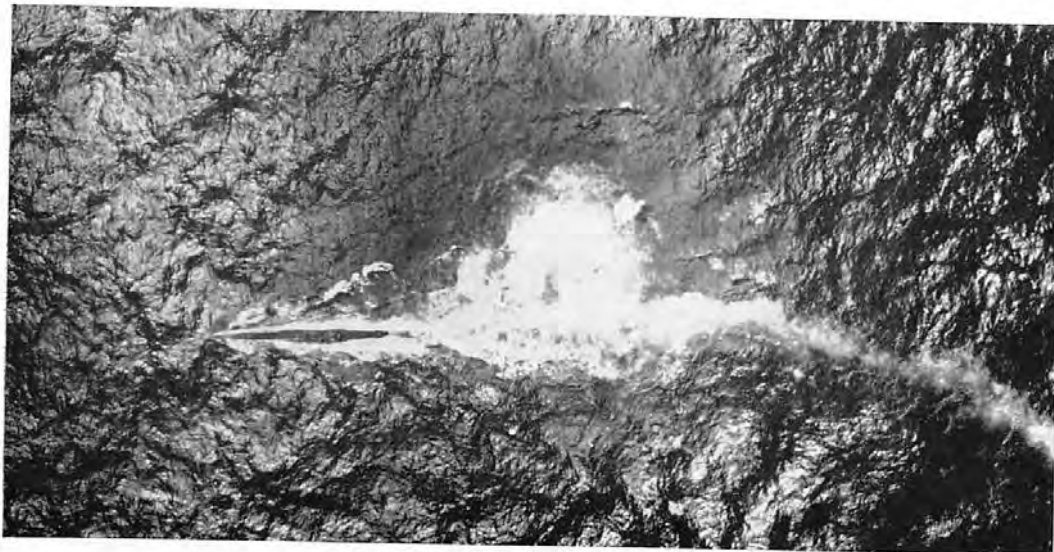




This U-Boat was attacked by Mosquito H/333 (Norwegian) north-east of the Shetlands on June 16. The depth charges were close enough to inflict damage and to produce the oil patch shown in the photograph. The U-Boat submerged and resurfaced several times before finally disappearing.



Liberator K/86 twice attacked this U-Boat north-east of the Shetlands on June 20. In the second attack the depth charges exploded close to the hull and the U-Boat remained surfaced for over an hour, steering an erratic course and leaking oil before she finally dived.



An attack by Halifax D/502 south-west of the Scillies on June 21. The 600 lb. A/S bomb was dropped from 1,200 feet and can be seen bursting about 100 feet astern of the target. The U-Boat must have been shaken up but was not damaged.

lower bandstand. The formation turned to attack, climbing to 400 feet and moving into line astern. "T" heard the sighting report on the V.H.F. and turned back. "S" attacked first from the U-Boat's port quarter, opening with cannon and machine guns from 600 yards. "W" and "V" followed with similar attacks. The U-Boat began turning to port and when "T" arrived the pilot made a beam attack. At first the U-Boat opened up with her guns and "S" was hit by a shell fragment, but the later attacks were unopposed. One gunner jumped overboard at the beginning of the action and after "T's" first attack four or five bodies were strewn about the decks. Others were seen to fall into the sea. The Mosquitos attacked repeatedly and each aircraft made about six runs. The U-Boat circled slowly and most of the attacks were made from the beam. The enemy's condition soon became serious. The ready-use ammunition blew up with a sheet of flame and quantities of black smoke, the conning tower was shattered and the gun positions were wrecked. Men began coming from below but were either mown down by the Mosquitos' fire or else they jumped overboard. After the attacks there were about 20 survivors in the water, most of them in life jackets. There was no sign of life in the U-Boat, which was down by the stern and trailing oil from her riddled tanks.

At that point **Liberator K/206** arrived. The Radar operator had picked up a contact ten miles on the starboard bow and after homing, the

battered U-Boat was sighted four miles ahead. She was zig-zagging on a course of 120° at 10 knots and the four Mosquitos were still making runs over her. The Liberator went straight in to attack over the U-Boat's port quarter and from 50 feet released five depth charges spaced at 55 feet. The low level bombsight was used. One depth charge hung up and of the rest one exploded on the port side and four to starboard. After this attack the U-Boat was leaving a trail of oil and the Liberator turned very quickly and made two more attempts to attack. Each time the depth charges failed to release. On the fourth run, which was made over the enemy's starboard quarter, six depth charges with the same settings as before were successfully released from 50 feet. The low level bombsight was again used and a perfect straddle resulted, three depth charges falling on either side of the target. The U-Boat's bows immediately heaved out of the sea and the whole boat slid back and sank amid bubbles, oil and debris. The Liberator turned and tracked over the spot, where the crew saw three survivors wearing life-jackets. The Mosquitos watched the whole action and their photographs confirm the first straddle. The crew's reports also confirm the sinking. On the Liberator's second run the U-Boat fired very short bursts of flak as if by remote control.

Comments

The fine work of these five aircraft finally led to the enemy's destruction.

A Model of Speed and Precision

In the afternoon of June 11 **Canso B/162** (R.C.A.F.) was patrolling at 1,000 feet when a U-Boat was sighted seven miles away on the starboard bow. There was 8-10ths cloud at 800-1,200 feet, the sea was calm and the visibility between five and ten miles. The enemy was in position 63° 07' N., 00° 20' E., steering north at eight knots. The schnörkel was clearly seen on the U-Boat's port side. The Canso immediately turned towards the enemy and at 800 yards opened fire with the front and starboard blister guns. The U-Boat replied with fairly accurate and concentrated light flak and turned to port in order to keep stern on to the aircraft. The Canso closed the range, jinking slightly, and attacked over the U-Boat's port quarter. Four depth charges spaced at 100 feet were released

from 50 feet while the U-Boat was fully surfaced. The depth charges straddled, one falling close aboard on the port side midway between the conning tower and the bow. Three charges exploded to port and one to starboard, the plumes obscuring the target. When the U-Boat emerged she continued to circle at a much slower speed leaving an oil trace behind her. A gun action then ensued until ten minutes after the attack when the U-Boat, which was very low in the water, ceased fire and sank on an even keel. About 35 survivors and much wreckage were left in the water.

Comments

A perfect attack in the face of intense flak.

Probably a Miss Astern

Just before midnight on June 13 **Wellington Y/172** was patrolling at 1,200 feet over a moderate sea when the Radar operator picked up a contact bearing Red 40°, range eight miles. The Wellington homed and at three quarters of a mile the Leigh Light was switched on, revealing a fully surfaced U-Boat steering due north at fifteen knots. The position was 47° 59' N., 05° 28' W. Just before the Leigh Light was switched on the U-Boat began firing astern, but as soon as the gunners saw the Leigh Light they directed their fire at the aircraft. The tracer, however, passed to port

of the Wellington at about the same height. The aircraft's front gunner returned the fire but he saw no hits and did not silence the enemy's fire. The Wellington attacked over the U-Boat's port quarter and from 50 feet released six depth charges spaced at 60 feet. As he passed over the U-Boat the rear gunner opened fire and silenced the enemy's guns. He did not see the points of entry of the depth charges but he states quite definitely that the explosions straddled the enemy across the stern. The U-Boat is described as a typical 517-tonner, painted light and dark

grey, with at least one bandstand abaft the conning tower. After the attack the aircraft made a climbing turn to port and circled two flame floats which were burning near the scene of the attack. During the third circuit the U-Boat opened fire from immediately beneath the Wellington and about half a mile north of her original position. At the same moment both the second pilot and the rear gunner (who returned the fire) saw the U-Boat lying stopped. The aircraft took evasive action and two minutes later, about 18 minutes after the attack, the crew of the Wellington saw a dull yellow glow from the U-Boat's position, followed by a vivid orange explosion. After this a column of thick, black, oily smoke rose 1,000 feet in the air. When the explosion subsided the crew saw a long, narrow

burning mass about 200 feet long, and more black smoke. The fire was still burning fiercely when the aircraft left the area. Unfortunately the W/T transmitter and the Radar equipment became unserviceable immediately after the attack and the Wellington was unable either to send reports or to maintain contact with the enemy by Radar. In view of this the aircraft set course for base about 25 minutes after the attack, having first carried out Marine Marker procedure.

Comments

A very good Radar approach. The failure to allow sufficient relative drift seems to account for the probable miss astern. The fire on the water is believed to have been a burning aircraft.

Canso Forced to Ditch after Destroying a U-Boat

On June 13 **Canso T/162** (R.C.A.F.) was patrolling northern waters at about 800 feet when one of the crew sighted the feather of two periscopes three miles away. The two periscopes were evidently part of the same U-Boat which was steering due west at three knots. The position was 62° 45' N., 02° 59' W. When both periscopes and the conning tower were visible the Canso attacked from the U-Boat's starboard bow and released from 50 feet four depth charges spaced at 100 feet. Two depth charges hit the water on the starboard side and the other two are believed to have fallen to port. At least three were seen to explode and to envelop the U-Boat in the plumes. The Canso continued on course for about 20 seconds and then turned hard to port. The U-Boat was then seen surfacing with decks awash and turning slowly to starboard. The Canso flew away and circled at two to three miles range. The enemy remained with his decks awash, turning slowly and leaving practically no wake. After travelling about 400 yards the U-Boat stopped and began to settle by the bows. The conning tower disappeared and the stern rose into the air until the rudder and screws were plainly visible. The Canso made several runs in order to take photographs and then the conning tower began to reappear. As the aircraft

was making another run the captain saw the U-Boat's gunners running to man their weapons. By then he was committed to his run and as soon as he saw the smoke from the enemy's guns he began to jink violently. Immediately after passing over the U-Boat the Canso was hit in the port engine which began to leak oil and belch black smoke. The engine was switched off but it was impossible to feather the propeller or to jettison any fuel for fear of the aircraft catching fire. In spite of using full boost on the starboard engine the Canso began to lose height and eventually the captain was forced to ditch. The hull had been so badly holed by shells that the aircraft filled rapidly and sank in about twenty minutes. The crew were all uninjured and were able to take to the dinghies. They were soon found by a patrolling Liberator and an airborne lifeboat was later dropped by a Warwick. Other Warwicks dropped Lindholme dinghies and the survivors were eventually picked up by an Air/Sea Rescue launch. (See page 19.)

Comments

A very creditable performance, not only in sinking a U-Boat, but also, when having to ditch, in attempting to save the camera, maps, etc.

A Mosquito Attack with one Depth Charge

On June 14 **Mosquito H/333** (Norwegian) was flying at 500 feet when the pilot sighted a U-Boat six miles away on the port beam. She was in position 61° 06' N., 03° 25' E. and was steering due south at eight knots. She was painted grey and carried one gun well forward and smaller guns in the conning tower. The deck forward of the front gun was uneven, which may indicate that the vessel was a minelaying U-Boat. The aircraft manoeuvred to attack from out of the sun and as it did so the U-Boat began circling to port. When the Mosquito was in position the U-Boat was beam on and had opened fire. The Mosquito pilot therefore circled to port and went in to attack from the U-Boat's stern. He turned in at 1,200 yards raking the deck and conning tower with cannon fire, and released one depth charge from 30 feet. The depth charge may have landed on the deck and bounced off, as it exploded

close alongside the starboard bow, lifting the bows in the air and slewing the whole vessel through 90°. As the aircraft tracked over the target dead Germans were littering the deck and there was no more opposition from the gunners. The Mosquito circled and returned to the scene one minute after the attack but there was no sign of the U-Boat. She had not been seen to dive, but it would have been quite possible for her to do so without being seen owing to the Mosquito's speed and to the position of the crew. The Mosquito pilot intended to drop his second depth charge on this run, but as he had no target and no swirl, he could not do so. Shortly after this the aircraft set course for base.

Comments

An excellent attempt to sink a U-Boat with one depth charge.



North of the Channel Islands on June 18, Liberator B/110 (U.S.N.) attacked a U-Boat at "schnörkel depth" and took the above photograph. The schnörkel itself is plainly visible with its G.S.R. aerial fitted on top. Smoke from the exhaust, which is designed to operate below the level of the water, is emerging aft of the schnörkel and the periscope can just be seen still further aft.



This photograph, taken by a Catalina of 330 (Norwegian) Squadron, shows some of the survivors of a U-Boat sunk on June 13 by Canso T/162 (R.C.A.F.). The Canso was forced to ditch after the attack but most of the crew were rescued by an A.S.R. launch.



On June 26 Liberator N/86 made two attacks on a U-Boat in northern waters. In the first the depth charges fell short, but the second attack destroyed the U-Boat. The two upper photographs were taken during the first and second attacks respectively. The lower picture gives a close-up view from an unusual angle. The U-Boat is a 500-tonner and had not been fitted with schnörkel.

Another Mosquito Attack

In the evening of June 16 **Mosquito H/333** (Norwegian) was on patrol in northern waters when the pilot sighted a vessel eight miles ahead. He went into cloud to mask his approach and when he emerged he saw a U-Boat two miles away on his port bow. Her position was $61^{\circ} 01' N.$, $03^{\circ} 00' E.$ and she was steering due north at eight knots. At the time of sighting she was turning to starboard. She was small in size and her conning tower had no noticeable step. No guns were seen forward, but during the run in light flak came from the conning tower. The Mosquito turned to attack and the enemy opened fire at 800 yards. The Mosquito replied and raked the conning tower with cannon fire. The aircraft attacked from stern to bow slightly on the starboard side and released two depth charges from 100 feet. They exploded on the starboard side level with the conning tower about five feet away from the hull. The U-Boat heeled over and immediately began to leak oil. Two dark

objects, which may have been bodies, were seen in the oil patch and when the U-Boat submerged about two minutes later wooden wreckage floated on the water. After two more minutes about six feet of the bows reappeared sticking vertically out of the sea and remained in that position for about five minutes. The Mosquito pilot fired at this target, which eventually submerged for about half a minute. Then the whole U-Boat surfaced, lying on her side with the bows sticking up at an angle of about 30° . She stayed in that position for two minutes and then slid stern first under the surface. By the time the aircraft left, 40 minutes after the attack, the oil patch was 1,000 yards long with a subsidiary trail zig-zagging towards the north.

Comments

A good attempt to use cloud cover for surprise. A very fine attack, which at least seriously damaged the U-Boat.

A Long Range Sighting

On June 17 **Catalina D/333** (Norwegian) was patrolling at 1,200 feet when the pilot sighted a U-Boat abaft the port beam about 11 miles away. The position was $63^{\circ} 06' N.$, $02^{\circ} 05' E.$, and the U-Boat was steering 035° at 12 knots. She was a 517-tonner with a double bandstand aft of the conning tower, and she mounted one big gun forward and at least two aft. The Catalina altered course towards the enemy who opened heavy and optimistic fire at a range of nearly five miles. The aircraft then went into cloud at 2,100 feet to get a fix. On leaving the cloud the captain sighted the U-Boat three miles away on the port side. He turned to attack and the enemy again opened fire. The Catalina evaded this by jinking and the front gunner replied when the range had closed to 2,000 yards, but the guns jammed after 75 rounds. At about 900 yards the U-Boat ceased fire and the Catalina attacked from the starboard quarter. Six depth charges spaced at 60 feet were dropped from

about 40 feet while the U-Boat was still fully surfaced. No. 1 depth charge hit the water near the U-Boat's stern on the starboard side, Nos. 2 and 3 fell between the stern and the conning tower, Nos. 4 and 5 were between the conning tower and the bow on the port side and No. 6 was well forward. It was impossible to see where they exploded as the whole target was completely enveloped in the plumes. Immediately after the attack the port blister gunner was able to put about 40 rounds into the forward part of the conning tower. The U-Boat's bows then rose in the air while the vessel continued on course in that attitude. After about two minutes she slid under the surface stern first leaving a long patch of oil and about 40 survivors.

Comments

A calmly reasoned approach and attack resulting in the kill it deserved.

II.—ANTI-SHIPING

SUMMARY OF ANTI-SHIPING OPERATIONS BY COASTAL COMMAND AIRCRAFT

JUNE 1944

Weapon Carried.	Number of Sorties			Number of Aircraft to Attack.			Target	
(1)	On Reconnaissance.	On Strike.	Total.	On Reconnaissance.	On Strike.	Total.	M/V.	Naval.
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DAY OPERATIONS								
Torpedo	13	10	23	—	9	9	9	—
R.P.	123 (7)	87	210 (7)	12 (7)	40	52 (7)	4	48 (7)
Bomb	532 (1)	36	568 (1)	52 (1)	16	68 (1)	7	61 (1)
Depth Charge	— (1)	—	— (1)	— (1)	—	— (1)	—	— (1)
Tsetse	1 (6)	2	3 (6)	— (6)	2	2 (6)	2	— (6)
Cannon and M.G. only	241 (9)	136	377 (9)	16 (9)	74	90 (9)	28	62 (9)
TOTAL DAY	910 (24)	271	1,181 (24)	80 (24)	141	221 (24)	50	171 (24)
NIGHT OPERATIONS								
R.P.	75	13	88	10	—	10	—	10
Bomb	664	20	684	148	3	151	15	136
Depth Charge	— (1)	—	— (1)	—	—	—	—	—
Cannon and M.G. only	23 (3)	11	34 (3)	14 (3)	—	14 (3)	—	14 (3)
TOTAL NIGHT	762 (4)	44	806 (4)	172 (3)	3	175 (3)	15	160 (3)
ALL OPERATIONS								
Torpedo	13	10	23	—	9	9	9	—
R.P.	198 (7)	100	298 (7)	22 (7)	40	62 (7)	4	58 (7)
Bomb	1,196 (1)	56	1,252 (1)	200 (1)	19	219 (1)	22	197 (1)
Depth Charge	— (2)	—	— (2)	— (1)	—	— (1)	—	— (1)
Tsetse	1 (6)	2	3 (6)	— (6)	2	2 (6)	2	— (6)
Cannon and M.G. only	264 (12)	147	411 (12)	30 (12)	74	104 (12)	28	76 (12)
GRAND TOTAL	1,672 (28)	315	1,987 (28)	252 (27)	144	396 (27)	65	331 (27)

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

Results claimed for June (Subject to Assessment)

Torpedo	Day :	1 M/V (8,000 tons) sunk, 1 M/V (3,800 tons) sunk.
R.P.	Day :	2 M/S damaged. 4 E/R Boats damaged. 2 D.D.s damaged.
R.P. and Cannon	Day :	1 M/S sunk. 2 M/S damaged. 2 A/T.s damaged.
Bombs	Day :	2 M/S damaged. 1 E/R Boat damaged.
	Night :	1 E/R Boat sunk. 1 E/R Boat seriously damaged. 1 M/S damaged. 8 E/R Boats damaged. 1 A/T damaged.
Tsetse	Day :	1 M/L sunk. 1 Tanker (1,000 tons) damaged. 1 M/S damaged.
Cannon	Day :	3 Patrol Vessels seriously damaged. 4 Patrol vessels damaged. 5 M/S damaged. 2 E/R Boats damaged.
	Night :	2 M/S damaged. 6 E/R Boats damaged.

Analysis of Weapons Expended

Weapon.	No. of Aircraft to Attack.	Weapons Expended.	
		M/V.	Naval.
<i>Day Operations :—</i>			
Torpedo, 8 ft.	9	9	—
R.P.	59	32 × 25 lb.	274 × 25 lb. 160 × 60 lb.
Bombs	69	14 × 500 M.C. 2 × 250 M.C.	46 × 500 M.C. 44 × 250 M.C.
Depth Charge	1	—	8 × 250 lb.
Tsetse	8	2 attacks	6 attacks
<i>Night Operations :—</i>			
R.P.	10	—	76 × 25 lb.
Bomb	151	25 × 500 M.C. 10 × 250 M.C. 16 × 250 G.P.	243 × 500 M.C. 108 × 250 M.C. 263 × 250 G.P. 13 × 500 G.P.

Final Assessments for May

Day :—

Torpedo	2 M/V.s (of 2,000 each) sunk.
Cannon	" M " Class M/S sunk. E/V seriously damaged. M/S and 3 E/V.s damaged.
R.P.	Small Coaster and " M " Class M/S damaged.

Night :—

Bombs	Small U/I Vessel sunk. 2 M/S sunk. 2 E/Boats and 1 M/S and 1 T.L.C. seriously damaged. 1 E-Boat damaged.
Depth Charge	1 E-Boat damaged.

Operations against Enemy Surface Forces in the Channel

In readiness for the Allied invasion of the Continent the enemy had concentrated, by the beginning of June, a substantial number of minor war vessels in ports between the Gironde, on the French coast, and IJmuiden in Holland. During the month the Strike Squadrons of Coastal Command and those of the Fleet Air Arm operating with it, have achieved a record number of attacks against these forces.

Immediately before the invasion the enemy was in doubt as to where it would materialize, and he therefore retained a strong force of his heavier units on his flank. This consisted of four *Seetzer* destroyers and one *Tjerk Hiddes* destroyer—almost equivalent to light cruisers—which remained in the Gironde. The lighter forces in the Channel area were concentrated with Le Havre as the focal point. By D-Day the enemy disposed some five torpedo boats and 50 E-Boats between Cherbourg and IJmuiden, and these were his main striking force. For defence there were available a substantial number of R-Boats, "M" class minesweepers, tank landing craft modified as gunboats, and a host of trawler-type auxiliaries.

Apart from U-Boats, E-Boats seemed the most obvious choice for direct offensive action against invasion convoys, and as operations proceeded, it was clear that the enemy was also of this opinion. The E-Boat, with her 40 knots and her ability to operate with torpedo or mine at some distance from base, is an ideal weapon for harrying the flanks of shipping concentrations. On the other hand, the light construction and armament of these vessels virtually limit operations to the dark hours. Moreover, constant air and surface patrols have severely circumscribed their opportunities.

As soon as it became clear that the attack had really begun, the enemy attempted to reinforce his Channel forces by moving three of his heavy destroyers from the Gironde to the assault area. (The other two were unserviceable at the time.) It was these vessels which were attacked by aircraft of 144 and 404 Squadrons on June 6 while they were still south of Brest, but the damage inflicted was insufficient to stop their progress. After spending two days in Brest the three destroyers and a torpedo boat were again sighted by aircraft of 19 Group as they rounded the Brest Peninsula, and on the same night (8/9th) an Allied destroyer force successfully engaged them, sinking one outright, driving another on to the rocks of Ile de Batz, and forcing the third back to Brest. A subsequent attack with R.P. and bombs by 144 and 404 Squadrons on the beached destroyer finally disposed of any hopes that the enemy may have entertained of eventually salvaging her. Left with only one serviceable destroyer and an *Elbing* torpedo boat in Brest, the Germans made no further attempts to reinforce the Channel from the west.

In the Channel itself, the enemy attempted to attack our convoys by nightly E-Boat sorties. In the early stages both torpedoes and mines were used for this purpose, but towards the end of the month it seems as though E-Boat operations have been limited to minelaying near the beaches. As

for the torpedo boats which were in Le Havre, they never made direct contact with our forces, and if they ever left port, it must have been for offensive minelaying only.

Constant and continuing attacks on E-Boats have been made by our Beaufighters, Wellingtons, Albacores, Avengers and Swordfish, but the results are singularly difficult to assess. Firstly, the majority take place at night—since the E-Boat almost always endeavours to return to port before daylight—and clearly damage to these small vessels can only be guessed at in most of the night attacks. Secondly, the enemy possesses concrete shelter pens at most of the Channel bases, which not only prevent us from calculating exactly how many boats are available on any one day (since we cannot see under the roofs), but also prevent us from assessing how many have failed to return from operations. However, it is tolerably certain that a not insignificant number of these thorns in the flanks of our invasion forces must have been damaged, if not sunk. It is notable that their operations were reduced as the month proceeded.

In this connection the achievement of Bomber Command should be mentioned. Maginot-mindedness and the meretricious attraction of concrete have been costly to the enemy. The considerable concentrations of E- and R-Boats and other minor war vessels at Le Havre and Boulogne presented exceptional targets. In two violent daylight attacks Bomber Command considerably reduced the number of vessels based on these ports.

Once again the shelter pens have prevented an accurate assessment of the results of these two attacks, but it is notable that at Le Havre, three of the torpedo boats which were previously present, disappeared completely, while the other two have been in dry dock at various times since. Some E-Boats were seen thrown up on the beaches, and direct hits on the pens, which in one case penetrated the roof, must have caused substantial damage to the boats within.

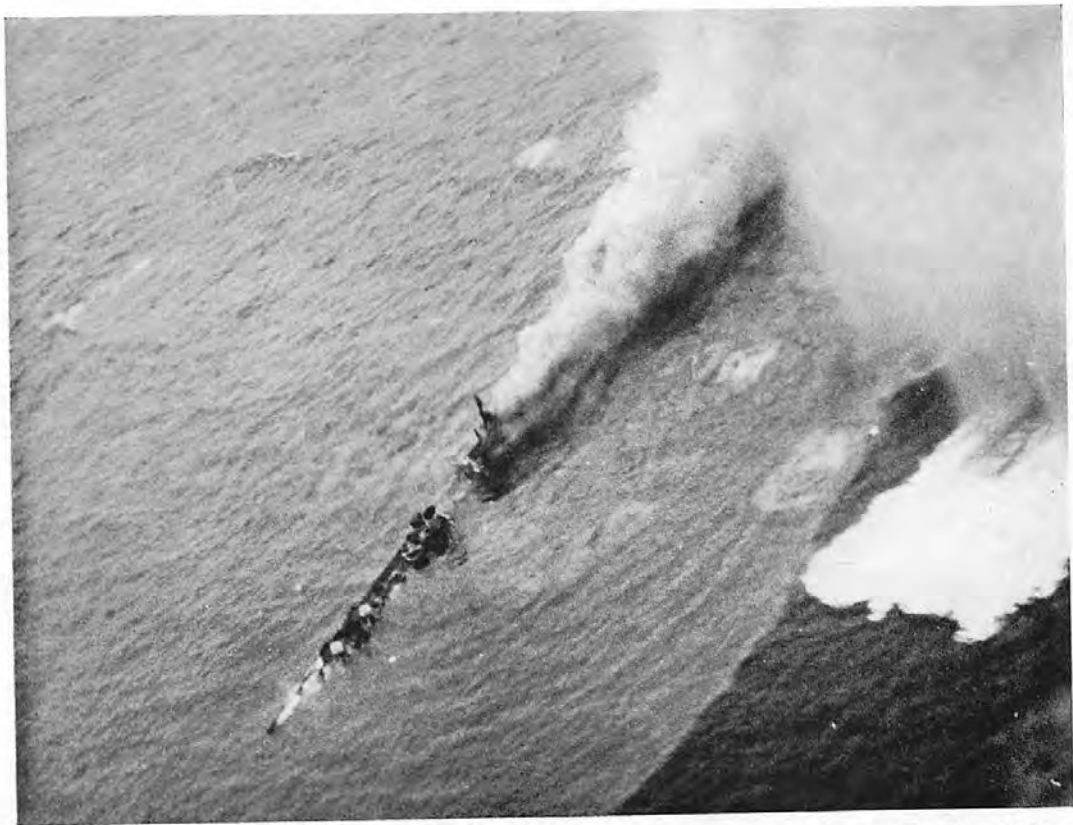
Apart from their slower speed and lack of torpedo tubes, it is not easy to distinguish R-Boats from E-Boats, particularly in the dark, and undoubtedly a fair proportion of the night attacks made by our aircraft in June have been on R-Boats. None the less, a successful attack on these craft is very well worth while since their frequent minelaying is a menace. They are also most useful for sweeping up the minefields laid by our forces near the enemy coast, as well as for escort duties.

The fall of Cherbourg at the end of the month cut the enemy's forces in two. He appears to have withdrawn some of his units—minesweepers, T.L.C. and a few E-Boats—to the Channel Islands and St. Malo. It is also possible that he may have succeeded in evacuating a few of his E-Boats through our lines into the eastern Channel ports.

As was expected the enemy has made no use of his major units, which have remained in the Baltic. Moreover, with the exception of one flotilla of E-Boats, he seems to have made no attempt to reinforce the Channel forces from the



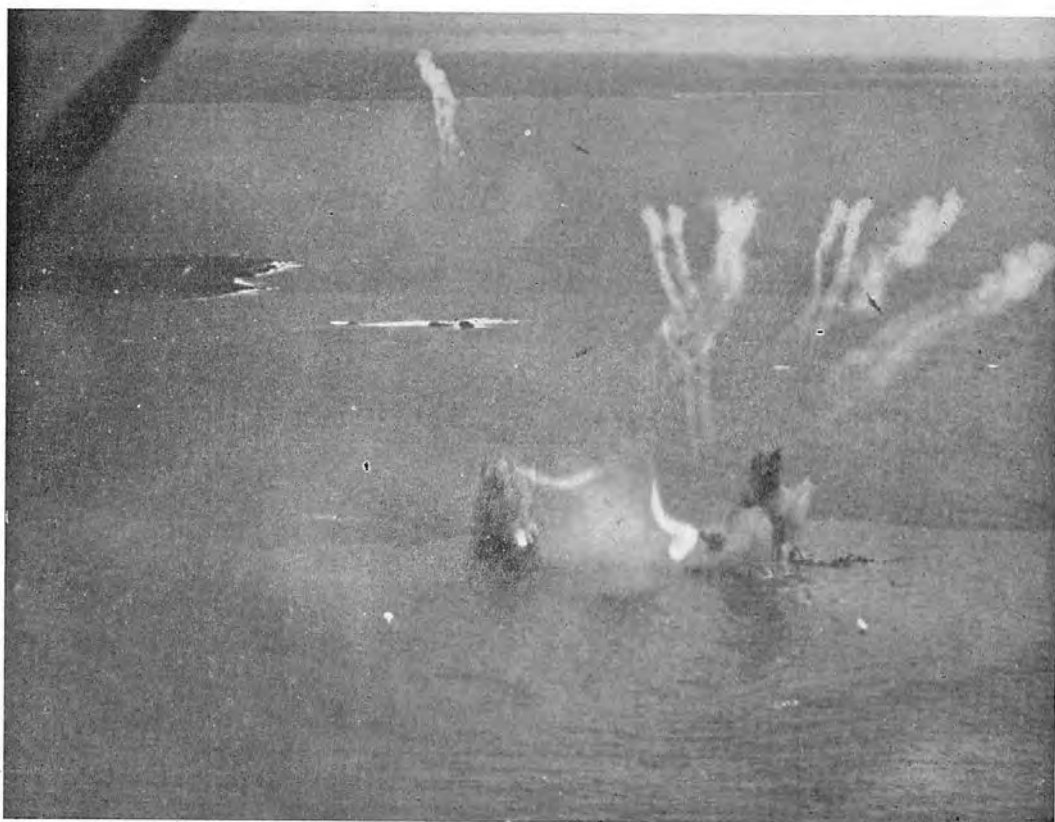
A force of two *Seetier* and one *Tjerk Hiddes* class destroyers was attacked by 144 and 404 Squadrons while in transit from the Gironde to Brest on June 6. The ships were damaged by R.P. but were able to proceed to Brest. This photograph was taken by an aircraft of 404 Squadron during the action.



The above photograph shows the end of one of the *Seetier* class destroyers which sailed from the Gironde on D-Day. This vessel was driven on to the Ile de Batz by an allied destroyer force and finished off by Beaufighters. The photograph was taken by a Boston of the R.A.F. Film Unit which accompanied the striking force. See also plate 8.



The destroyer force which was attacked by aircraft on June 6 reached Brest early the next morning. The ships left again in the evening of the 8th and rounded the Brest Peninsula. They were then sighted by aircraft from 19 Group and brought to battle by allied destroyers. One was sunk outright and another driven on to the rocks on the Ile de Batz. Next day the beached vessel was attacked by 144 and 404 Squadrons and so damaged that it will be quite impossible for the enemy to salvage her. These photographs were taken during the attack.



east, in spite of the fact that he had a number of *Narvik* and *Maas* destroyers, as well as some 20 torpedo boats, available in the Baltic. Perhaps his hands are too full with current events in the east, or experience may have shown him that the scope for operations in the Channel is too limited.

E-Boat operations in the Channel will probably continue until we possess Le Havre, or until our air and surface forces reduce their numbers to insignificance. If the achievements of June are repeated in July, such a feat would be by no means impossible.

Shipping Strikes in June

On the night of May 28/29 **Avenger K/848** sighted three "M" class minesweepers and one other vessel near Le Havre. The pilot attacked one of the minesweepers with bombs and scored a direct hit on the bridge. Another of the bombs burst just over the ship. Although no further results were seen, the minesweeper was undoubtedly damaged.

During the early hours of May 30 **Swordfish A/819** made a bombing attack on seven T.L.C. type escort vessels a few miles from Ostend. One bomb scored a direct hit amidships and another was a near miss.

About a quarter of an hour after A's attack **Swordfish P/819** bombed a force of ten or eleven E- or R-Boats near Gravelines. One of the boats was hit and left in flames.

On June 2 four **Mosquitos** of **248 Squadron** attacked an 800-ton minesweeper off the Ile de Groix. "R" and "P" went in first and raked the ship with machine gun and cannon fire. Immediately afterwards "L" and "H" attacked with their heavy guns and scored about eight hits with six-pounder shells. The minesweeper was last seen with clouds of white smoke rising from amidships.

During the late evening on June 6 the **Wick Wing** attacked three enemy destroyers near Belle Ile. The Wing comprised 14 **Beafighters** of 404 Squadron, armed with 25 lb. R.P., and 17 **Beafighters** of 144 Squadron with cannon only. Eight **Mosquitos** of **248 Squadron** provided fighter escort. The attack was made out of sun and the enemy was apparently taken by surprise. All the anti-flak aircraft attacked simultaneously and effectively damped the return fire. The R.P. **Beafighters** scored a great many hits and a large explosion was seen on one of the ships.

Later the same night three **Beafighters** of **404 Squadron** sighted the destroyers again, and one of them was still smoking. The **Beafighters** attacked by moonlight with 25 lb. R.P. and scored hits on all three vessels. Despite the damage inflicted during these two attacks the destroyers were able to continue on their way, but were subsequently dealt with by destroyers of the Royal Navy. One of the German vessels reached Brest, one was sunk, and the third so badly damaged that she had to be beached and abandoned.

On the evening of June 9, 12 bomb-carrying **Beafighters** of **144 Squadron** and 12 **Beafighters** of **404 Squadron**, armed with 60 lb. R.P., attacked a *Seetier* class destroyer which was aground off the Ile de Batz. The vessel had had to be beached as a result of treatment by the Royal

Navy and she was listing and down by the stern. The **Beafighters** finished the good work by making a great many holes in the hull with R.P. Bombs also dropped all round the ship and although no direct hits were seen there were several near misses. It is extremely unlikely that this vessel can be refloated and used again.

On June 10 four **Mosquitos** of **248 Squadron** sighted an armed motor launch close to Ushant. They at once attacked with machine guns and cannons, but one of them was hit by flak and crashed into the sea. Two Tse-Tse **Mosquitos** of the same squadron then joined in the fray and scored several hits with 6-pounder cannon. The crew of the launch were seen to abandon ship, and the vessel was left sinking. When some of the **Mosquitos** returned to the scene a little while later the boat had disappeared.

During the early hours of June 11, **Beafighter J/143** made a determined cannon attack on four E-Boats near Berck-sur-Mer. The aircraft scored many hits on all the vessels, two of which are estimated to be seriously damaged and one damaged.

On June 15 the **North Coates** and **Langham Wings** combined to inflict a crushing blow on an enemy convoy off Schiermonnikoog. **North Coates** provided ten torpedo and nine anti-flak **Beafighters**, five of the latter carrying 25 lb. R.P. as well as cannon. **Langham** contributed 23 anti-flak **Beafighters** armed with cannon only. The force was escorted by ten Mustangs from A.D.G.B. An 8,000-ton merchantman and a 4,000-ton naval auxiliary, subsequently identified as an E-Boat depot ship, were in the centre of the convoy, surrounded by ten "M" class minesweepers and an R-Boat; six other R-Boats were in the van. The striking force approached from the rear of the convoy, but turned out to sea and attacked on the port beam. The **Torbeaus** concentrated on the big ships and scored two torpedo hits on each, while the rest of the force dealt with the minesweepers and R-Boats so effectively that the **Torbeaus** had little opposition from flak. As a result of the attack the 8,000-ton ship, the 4,000-ton auxiliary and one "M" class minesweeper were sunk, and four other minesweepers were damaged. In contrast to this, all the attackers returned without injury to the crews and with only minor damage to their aircraft.

Without a doubt this well-led strike was one of the most successful anti-shipping operations of the war. The provision of an anti-flak force big enough to deal with the large number of escort vessels contributed greatly to the success of the action. Both **North Coates** and **Langham** are to be congratulated on a very fine effort.

III.—OTHER OPERATIONAL FLYING

Combats with Enemy Aircraft

On May 15 **Liberator S/547** was flying at 1,000 feet on anti U-Boat patrol in the Bay Area, when an aircraft was sighted about 8 miles astern. The aircraft, which was flying on the same course and keeping well out to one side, climbed to 5,000 feet and overtook the **Liberator**. About twenty minutes after the first sighting three Ju. 88's were seen on the starboard bow at sea level. One of them climbed above "S" and the other two made a simultaneous head-on attack. After this, all the enemy aircraft, including the one which had been shadowing and which was then identified as another Ju. 88, made single attacks from ahead or from the beam. There were about 12 attacks altogether and the **Liberator** took evasive action. The gunners gave a good account of themselves and damaged two of the 88's, both of which were last seen leaving trails of smoke behind them. After about 12 minutes the enemy gave up the attack and flew away. Aboard the **Liberator** there were no casualties and only very slight damage.

On June 6 **Mosquitos G** and **F/248** were part of a formation giving top cover to a striking force of **Beaufighters**. After the attack the two **Mosquitos** left the main formation to investigate some aircraft which, however, proved to be friendly. A little later "G" sighted a Ju. 188 shadowing a force of British destroyers near the Brest Peninsula. The pilot immediately closed to attack, but he was able to fire only a short burst before the Ju. gained cloud cover. Less than half a minute after this, the enemy aircraft broke cloud about 500 yards in front of "F." The pilot immediately attacked on the enemy's port quarter and closed to 150 yards. The enemy's starboard engine burst into flames, after which the Ju. 188 rolled on to its back and spun into the sea. There were no survivors.

On June 7 **Mosquitos Y, V** and **W/248** were on offensive patrol off the Brest Peninsula when an unidentified aircraft was sighted about 5 miles ahead of the formation, making for a big patch of broken cloud. "Y," the leader, ordered the other two **Mosquitos** to make for the far end of the patch while he himself entered the cloud in

pursuit of the aircraft. After a few minutes he sighted a F.W. 190 on his starboard bow and he fired three short bursts while following the enemy in and out of cloud. The first two missed astern but the third burst hit the F.W. and caused it to dive into the sea. After the attack pieces of wreckage were seen floating on the water.

On June 9 a third enemy aircraft was destroyed in air combat off the Brest Peninsula. **Beaufighter L/235** was on offensive patrol with three other **Beaufighters** when the pilot sighted an unidentified aircraft about four miles dead ahead. The aircraft, which proved to be a Ju. 88, was on a course at right angles to that of "L." The **Beaufighter** turned to intercept and climbed a little in order to attack from the quarter. The enemy pilot immediately turned into "L's" attack and when the two aircraft were almost facing each other "L" fired a short burst from 400 yards. The enemy's port engine and fuel tank burst into flames, and the Ju. went into the sea and exploded on impact. One of the crew baled out at 800 ft., but his parachute only partially opened. No survivors were seen. The **Beaufighter** pilot's shooting was excellent—he had used only 60 rounds of ammunition.

On June 13 **Mosquitos R** and **P/248** were flying in formation on A.A. patrol, when they sighted an aircraft about three miles away. They altered course to investigate and identified the aircraft as a Ju. 188 which promptly turned towards land and increased speed. "R," the leader, instructed "P" over the V.H.F. to chase the Ju. while he himself tried to head it off from land. The enemy pilot crossed the coast of Ushant with "P" about 1,000 yards astern, but seeing "R" approaching rapidly on his starboard side, he turned out to sea again. Meanwhile "P" had closed to about 500 yards and the pilot fired a short burst which missed astern. He fired again from 400 yards and finally got in a long burst from 200 yards. He saw hits all along the starboard wing of the Ju. 188 which got out of control, and crashed into the sea. Photographs taken by the observers of both **Mosquitos** show the enemy aircraft burning on the water.

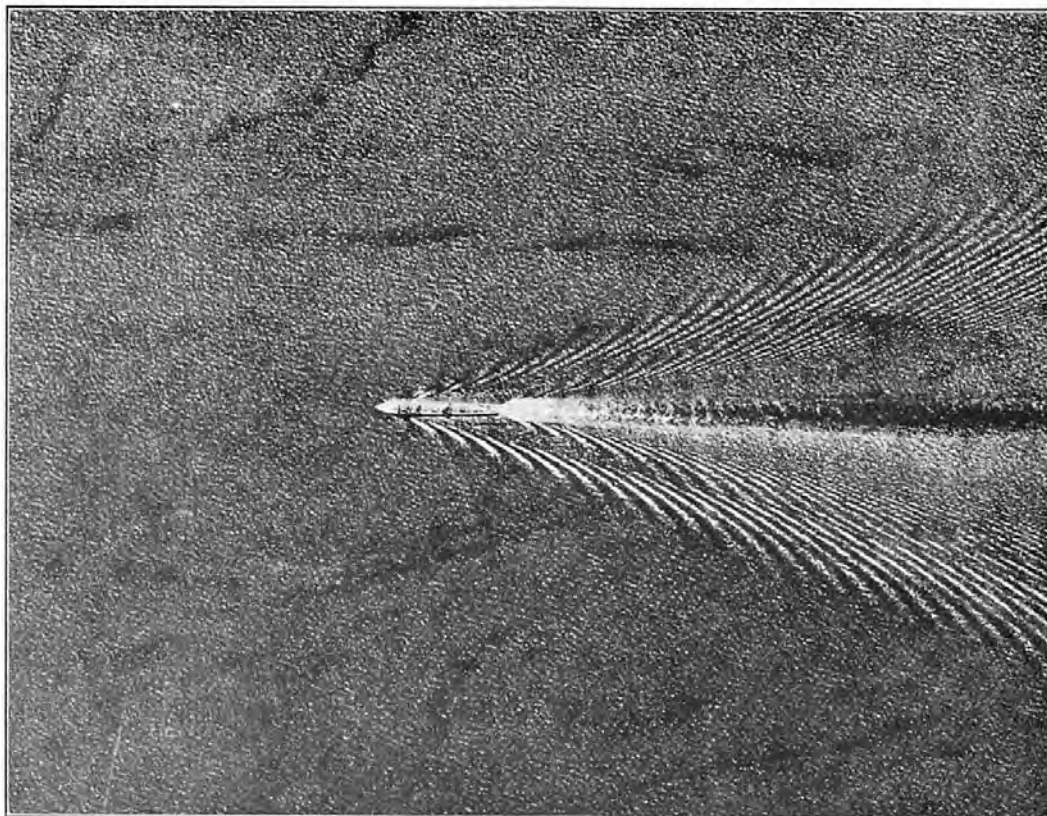
Photographic Reconnaissance

In addition to covering their normal routine targets, 106 Group aircraft were to a great extent engaged in damage assessment photography both during the pre-invasion softening up and, after D-day, in discovering the effect of the bombing of enemy communication lines. The problem of detecting the enemy's reserves and their probable routes towards Normandy also received attention from P.R. aircraft. The most spectacular photographs were possibly those of Boulogne and Le Havre after the heavy attacks by Bomber Command which destroyed a large part of the enemy light naval force in the Channel.

Pilotless aircraft sites in the Pas de Calais area received considerable attention both for damage assessment and for the detection of possible new sites.



A combined Wing strike was made on June 15 by 236, 254, 455 (R.A.A.F.), and 489 Squadrons against an eastbound convoy off Schiermonnikoog. The targets were the *Amerskerke* of 8,000 tons and a 4,000-ton vessel which had been modified as an E-Boat depot ship. The escort consisted of "M" class minesweepers and R-Boats. Both merchantmen were sunk by torpedo and a minesweeper also blew up and sank. At least four other escorts were damaged. The top photograph shows a heavy attack on a minesweeper, and the lower pictures show respectively the *Amerskerke* and the depot ship on fire. Both these ships were new and on their maiden voyages.



This photograph was taken by 540 Squadron in the Mecklenburger Bucht. It shows an *Elbing* class torpedo boat proceeding at a speed calculated from the wave pattern to be $12\frac{1}{2}$ knots. *Elbings* were for a long time described as destroyers, but the Germans class them as torpedo boats. As they displace 1,200 tons, mount four 4·1-inch guns and approximate to our *Hunt* class destroyers, they are a borderline case.



On June 30 twelve Beaufighters of 404 Squadron and 21 Mosquitos of 235 and 248 Squadrons attacked two "M" class minesweepers and two trawler-type auxiliaries off Concarneau. All four ships were damaged with R.P. and cannon fire and one of the trawlers was probably sunk. This photograph of the action was taken by an aircraft of 404 Squadron.

(The following account was written by the pilot of the aircraft concerned.)

541 Squadron (Spitfire)

On June 15 I was briefed for a target in the Ruhr. After I had got into my flying kit, I decided to wear a new pressure waistcoat which had been given to me to try out the day before. This waistcoat, which can be inflated and used as a Mae West in an emergency, is designed to assist the pilot to get sufficient oxygen into his lungs at great heights. Among other gadgets it has a small electric lamp attached to a skull cap that winks automatically for 72 hours. When I was strapped into the Spitfire I discovered that the new waistcoat had not been fitted with the quick release attachment for the dinghy lead. As time was short I tied the dinghy lead on to the leg strap of the pressure waistcoat and remarked to the airman who had helped me in, "Anyway, it is only a short sea crossing." These very nearly joined the list of famous last words.

I climbed to 30,000 feet quickly as there was a tail wind of 120 m.p.h. at that height, then levelled out and reduced to 2,100 r.p.m. Towards the top of the climb I looked over the gauges and everything was normal. I crossed out at North Foreland about 25 minutes after take off. A few minutes later I saw that I was not getting quite the speed I had expected and at about the same time I had a feeling, twice in quick succession, of a sudden lack of traction, rather like slipping a car momentarily into "neutral." I looked round the cockpit and saw that my oil pressure was reading 5 lbs. The oil and coolant temperatures were both reasonable so I thought perhaps it was just instrument failure. Nevertheless, I turned back for England and called Manston to say that I was returning with engine trouble.

When I next looked at the instruments the oil pressure was nil and the temperature was rising, though not alarmingly. I moved the pitch lever to the fully coarse position and began to descend. At about 23,000 feet the aircraft began to feel rather peculiar and on looking at the dashboard I found to my astonishment that the rev. counter was reading 4,000 r.p.m. I hastily switched off and continued the descent in a glide at about 180 IAS. I got another vector from Manston and could see the English coast but I began to doubt whether I should reach it as I was losing height very fast. At about 12,000 feet I told Manston I could see them and asked whether they could see me. There were chalk cliffs on the coast, which meant that an undershoot would be disastrous, and as there is no future in ditching a Spitfire, I called up Manston and said that I was going to bale out. My height was 5,500 feet.

I pushed back the hood, unplugged the radio and oxygen, took off my oxygen mask and undid the Sutton harness. I saw that I was then doing 140 IAS, so I pushed the nose down until there was 200 on the clock, then rolled the aircraft over with the nose well above the horizon. I let the nose come down, eased the stick forward and dropped out at about 4,500 feet.

I saw the stripes on the fuselage slide past me and then looked for the handle of the ripcord. The parachute opened immediately. I saw the aircraft dive straight into the sea and burst

into flames. This was reassuring as I thought that the column of smoke would be seen.

I went into the water drifting sideways, bobbed up again and got rid of the parachute. I then saw the dinghy pack floating beside me. It had burst open on impact and the dinghy was half out. I grabbed the bottle, pulled out the pin, shook the dinghy out of the pack and began to inflate it. When the dinghy was fully inflated I remembered that I had not blown up the Mae West part of the pressure waistcoat, so I inflated that too.

I climbed into the dinghy and lay on my face, puffing and blowing. I turned over to get into a sitting position and found myself back in the sea again. I got in a second time and turned over very cautiously. I then found that the dinghy pack cover had become detached from my harness and I could not find it anywhere. With it had gone the mast, sail, paddles, rations and, worst of all, the rockets and smoke candles.

As I was rather exhausted, I sat back for a time and could see a big convoy about 3 or 4 miles west of me sailing northwards. Beyond it, about another 5 miles away, were the cliffs of England. It was about 0640 hours and the morning was warm and sunny with a fresh south-westerly breeze. There was a slight chop on the sea and quite a lot of water in the dinghy. I baled for a bit, threw the drogue over the side and fastened the weather apron about half-way up. I saw a buoy about a mile to the north and tried paddling towards it with my hands but soon gave it up as futile and exhausting. About half an hour after getting into the dinghy I saw a Spitfire go right overhead and guessed that he was looking for me. Soon after I saw two Thunderbolts and later an Avenger which also went overhead. This went on all day and was exasperating. I very much regretted the loss of my signal rockets because I am sure that I would have been spotted in the first hour if I could have made any kind of signal. I tried to use my goggles as a heliograph but without success. I think the search was probably made harder by the sun glinting on the choppy sea, which must have made one little "K" type dinghy very inconspicuous. I noticed that the drogue was always out to the port side and was pulling the dinghy broadside to the sea, so I pulled it in and found that the dinghy automatically kept head to sea very well indeed.

By noon I had drifted north-eastwards out of sight of the buoy, and I could only just see the coast of England when I rode on the top of a wave. The sea was getting higher so I baled 100 times with the baler, reducing the water in the dinghy to about 1½ inches in depth, and then fastened the weather apron right up. I did not put the weather cape over my head as I still had my helmet on and wanted to look about me. About every four hours I gave the dinghy ten puffs of the bellows pump. It was not really necessary but it gave me something to do.

The Avenger kept up the search right through the middle of the day and I saw him go past me out to sea on one side and then return the other side several times. I was spotted by a number of birds, particularly by a very pretty little tern with red legs and beak who would have landed on

my head if I had not upset his approach by moving. There was also a puffin who was greatly intrigued, and swam around inspecting me from every angle. He eventually got to within about three feet of me where he bobbed about for quite a time first on one side and then the other. Two porpoises also rolled past but did not come closer than about 20 yards—to my relief. In the afternoon the sky clouded over and the swell got longer and higher but although the wind seemed to be freshening it was still quite warm. Some of the seas were breaking and I was periodically soaked, but rather to my surprise I did not suffer from cold. I was wearing ordinary blue battle dress, a woollen pullover, a big woollen sweater, long woollen stockings, flying boots, gauntlets, helmet and Mae West and this outfit kept me very comfortable except for a rather chilly section around the thighs, which were only covered by the battle dress trousers. The search seemed to lower and intensify in the evening and I saw two Spitfires at about 500 feet pass within a mile or two again and again. Sometimes they were even closer. It seemed to me that any aircraft in which a lookout could lie in the nose and search straight ahead, would be a better search aircraft than a single-engined type. About this time I thought of opening my flying rations, but I was not really hungry and I feared that eating might make me thirsty. I had no water and no prospect of getting water so I decided not to eat anything until the next morning. At about 1900 hours I saw a Walrus doing a careful search low down about 5 miles south of me. Then when he was about a mile away he headed straight for me and I thought he had seen me, but just about 400 yards short he turned to port and returned the way he had come. As he was very close and only about 300 feet up, I was very disappointed.

The Air Sea Rescue people put on a terrific search and kept it up all day. If I had not lost my signals they would have found me quite early, as they were always in roughly the right area.

By now the sea was pretty high and as I rode up on a big wave I saw part of the dinghy pack trailing under water about six feet beyond the foot of the dinghy. It was attached by a painter. I thought that possibly this was the part of the pack that contained all the gadgets, so I tried to reach it. I found this quite impossible without getting up and kneeling in the end of the dinghy and I was pretty certain I would go overboard if I did that. I therefore gave up, thinking that it was very unlikely that such an important item would be attached to the wrong end of the boat. I afterwards learned that this was in fact the container and I think that the position of the line should be changed as it is impossible to reach it while sitting in the dinghy.

Dusk was falling, so I put the lamp, which was provided with the pressure jacket, on my helmet and plugged in the terminal. Everything was soaking wet and I did not really expect it to work. I then put the weather cape over my head and shoulders, held the weather apron up to my face and tried to get some sleep.

About 30 minutes later I heard a terrific racket nearby, peeked out and saw an M.T.B. about 30 yards away. I was thrown a line and taken aboard. The dinghy had drifted away so I asked them to sink it by gunfire. In the meanwhile I was taken below, stripped, rubbed down, filled up with rum and put to bed.

The M.T.B. which had seen the light winking on my helmet, then carried on to the enemy coast to look for E-Boats.

Air/Sea Rescue

During the month of June, 385 aircrew and 247 others were saved from the sea by the Air/Sea Rescue service.

The following are accounts of the outstanding long range rescues of the month.

700 miles from Land's End

At 0733 hours on June 6 Halifax K/517 reported that it was returning to base with engine trouble in position 43° 33' N., 17° 07' W. This was followed by a series of dots and dashes and then the signal faded. Nothing more was heard from this aircraft and it was presumed overdue at 1230 hours on the same day. The position put the aircraft about 700 miles from Land's End and 400 miles west of Cape Finisterre. A track search was immediately made by Halifax H/517 but this aircraft returned to base with engine trouble. Meanwhile a signal had been sent to Gibraltar with the above information requesting them to make a search in that area. Catalinas from 202 Squadron at Gibraltar then joined the Halifaxes of 517 Squadron in long and extensive searches. At 1100 hours on the 7th, J/202 signalled that it was over a dinghy with survivors in position 43° 23' N., 17° 17' W. The aircraft was instructed to drop a maximum delay Mark III

marine marker. On receiving the Catalina's signal Headquarters 19 Group immediately asked the Royal Navy for assistance and a hospital ship and an American surface craft were diverted. In the meantime Halifax F/517 had sighted white smoke on the surface of the sea at 2129 hours on the 7th and made contact with the dinghy. The aircraft dropped six Bircham Barrels and two dinghy radios which were picked up by the survivors. At 2154 hours Catalina G/202 was sighted. Both this aircraft and F/517 circled the dinghy until 2330 hours when F/517 had to return to base. G/202 dropped a triangle of Mark II marine markers and a "J" type dinghy which was retrieved by the survivors. Whilst doing this "G" homed Catalina O/202 to the dinghy and at 0310 hours on the 8th this relief aircraft arrived. Both these aircraft continued to circle the dinghy with their navigation lights on. At 0315 hours on the 8th

G/202 had to set course for base. O/202 was not able to sight the dinghy at once but circled the flares and markers which had been dropped by G/202. At 0513 hours the dinghy was sighted, contact was maintained and instructions were received to send call signs and dashes on 500 kc/s., so that the American vessel could be homed to the position. At 0740 hours radar contact was made with an American destroyer. Homing was continued and the ship eventually found the dinghy at 0825 hours. At 0830 hours O/202 signalled "Operation completed, returning to base." Meantime, Catalina P/202 had arrived on the scene and it sighted both O/202 and the American destroyer.

This was a very fine and creditable rescue under difficult conditions. Catalina J/202 and Halifax F/517 did particularly well. Navigation, signals and the homing procedure were of a very high order and all concerned are to be heartily congratulated. The success in finding the dinghy in the first place was due to the Navigator of J/202

who took great care not only to obtain frequent fixes (mostly Consol) but also to adjust his plot accordingly. There was a momentary lapse when a Consol fix at 0645 hours was rejected as unreliable because it was 18 miles N.E. of the D.R. position. This was put right when, on the strength of another fix at 0953 hours, the plot was moved 22 miles N.E. This made the position of the sighting as reported so accurate that five other aircraft and a destroyer all had no difficulty in arriving at the right spot.

A word of warning might not be out of place. When it is a question of finding a small spot at extreme range, it is a fallacy to put endurance in the area before accurate navigation on the way out. This is what one Navigator did, for he remarks, "Three course winds were not flown in order to permit maximum time in patrol area . . ." It is not much good having twice as much time to search an area if the area to search is three or four times as great as it need have been.

Two Rescues in Northern Waters

At 1038 hours on June 13 Canso T/162 (R.C.A.F.) sent a sighting report of a U-Boat, with the position, followed by an S.O.S. In the combat the aircraft had been hit, the port engine put out of action and the aircraft badly holed. The captain could not maintain height and eventually hit a wave top. He then decided to ditch. The starboard engine was cut and the aircraft alighted on the water at 1025 hours with the crew uninjured. Two rafts were immediately inflated but unfortunately the port one burst. The crew then transferred to the starboard dinghy which had been loaded with the camera and other operational equipment. This, however, had to be jettisoned owing to lack of space. Two of the crew got into the dinghy whilst the remainder hung on. The aircraft remained floating for about 10-15 minutes after it had ditched. The two men in the dinghy were changed twice, after which it was impossible to get men into the dinghy owing to their weakness and to their water-logged clothing. On receiving the S.O.S. base instructed the aircraft to change to 385 kc/s but it continued signalling messages very slowly on the group frequency, indicating that the aircraft was on the water and sinking. Warwick U/281 which was in transit from Wick to Sumburgh was immediately diverted to the position. High Speed Launch 2723 was ordered to sail, while Liberator H/86, which was in the area, was ordered to search. At 1144 hours the Liberator reported that it was over a dinghy and requested instructions. It was told to send homing transmissions to U/281 on 385 kc/s. In view of the length of time it would take the High Speed Launch to reach the position U/281 was instructed to drop an airborne lifeboat when it located the dinghy. This was done at 1304 hours. In the meantime a second Warwick, V/281, was despatched. This aircraft homed on the Liberator and the other Warwick, and after getting in touch with them V/281 stayed with the Liberator and sent homing transmissions to the High Speed Launch. At 1517 hours Sunderland Y/330 joined the aircraft over the dinghy and remained circling until the Warwick had to leave at 1800 hours. The Liberator, which by then had left the

lifeboat, made contact with the High Speed Launch on the way home and spent some time directing it towards the lifeboat. Sunderland Y/330 continued to send homing transmissions to the High Speed Launch and at 2000 hours a report was received that the survivors had been taken aboard.

Of the eight aircrew of the Canso one was missing and five were landed at Lerwick, but despite all efforts by the crew of the launch to revive them, two of the ditched crew failed to survive their ordeal.

At 2125 hours on June 24 a signal was sent diverting Canso P/162 (R.C.A.F.) to Sumburgh, on account of weather. By 2200 hours the aircraft had not acknowledged the signal and it was called by W/T on all frequencies. At 2340 hours Liberator D/333 sent "Am over dinghy with two wounded aircrew in position 62° 55' N., 00° 01' W." As nothing had been heard of P/162 it was presumed this dinghy belonged to it. It later transpired that the aircraft had been forced to ditch after sinking a U-Boat. D/333 was instructed to remain over the dinghy and in the meantime Warwicks U and B/281 were airborne at 0045 and 0049 hours on the 25th respectively. A High Speed Launch was also ordered to sail. At 0045 hours D/333 sent "30-40 men dead and alive in large oil patch 3 miles from dinghy am investigating." These men were the survivors of the U-Boat which P/162 had sunk. A submarine chaser was sailed at 0746 hours and M/281 took off for the position. At 0801/25 a message was received from Liberator N/86 reporting that visibility was bad and that it was difficult to keep the dinghy in sight. At 1040 hours, D/333 and M/281 both lost contact with the dinghy for 17 minutes but at 1058 hours it was again sighted by M/281. This aircraft immediately dropped an airborne lifeboat. Unfortunately it drifted downwind of the survivors and because of the very large seas that were running at the time, and the fact that three men were in the water hanging on to the dinghy, the crew were unable to reach the lifeboat. Seeing this M/281 dropped a Lindholme dinghy but this

too could not be recovered owing to heavy seas. In the meantime the High Speed Launch was approaching the area and both N/86 and M/281 were ordered to begin homing procedure. At 1510 hours a message was received from N/86 "dinghy crew rescued 1510 hours."

At 1620 hours a High Speed Launch reported that she had picked up six survivors, one in bad shape. They were landed at Balta at 0200 hours the following morning and it was later reported that of the crew of eight, five had survived.

At 0534 hours on June 29 Beaufighter S/489 reported that it was over a dinghy with one occupant in position 52° 03' N., 04° 00' E. Warwick W/280 with an airborne lifeboat took off from Strubby with fighter escort. While searching the area it was hit by flak in the port engine. Meanwhile the fighters on their way back to base sighted a dinghy in position 52° 00' N., 03° 40' E. Two Hudsons of 279 Squadron took off and a High Speed Launch sailed. Fighter escort was again provided. At 1215 hours the Hudsons sighted the dinghy and at the same time they saw an enemy surface craft approaching from the Dutch coast. One of the aircraft went to find the High Speed Launch and the other circled and dropped the airborne lifeboat. However, before the man in the dinghy could reach the lifeboat the High Speed Launch arrived at the position and rescued him. The fighter escort destroyed the airborne lifeboat to prevent it

falling into the hands of the approaching enemy vessel.

During this time W/280, which was last seen with the port engine smoking, had ditched in position 52° 05' N., 02° 25' E. Spotter aircraft from Saffron Walden sighted the six survivors at 1350 hours and High Speed Launch 2557 was diverted to the position. The aircraft remained circled and at 1507 hours all the crew were rescued.

On the same morning Saffron Walden received a distress signal from an American Fortress. The aircraft on standing patrol were informed and at 1155 hours, Thunderbolts sighted eight survivors in position 52° 41' N., 04° 11' E. Warwicks Q and G/280 were diverted to the position and at 1343 hours they sighted the dinghy with two Thunderbolts overhead. A Lindholme dinghy was dropped successfully and a High Speed Launch was homed. At 1530 hours, High Speed Launch 2551 reached the position and rescued the crew. While returning to base she was shot up by a Ju. 88 and set on fire. The captain and three of the crew were killed, four of the crew and four of the rescued Americans seriously injured, and others suffered superficial wounds. Two Hudsons of 279 Squadron and High Speed Launches 184 and 158 went to the position and rescued the survivors. The Ju. 88 had been shadowing this H.S.L. for some time and owing to low cloud and bad visibility it was able to attack while the fighter escort had temporarily lost contact.

Homing by GEE

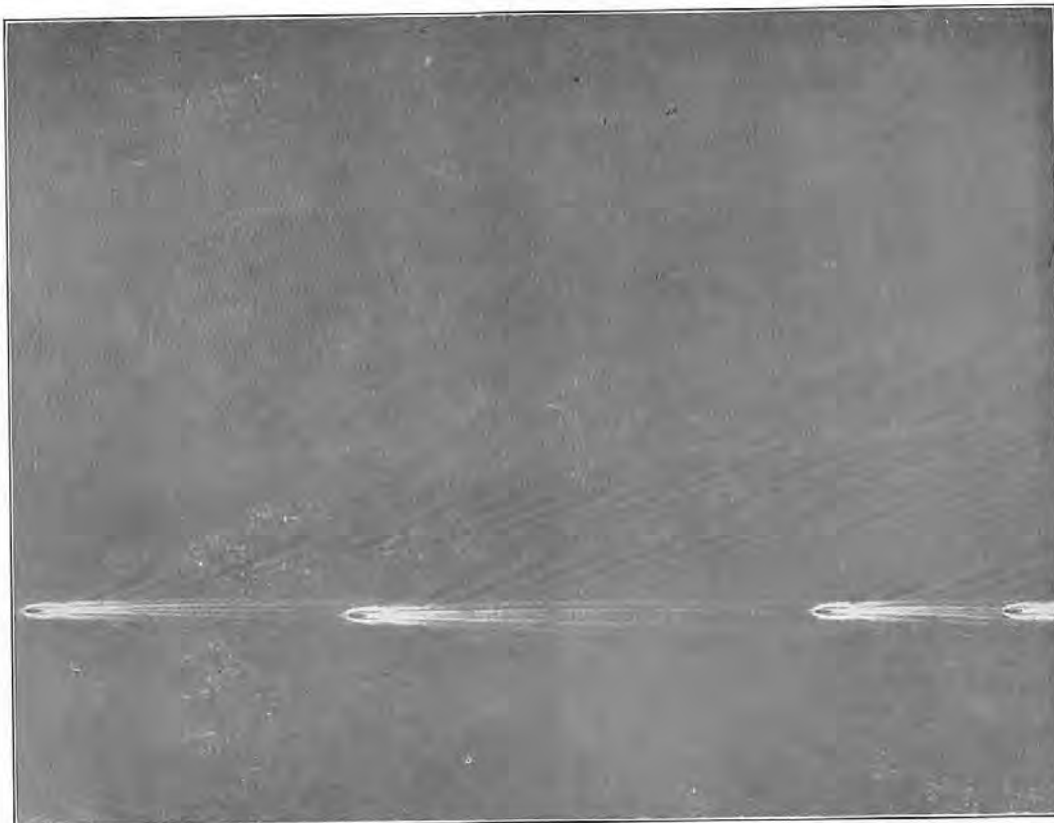
The reference to Gee as a landing aid, which appeared in the *Coastal Command Review*, Vol. III, No. 4 (April, 1944) has been interpreted as making a case for using Gee in preference to the QGH procedure. This was not the intention, for the case was quoted in order to show another useful feature of Gee which might, if the communication equipment failed, enable an aircraft to land safely in QGH conditions.

The paragraph is further criticized on the ground that it infers that a normal QGH approach takes four times as long as a Gee approach. This may be due to the statement that eleven minutes elapsed between the time it

was decided to use Gee and the time of touch-down. It was not stated, nor was it intended that anyone should infer, that a normal QGH descent takes four times eleven minutes.

QGH procedure has now become so efficient that the time between arrival over base and touching down is seldom more than ten minutes. In suitable conditions, however, Gee will always be quicker because a continuous fix is available in the aircraft and a landing may be made direct without the necessity of flying a loop.

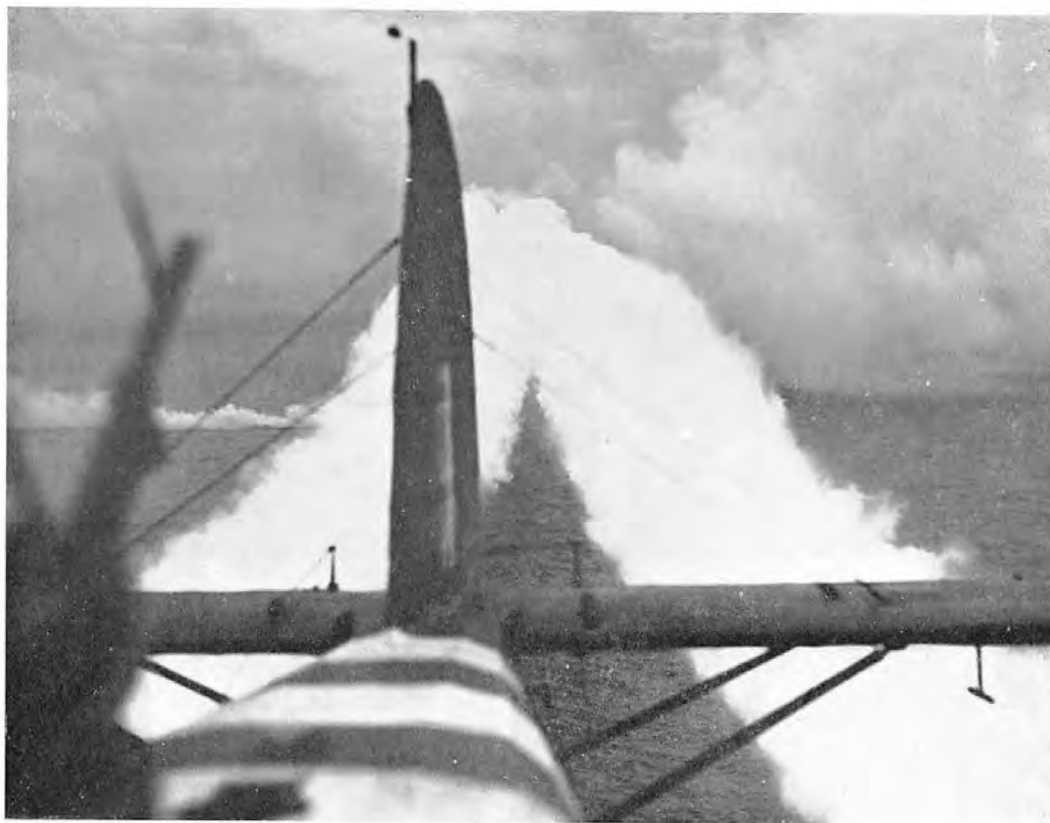
A landing should obviously not be made by Gee without the co-operation of flying control, except when communications are out of action.



There were many encounters with E-Boats during June, but as these vessels operate almost exclusively by night, no action photographs were taken. The picture above, which was taken by 541 Squadron, shows four out of a formation of eight E-Boats proceeding at 24 knots off Scharhorn, near Cuxhaven.



This photograph, which is also the work of 541 Squadron, shows Cuxhaven, the base for most of the escort vessels used by the enemy in the southern North Sea. Eight E-Boats can be seen at one of the quays in the centre of the picture. They were probably on their way from the Baltic to reinforce the flotillas operating in the Channel.



Among the duties of some of the Fleet Air Arm squadrons working with Coastal Command before and during the invasion operations, has been the laying of smoke screens to cloak the movements of our surface forces. The upper photograph was taken by a Swordfish of 819 Squadron engaged on this work, and the lower picture shows a surface vessel also making smoke.



IV.—SPECIALIST AND GENERAL ARTICLES

German Navigation

"We consider that British navigation is better on the whole than ours. After all, you have the long tradition of the sea behind you. You are a race of navigators."

This opinion of a captured observer from a German long range Sea Reconnaissance Unit is common in the Luftwaffe. The suggestion that our navigational superiority is due to our maritime traditions may be true, but it cannot account entirely for the surprising fact that the Germans, who are famed for their precision, are our inferiors in a subject where application to detail and thoroughness are so important.

In fact there are other explanations. At the beginning of the war the Germans considered that the skilled navigator was an anachronism. In all Bomber Groups, at that time, officers who were not already pilots were hastily sent on pilots' courses. Only a few senior men and those who failed the courses remained as captains of aircraft while still flying as observers. In Reconnaissance Units the new policy was not fully practised, but even these formations suffered from the general tendency to underrate the task of the navigator.

The basis of this new principle was the belief that radio aids were fast making navigation less important. In Bomber Groups the system might have worked, for the range of operations was short and when radio aids were interfered with or else became unreliable and complicated, the navigators might have been able to find their way even though their D.R. was far from perfect. But the error of this policy of playing down the part of the observer later became obvious even in the Bomber Groups. When, for instance, K.G. 66 was made into a specialised Pathfinder Force the navigation, in spite of special training, failed lamentably. It simply was not possible to form an elite body of observers because there were no foundations on which to build.

The case of the German long-range Reconnaissance and Strike Units (which roughly correspond to Coastal Command) has been different. They have always received the pick of the navigators from training schools and the observers are still generally officers and captains of aircraft. Nevertheless, broadly speaking, there has been very little development in technique apart from improvements in direction finding by W/T. There seems to be no navigation drill as developed by Coastal Command. Logs are analysed quite often, particularly in cases of doubtful positions, etc., but this is not done systematically, and there is no individual or squadron assessment. Nor do logs seem to be so well kept as in the R.A.F.

A recently captured, and undoubtedly competent, observer said that his method of finding the wind was to take a quick drift on one minute alterations of course, 30° to port and 30° to starboard without compensating for flying time.

He also confessed that he relied largely on winds estimated by means of the wind-lanes and the Beaufort scale. He was apparently quite satisfied if his results were accurate to three miles an hour and ten degrees. Furthermore, in his unit, F.A.G.5, there was no method of taking drifts at night. When some of Coastal Command methods were described to him, the same observer remarked that the British make a fetish of things which are not worth so much trouble. When shown A.P. 1234 he said that the Luftwaffe had no equivalent either in detail or presentation.

On the other hand German navigators have at their disposal certain instruments and fittings of great excellence, such as their Integrating Octant, which is claimed to be superior to ours; the Heyde 17 M, a drift and groundspeed recorder worked on the automatic bomb-sight principle; good repeater compasses, and, in the Ju. 290, a revolving astrodome with a clear vision panel.

But something is lacking which prevents them making the best of their technical ingenuity. Training in advanced navigational methods is almost non-existent. One of the reasons for this is that German observers are not automatically withdrawn after a certain number of operations to act as staff navigators or instructors. The training schools and the training group of each Geschwader have to be content with a minimum number of ex-operational teachers. There is no post-operational specialist training and no equivalent of our long and short "N" courses. Even if the necessity were to be admitted, observers could hardly be spared for such courses, for actual flying has an urgent priority. So much so that such a thing as an enthusiastic theorist is hardly to be found in the Luftwaffe. Even if the theory had been more thoroughly examined and developed, there could be no body of experienced staff navigators to arouse the necessary interest in their subject.

When the Germans did realise that the day of the observer was not passing, any intention they may have had of increasing practical training was made impossible by one of the far-reaching effects of the Stalingrad disaster. So many Ju. 52's, the standard training aircraft, were withdrawn for transport duties and subsequently lost, that flying hours in the schools suffered. Furthermore, there was always the necessity of economising in fuel. Finally, the schools are not so completely removed from the danger area as the majority of British establishments.

All these factors have brought about the paradox that in navigation, the Germans, for all their love of theory, precision and detail, have shown themselves inferior to us. Perhaps the lesson of this is that the practice of Air Navigation remains an art to be learnt only by hard work, rather than a mixture of science and tricks-of-the-trade which can be picked up as you go along.

Some Uses of U-Boat Attack Photographs

Coastal Command Headquarters has for a long time emphasised to all aircrews the vital importance of photographing attacks on U-Boats. As a result the standard of photography has grown steadily from 1942, when 12 per cent. of day attacks produced photographs capable of exact assessment, to 1944, when the corresponding figure is 25 per cent. In spite of this improvement the successful photographs are still the exception, but the following paragraphs will show that efforts to obtain them have been well worth while. There is no doubt that U-Boat attack photographs have made an important contribution to winning the U-Boat war.

The first and most obvious information obtainable concerns new technical developments by the enemy. To devise proper counter-measures it is often necessary to have exact measurements—this is particularly important in the Radar world. Such a photograph as that on plate 3 in this issue will be of great help to the experts in calculating the kind of cover to be expected from such an aerial system against aircraft at different heights. Several photographs by Coastal Command aircraft have given invaluable technical information of this kind—a few examples are the first photograph of a fixed anti-ship Radar aerial on a U-Boat (taken by 206 Squadron early in 1943), the first photograph of the new 37-mm. A/A gun (C.C.R., Vol. III, No. 1 (January 1944) Plate 2), and, during the last few weeks, the photographs of the Schnörkel, which are shown on plate 5 of this issue.

These technical photographs are often of great importance, but photographs of attacks themselves have probably been of even greater value.

Early in 1942 there was still considerable doubt as to what was the best weapon and stick spacing to use against U-Boats. Everyone was agreed that it depended on the average operational bombing error but no one really knew what this was. In the end the answer to this question and to several others was found by the measurement of large numbers of attack photographs.

In an earlier number of this *Review* (No. 12, April, 1943) the method of doing this was described but it may be worth repeating it here. The photographs obtained are obliques taken by a camera which is usually set at something like 10–15° below the horizontal. This does, of course, vary with the aircraft's attitude. Knowing this depression angle (it is usually easily obtained since most photographs show the horizon) and the focal length of the camera lens, it is possible to reconstruct from a complete photograph a plan diagram of the U-Boat and depth charges as they really were placed on the sea. If the focal length is not known this cannot be done precisely, so that it is most important to state the focal length, particularly if unconventional cameras are used. The geometry of the reconstruction is such that it is necessary to know where, in the complete photograph, the "interesting" part is, so that enlargements of portions of frames should not be submitted alone but only in conjunction with contact prints. This stage of the analysis can be done either by special grids (U.S.N. procedure), by optical projection with a special "magic

lantern" (a method often used by Coastal Command and the R.C.A.F.) or by brute force and geometry. The result is a scale diagram in which the scale is not known. The scale can be determined only if the height of the aircraft at the time of photographing is known exactly. Unfortunately the height is hardly ever known precisely, for the vital photograph is often taken several hundred feet away from the U-Boat when the aircraft has started to climb; the 50 feet usually given may be anything up to 150 feet in reality. A scheme to make the radio altimeter record the height on the plate proved impracticable. Therefore, the scale has to be obtained from a series of constants of which the U-Boat herself, if visible, is an accurate one. If the U-Boat is not visible the scale must be calculated as accurately as possible from other yardsticks such as stick spacing, diameter of entry splash, height of explosion plume, diameter of the explosion dome, etc., all of which have been measured in the past by special trials (most of them by C.C.D.U.) and have since been checked against photographs in which the U-Boat herself is visible.

At the end of this analysis a final diagram is prepared giving the positions of the explosions relative to the U-Boat and the height of the aircraft at the time of the photograph, and when a sufficient number of these diagrams are available the average operational bombing error can be worked out.

With the use of these methods several interesting results have been obtained. The first is the vindication of the Mark XI depth charge. Sixteen photographs had been taken up to a few months ago showing an undoubted straddle with 60–80 feet spacings. Of these, fourteen have been assessed after comparison with other information, as known or probably sunk, and two as seriously damaged. Further, from the average errors found from photographs, from the known length of the stick and from the estimated lethality of the weapon, the percentage of kills was calculated. When this calculated figure was compared with actual kills, the results agreed very well. Photographs have therefore shown beyond any reasonable doubt that the Mark XI depth charge will almost always kill if the U-Boat is really straddled—in the very few cases where the U-Boat has not been sunk, very serious damage at least has resulted.

Perhaps the biggest value that we have yet obtained from these attack photographs is from the study of errors. Errors can be divided into systematic errors (such as a tendency to overshoot) and random errors. The distinction can be seen from a plot of a large number of attacks, for a systematic error will be disclosed by the fact that the mean point of impact is not centred on the target. Random errors can be improved only by raising the general standard of bombing—either by using bomb sights or by more practice; systematic errors can often be cured by a change of tactics.

Two main types of systematic errors have been disclosed by photographic analysis and the analysis of forms U-Bat. The first was a marked



Above. This object was sighted in the Atlantic by a transit aircraft and reported as a U-Boat. It was subsequently identified as a whale and photographed by Fortress Y/220.



The oil streak above was left by the dead whale seen in the lower photograph. Live whales do not normally leave slicks behind them, but dead ones, particularly if they have been depth charged, appear to exude a certain amount of oil from the blubber. The photographs were taken by Liberator T/59 in position 63° 28' N., 02° 30' E. on June 2.





It is encouraging to be able to record that the arts of peace continue to flourish even in close proximity to those of war. The smoke rising from the Ile de Bannec is not the result of a bombing attack but comes from piles of seaweed which is burnt in order to extract iodine. The photograph was taken by a Liberator of 547 Squadron while on anti U-Boat patrol.



The slipway at Port Lyautey photographed by 202 Squadron.

tendency to place the bomb ahead of the U-Boat's track—a diagram showing this is given in *Coastal Command Review*, No. 8 (December, 1942), page 19. Presumably this was due to over-correction for the U-Boat's movement during the time of fall of the depth charges, and so instructions were issued to pilots to go straight for the conning tower. Whether as a result of this or not, that particular systematic error has since disappeared. This may seem a small matter, but it probably nearly doubled our chance of a kill. The second major systematic error, which still persists, is a marked tendency to miss by overshooting rather than undershooting.

The random errors may be divided into errors of line and errors of range. The distinction is of importance because the bombsight used by most of our aircraft—the Mark III Low Level Sight—will correct only for errors in range. A sight correcting for line error as well would be much more difficult to make, but fortunately the line errors in day operations are not so big as to make this essential (photographic evidence again). We may add one example of the importance of this distinction. A U-Boat is a very long thin target and the depth charge has a lethal radius of only about 20 feet. It can be calculated that if line errors are more than about one-third of range errors, it would pay to make beam attacks. It seemed probable that this would be so and hence the Command doctrine two or three years ago was that attacks should, if tactically possible, not be

made within 30° of the U-Boat's track. But an analysis of the actual Admiralty assessments showed the surprising fact that track attacks really gave better results. Later, when sufficient photographs had accumulated, it became clear that line error was itself dependent on the angle of attack and that line error was much smaller in track attacks than in beam attacks. This easily made up for the disadvantage inherent in the U-Boat's long thin shape, and track attacks have therefore become the official doctrine.

Attack photographs are therefore far from being used solely as a sinister method of disallowing optimistic claims. In fact it is obvious that hours of work measuring photographs will give more accurate information than the best verbal description of what happened in a split second of great excitement. Further questions which are being dealt with by analysis of photographs concern the operational errors of the Mark III sight (not quite enough pictures are yet available) and the chief causes of error on each type of aircraft.

The next problem before us is to obtain night photographs. Methods developed experimentally have as yet given only few operational results, but it is clear that the results will be of great importance since the efficiency of killing even surfaced U-Boats by night is only about half what it is by day. As far as can be seen at present—from Forms U-Bat—the chief problem is line error caused by the difficulty of assessing relative drift.

The Last Patrol of U 761

(The following account is based on the stories of prisoners of war.)

U 761 was sunk on February 24, 1944, while trying to enter the Mediterranean through the Strait of Gibraltar. She was on her second patrol, the first having been uneventful. The action was fought by two **Catalinas** of 63 Squadron, U.S.N. and H.M. ships **Anthony** and **Wishart**. These were later joined by a **Ventura**, of 127 Squadron, U.S.N. and a **Catalina** of 202 Squadron. Forty-four men, including the Commanding Officer, Oberleutnant z. S. Horst Geider, were rescued and brought to Gibraltar.

U 761 left Brest at 1700 hours on February 12, with an escort of three minesweepers. Two other U-Boats shared the same escort, but parted company when the escort returned to base. Several days out, Geider told his crew that they were ordered to operate in the Mediterranean. He admitted that the passage through the Strait of Gibraltar was difficult but said that other U-Boats had successfully run the blockade and that they had a good chance of reaching Toulon.

As far as could be determined, U 761 steered a straight course from Brest to Cape Finisterre. She encountered no aircraft in the Bay of Biscay although the U-Boat dived several times when Radar was intercepted on her G.S.R. sets. From Cape Finisterre she followed the contour of the coast, diving at the first sign of dawn and remaining submerged until quite late at night. When submerged her speed was stated to have been "slow"; on the surface she proceeded at $\frac{3}{4}$ to $\frac{5}{8}$ speed. Geider firmly believed in the efficiency of the G.S.R. sets with which his boat

was fitted and he remained on the surface longer and longer each time Radar was intercepted. He was planning to write an extensive report on his G.S.R. experiences when he arrived at Toulon.

About one week after leaving Brest, U 761 was suddenly illuminated at night by a searchlight aircraft. (This was Wellington B/172.) Radar had been intercepted at such strength that the operator yelled, "the aircraft must be right over us." He was quite right in this and orders were given to open fire with all flak guns. The 37 mm. gun jammed after about three rounds owing to a shell not fitting properly in the feed, but instead of clearing the stoppage the gun crew took cover from the strafing of the aircraft until a man from below had dealt with the jamming. By that time the aircraft had dropped its bombs, but they hit the water some distance away and U 761 submerged without having been damaged.

U 761 passed Cape St. Vincent on the surface some time during the night of February 22/23, and reached the approaches to the Strait of Gibraltar twelve days after leaving Brest. At about 0500 on February 24, U 761 took a bearing on the light of Cape Trafalgar and then submerged in position 36° 10' N., 06° 11' W. Her approximate course of 150° led her through the Banco de Trafalgar where she took several sound bearings. In position 35° 57' N., 06° 01' W., she changed course to about 110° until she reached position 35° 54' N., 05° 50' W. There the U-Boat again altered to port and steadied on an approximate

course of 075° which was to lead her through the Strait. Geider, unsure of his position, raised his periscope two or three times during the approach and he was blamed by many survivors for having given away the U-Boat's position to patrolling aircraft.

U 761's underwater speed was "Dead Slow" and her mean depth was estimated at about 50 metres, though layers of different density made it difficult for her to remain at a predetermined depth. Then suddenly four explosions were heard. Prisoners said that they assumed that these explosions were caused by aircraft bombs or by depth charges from surface craft. No appreciable damage was done but the crew then realized that their boat had been discovered. Some prisoners spoke of two, some of three depth charge attacks following the aircraft bomb explosions. In the confusion no count of the charges was made but the consensus of opinion seemed to be that the last series of depth charges was the most damaging.

After the first depth charge attack, several of the prisoners stated that *U 761* must have broken surface. Shortly beforehand the U-Boat, for unexplained reasons, was heavy by the bow. The order was given to trim by blowing but apparently the U-Boat was closer to the surface than indicated and she surfaced. The mistake was promptly realized and she dived again.

According to prisoners either one or two more series of depth charges were dropped and these, added to the minor damage of the first attacks, made it necessary to abandon the U-Boat. All the electrical installations, including the batteries and the motors were damaged and out of action; the main switchboard was broken to pieces and

thrown on the floor plates; the hydrophones and all the radio apparatus were smashed, the former by one of the early attacks; the compressors were wrenched loose from their straps and water entered the boat through a loose valve in the main drain pump; the clutch between the diesels and the motors was jammed and the high pressure air lines were ruptured. Quite apart from this damage, which alone was sufficient to make evasive action impossible, the air inside the boat had become quite foul, all lighting, except the emergency lights, was out and one prisoner said that there was even a slight smell of chlorine in the boat. Clearly the situation was hopeless and after a quick consultation between Geider and Leudle, his engineer officer, the order was given to surface and to prepare to abandon ship.

About fifteen minutes after the first attack, *U 761* broke surface and her company began abandoning ship, without firing any of deck guns. The engineer officer attached a scuttling charge to a torpedo in the stern compartment and he and the Commanding Officer were the last to leave the U-Boat. The engineer officer was apparently confused and he swam towards the submerged stern of the U-Boat although his commander shouted warnings. When the torpedo exploded, Leudle was injured by the underwater blast and died in the arms of Geider who had come to his assistance.

While the ship's company was abandoning ship, destroyers nearby opened fire and several aircraft dropped more depth charges which killed some men and injured others. *U 761* sank about five minutes after the ship's company had begun to abandon her.

The O.T.U.s go to War

When an emergency arises and the operational squadrons have their hands full elsewhere, there is provision in the training organisation for O.T.U. crews to fly anti U-Boat patrols. On such occasions the O.T.U. routine remains unaltered and training continues in the normal manner, except that aircraft are fully armed and fly their patrols in operational areas which are not normally used on exercises.

During a recent attempt by the Germans to get their U-Boats into the Atlantic *via* the coast of Norway, No. 4 (C) O.T.U. (Sunderlands) was called upon at short notice to take part in the offensive against them. The results were most commendable. At the time of writing, the O.T.U. has flown eight anti U-Boat patrols of which seven were completed, one aircraft having to return with engine trouble. During these patrols three U-Boats were sighted of which one was sunk and one probably sunk. The third attack was made towards the end of the sortie and when the U-Boat had been submerged for 30 seconds. No results were seen. Any operational squadron would be proud of such results and for an O.T.U. they are highly creditable.

The reason for this considerable success by O.T.U. crews is obviously training and recent

practice. The crews taking part were not picked men but simply average crews who were nearing the end of their course. Each aircraft carried an instructor to act as an official observer and to take over in case of emergency. The crews who delivered the two successful attacks had each made between 80 and 100 practice attacks during the previous four to six weeks. If there are any who still doubt the value of constant practice, these figures should convince them. If every crew could make eighty practice attacks before each operational one, hardly a U-Boat would escape. Obviously so much practice is impossible on squadrons, but the moral is clear.

The pupils at No. 4 O.T.U. at least are converted. They realise that their long, rigorous and often boring sequence of training does have its culmination in successful action against the enemy. They are fortunate in being shown, at an early stage, what they are training for, and they are more than ever determined to learn every detail of their job.

The instructors too, who have a hard and tedious job with little apparent result, have recaptured some of the exhilaration of their operational days, and their tuition has become more enthusiastic.

Moreover, the ground staff in all sections feel at last that they are producing aircraft, bombs, guns, cameras, wireless and all the ancillary equipment to fight the enemy and not merely in order that somebody may receive a few hours' circuits and bumps. They too are enthusiastic, and with the incentive of operations they are keen to work long hours to turn out aircraft and equipment and even meals.

In short, in every phase of the O.T.U. life the spirit and the incentive to work has improved enormously. Every instructor, every pupil and every man on the station is working as hard as he can with the result that the crews are being sent to squadrons fully trained and ready to take their places in the line.

The successes of this O.T.U. should dispose of any idea that new crews are not fully operational when they join their units. It is now proved that except in some of our more technical and nocturnal activities, properly trained O.T.U. crews are first-class U-Boat killers.

No. 4 O.T.U. has been fortunate, but all other O.T.U.s should take heart. Learning and instructing may often be boring, but every bit of time spent in training will be valuable when the enemy is sighted. The pilot with his log book full of "Practice Bombing" will make his approach confident that he can hardly miss. The work of No. 4 O.T.U. has shown that the number of Germans who will die for their Führer varies with the number of training hours in a pupil's log book.

H.F. D/F

In the *Coastal Command Review*, Vol. III, No. 4 (April, 1944), an article appeared which outlined some of the difficulties of H.F. wireless communication. But the story does not end there. In discovering the waywardness of wireless waves we have also discovered how they can be made to help us, particularly in navigation. The following paragraphs will explain very simply the principles of Direction Finding which are perhaps too often considered to be the province of the wireless operator alone. The fundamentals of Direction Finding are the same on M.F., H.F. and V.H.F., so that despite their minor differences they may be treated together.

The main fact is that if an aerial loop is placed in the path of a wireless wave the strength of the signal picked up by the loop is proportional to the angle between the loop and the direction of propagation of the wave.

We all know the effect of a simple force of a body. If we tie a piece of string to a wooden block and pull it, the block will move in the direction of the pull and will have no tendency to move at right angles to that direction.

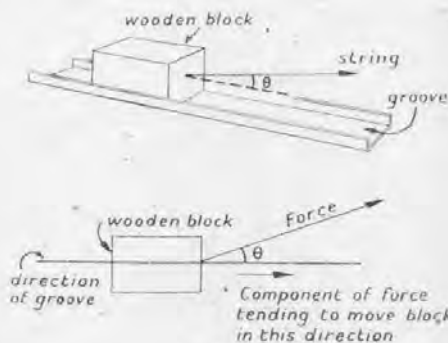


FIG. I.

If we make the block move in a groove or guide (Fig. 1) so that it can move in no other direction, we can then apply a force at an angle to the groove,

and the wooden block will move. In other words, there is a component of the force along the direction of the groove, and this force is proportional to the cosine of the angle θ , between the two directions in question. This cosine θ will be 1 when it is zero and zero when θ is 90° —which is what we would expect.

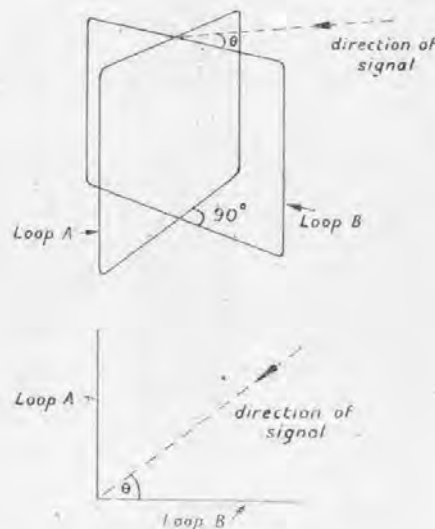


FIG. II.

Now let us apply this to a wireless wave in relation to two aerial loops at right angles (Fig. II). We can consider the problem as being analogous to the wooden block and the string. There will be a signal in one aerial proportional to $\cos \theta$ and one in the other aerial proportional to $\cosine (90^\circ - \theta)$, i.e., $\sin \theta$. The problem is then reduced to a comparison of these two signals, and this is done by using a radiogoniometer.

This instrument has two coils fixed at right angles, each connected to one of the aerial loops. It is unnecessary to analyse the mathematics of this instrument, but it must be taken for granted

that the resultant field caused by these two coils bears the same angle θ to the "B" coil, as did the signal itself to the "B" loop. The exact value of this angle is measured by means of a rotating coil, and so the direction of the incoming signal is determined. Quite naturally there is still an ambiguity of 180° , but the sense can be easily determined by using a vertical aerial in conjunction with the loop aerials.

Those who have any experience of D/F will know that the whole thing is not quite as simple as this, for there are many errors which can creep in unless the whole apparatus is perfectly maintained and calibrated. Moreover, this system only caters for ground ray reception. Any H.F. D/F at long range depends on the sky ray and must use a different system. We hope to describe this in a future issue.

H.F. D/F

and the wooden block will move. In other words there is a component of the force along the direction of the groove, and this force is proportional to the cosine of the angle θ between the two directions in question. This cosine θ will be 1 when it is zero and zero when θ is 90° , which is what we would expect.



Now let us apply this to a wireless wave in relation to two aerial loops at right angles (Fig. 11). We can transfer the problem as being analogous to the wooden block and the string. There will be a signal in one aerial perpendicular to one θ and one in the other aerial perpendicular to cosine θ (Fig. 11). The resultant signal then reduced to a comparison of these two signals, and this is done by using a radioindicator.

The instrument has two coils fixed at right angles, each connected to one of the aerial loops. It is unnecessary to analyse the mathematics of the instrument, but it must be taken for granted

in the *Commander's Handbook*, Vol. 11, No. 4 (April 1944), an article appeared which outlined some of the principles of H.F. wireless communication. But the story does not end there. In discussing the properties of wireless waves, we have also discovered how they can be made to behave in a very interesting way. The following paragraphs will explain very briefly the principles of Direction Finding which are perhaps too often mentioned to be the province of the wireless operator alone. The instruments of Direction Finding are the same as M.F., H.F. and V.H.F., so that despite their name differences they may be treated together.

The main fact is that if an aerial loop is placed in the path of a wireless wave the strength of the signal picked up by the loop is proportional to the angle between the loop and the direction of propagation of the wave.

We all know the effect of a simple force on a body. If we try to push or pull on a wooden block and pull it, the block will move in the direction of the pull and will have no tendency to move at right angles to that direction.



It is not the point of a groove or a loop, (Fig. 1) so that it can move in no other direction. We can then apply a force at an angle to the groove